DATA SET CATALOG # 28

Lunar Orbiter 1-5 Selenodesy

66-073Z-02A 5 tapes
66-073Z-02B 7 tapes

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1. INTRODUCTION:

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

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

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

2. ERRATA/CHANGE LOG:

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

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

Version	Date	Person	Page	Description of Change
01				
02				

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

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

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

4. CATALOG MATERIALS:

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

b. Core Catalog Materials

Lunar Orbiter 1 - 5

Merged TDP Tapes

66-073A-02C

66-100A-02C

67-008A-02C

67-041A-02C

67-075A-02C

These five data sets were restored. The input tapes were 556 BPI, multi-filed, BCD tapes. These original tapes in the -02C data sets were created at NSSDC by copying the tapes in their companion -02A data set onto a multi-filed output tape. The restored tape is 9-track, 6250 BPI, multi-filed ASCII tape. The DS tape is a 3480 cartridge. The tape numbers, files and time spans are listed below.

Tape Number	Data Set ID	Lunar Orbiter	Input Tape Number	File Number	Time Span
DR002075	66-073A-02C	1	DD-000619	1-5	08/10/66 - 10/28/66
	66-100A-02C	2	DD-000621	6-12	11/06/66 - 10/11/67
	67-008A-02C	3	DD-000623	13-18	02/05/67 - 10/09/67
	67-041A-02C	4	DD-000625	19-23	05/04/67 - 07/11/67
	67-075A-02C	5	DD-000627	24-30	08/01/67 - 02/28/68

Lunar Orbiter 1 - 5

Merged ODG Tapes

66-073A-02D

66-100A-02D

67-008A-02D

67-041A-02D

67-075A-02D

These five data sets were restored. The input tapes were 556 BPI, multi-filed, BCD tapes. These original tapes in the -02D data sets were created at NSSDC by copying the tapes in their companion -02B data set onto a multi-filed output tape. The restored tape is 9-track, 6250 BPI, multi-filed ASCII tape. The DS tape is a 3480 cartridge. The tape numbers, files and time spans are listed below.

Tape Number	Data Set ID	Lunar Orbiter	Input Tape Number	File Number	Time Span
DR001725	66-073A-02D	1	DD-000620	1-7	08/10/66 - 10/28/66
	66-100A-02D	2	DD-000622	8-17	11/06/66 - 10/11/67
	67-008A-02D	3	DD-000624	18-28	02/05/67 - 10/09/67
	67-041A-02D	4	DD-000626	29-36	05/04/67 - 07/11/67
	67-075A-02D	5	DD-000628	37-45	08/01/67 - 01/31/68

Lunar Orbiter 1-5, Selenodesy

As defined on page 2 of Formats of Edited DSN Tracking Data, word -1 of the Master File logical record indicates the number of words remaining in the logical record. The decrement of word -1 = 14_8. While processing tape B1-51021* (DOO-447) inconsistencies were found in physical records 407, 411, 413 and 414. The fourth logical record in physical record No. 407 contains 26_8 words and not 14_8 as specified in word -1. The first logical record in physical record No. 411 contains 7 words and the last logical record contains 27_8 words. In physical record No. 413 the first logical record has 22_8 words and the first logical record in physical record No. 414 has 21_8 words. Enclosed is an IBM 7094 octal dump of these records.

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* B1-51021 is the same as file 2 of Mission 5 Master File

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Lunar Orbiter 1 thru 5, Selenodesy

Lunar Orbiter 1-5, Selenodesy -

Data Set Description

Data Set A - These tapes describe the raster
Data Processor (TDP) which essentially
applying any modifications.

Data Set B - These tapes describe the Orbit Data
certain minor modifications and
applied to or associated with the raw data.
of the doppler bias, corrections to the
the proper transmitter frequency
when and what station is transmitting,
blocks, and shifting of station time tags

- Same info as Data Set A merged on to fewer tapes.

- Same info as Data Set B merged on to fewer tapes.

5.1 Master File and ODP File Tape Time Spans

5.1.1. Mission I

NSSDC No.	LRC No.	Mission Phase	Type of File	From	To
D-00 386	B1-10411	Cislunar	Master File	195857/222/66	162002/226/66
D-00 387	B2-10411	Cislunar	ODP File	201527/222/66	162002/226/66
D-00 388	B1-10421	First Ellipse	Master File	154408/226/66	102502/233/66
D-00 389	B2-10421	First Ellipse	ODP File	154415/226/66	102502/233/66
D-00 390	B1-10431	Second Ellipse	Master File	095010/233/66	100632/238/66
D-00 391	B2-10431	Second Ellipse	ODP File	095015/233/66	100632/238/66
D-00 392	B1-10441	Third Ellipse	Master File	160204/237/66	010002/260/66
D-00 393	B2-10441A	Third Ellipse (Part A)	ODP File	160209/237/66	191132/242/66
D-00 394	B2-10441C	Third Ellipse (Part C)	ODP File	031417/257/66	010002/260/66
D-00 395	B2-10441B	Third Ellipse (Part B)	ODP File	200947/242/66	003702/257/66
D-00 396	B1-10451	Extended	Master File	122402/260/66	122302/301/66
D-00 397	B2-10451	Extended	ODP File	122417/260/66	122302/301/66

5.1.2 Mission II

NSSDC No.	LRC No.	Mission Phase	Type of File	From	To
D-00 398	B1-20511	Cislunar	Master File	234900/310/66	211002/314/66
D-00 399	B2-20511	Cislunar	ODP File	234900/310/66	210802/314/66
D-00 400	B1-20521	First Ellipse	Master File	202440/314/66	010502/320/66
D-00 401	B2-20521	First Ellipse	ODP File	202445/314/66	010502/320/66
D-00 402	B1-20531	Second Ellipse (Part 1)	Master File	223302/319/66	132312/333/66
D-00 403	B2-20531A	Second Ellipse (Part 1-A)	ODP File	223332/319/66	214002/326/66
D-00 404	B2-20531B	Second Ellipse (Part 1-B)	ODP File	051732/326/66	132312/333/66
D-00 405	B1-20532	Second Ellipse (Part 2)	Master File	153702/333/66	200602/342/66
D-00 406	B2-20532A	Second Ellipse (Part 2-A)	ODP File	153732/333/66	095502/338/66
D-00 407	B2-20532B	Second Ellipse (Part 2-B)	ODP File	133912/337/66	200602/342/66
D-00 408	B1-20541	Extended (Part 1)	Master File	200002/342/66	081602/017/67
D-00 409	B2-20541A	Extended (Part 1-A)	ODP File	200032/342/66	220002/364/66
D-00 410	B2-20541B	Extended (Part 1-B)	ODP File	120932/003/67	081602/017/67
D-00 411	B1-20542	Extended (Part 2)	Master File	222102/020/67	092302/104/67
D-00 412	B2-20542	Extended (Part 2)	ODP File	222132/020/67	092302/104/67
D-00 413	B1-20543	Extended (Part 3)	Master File	085002/104/67	071033/284/67
D-00 414	B2-20543	Extended (Part 3)	ODP File	085007/104/67	071033/284/67

5.1.3 Mission III

NSSDC No.	LRC No.	Mission Phase	Type of File	From	To
D-00 415	B1-30811	Cislunar	Master File	012206/036/67	222302/039/67
D-00 416	B2-30811	Cislunar	ODP File	014810/036/67	222302/039/67
D-00 417	B1-30821	First Ellipse	Master File	200302/039/67	193702/043/67
D-00 418	B2-30821	First Ellipse	ODP File	200332/039/67	193702/043/67
D-00 419	B1-30831	Second Ellipse (Part 1)	Master File	170502/043/67	001802/053/67
D-00 420	B2-30831A	Second Ellipse (Part 1-A)	ODP File	170532/043/67	213202/047/67
D-00 421	B2-30831B	Second Ellipse (Part 1-B)	ODP File	013152/047/67	090522/050/67
D-00 422	B2-30831C	Second Ellipse (Part 1-C)	ODP File	201342/049/67	001802/053/67
D-00 423	B1-30832	Second Ellipse (Part 2)	Master File	075002/052/67	172702/069/67
D-00 424	B2-30832A	Second Ellipse (Part 2-A)	ODP File	075232/052/67	115542/055/67
D-00 425	B2-30832B	Second Ellipse (Part 2-B)	ODP File	022032/055/67	101402/059/67
D-00 426	B2-30832C	Second Ellipse (Part 2-C)	ODP File	205932/058/67	044902/063/67
D-00 427	B2-30832D	Second Ellipse (Part 2-D)	ODP File	153132/062/67	172702/069/67
D-00 428	B1-30841	Extended (Part 1)	Master File	074702/069/67	180602/102/67
D-00 429	B2-30841	Extended (Part 1)	ODP File	074732/069/67	180602/102/67
D-00 430	B1-30842	Extended (Part 2)	Master File	163002/102/67	103602/282/67
D-00 431	B2-30842	Extended (Part 2)	ODP File	163002/102/67	093821/282/67

5.1.4 Mission IV

NSSDC No.	LRC No.	Mission Phase	Type of File	From	To
D-00 432	B1-40911	Cislunar	Master File	223025/124/67	184202/128/67
D-00 433	B2-40911	Cislunar	ODP File	225709/124/67	184202/128/67
D-00 434	B1-40921	Photo Ellipse (Part 1)	Master File	130002/128/67	102402/138/67
D-00 435	B2-40921A	Photo Ellipse (Part 1-A)	ODP File	130032/128/67	025902/133/67
D-00 436	B2-40921B	Photo Ellipse (Part 1-B)	ODP File	070032/132/67	205952/135/67
D-00 437	B2-40921C	Photo Ellipse (Part 1-C)	ODP File	030032/135/67	101602/138/67
D-00 438	B1-40922	Photo Ellipse (Part 2)	Master File	030002/138/67	132302/152/67
D-00 439	B2-40922A	Photo Ellipse (Part 2-A)	ODP File	030232/138/67	205002/143/67
D-00 440	B2-40922B	Photo Ellipse (Part 2-B)	ODP File	020032/143/67	132302/152/67
D-00 441	B1-40931	Extended (Part 1)	Master File	191402/153/67	230102/159/67
D-00 442	B2-40931	Extended (Part 1)	ODP File	192432/153/67	230102/159/67
D-00 443	B1-40932	Extended (Part 2)	Master File	220002/159/67	104502/192/67
D-00 444	B2-40932	Extended (Part 2)	ODP File	220032/159/67	104502/192/67

5.1.5 Mission V

NSSDC No.	LRC No.	Mission Phase	Type of File	From	To
D-00 445	B1-51011	Cislunar	Master File	223506/213/67	184202/217/67
D-00 446	B2-51011	Cislunar	ODP File	230733/213/67	184202/217/67
D-00 447	B1-51021	1st & 2nd Ellipse	Master File	023002/217/67	115802/221/67
D-00 448	B2-51021	1st & 2nd Ellipse	ODP File	023002/217/67	115802/221/67
D-00 449	B1-51031	Third Ellipse (Part 1)	Master File	002502/221/67	060202/231/67
D-00 450	B2-51031A	Third Ellipse (Part 1-A)	ODP File	002532/221/67	145942/224/67
D-00 451	B2-51031B	Third Ellipse (Part 1-B)	ODP File	034017/224/67	183002/227/67
D-00 452	B2-51031C	Third Ellipse (Part 1-C)	ODP File	225017/226/67	060202/231/67
D-00 453	B1-51032	Third Ellipse (Part 2)	Master File	200132/230/67	022402/240/67
D-00 454	B2-51032	Third Ellipse (Part 2)	ODP File	200147/230/67	022402/240/67
D-00 455	B1-51041	Extended (Part 1)	Master File	080002/239/67	050702/284/67
D-00 456	B2-51041	Extended (Part 1)	ODP File	080032/239/67	050702/284/67
D-00 457	B1-51042	Extended (Part 2)	Master File	050302/291/67	034502/364/67
D-00 458	B2-51042	Extended (Part 2)	ODP File	050332/291/67	034502/364/67
D-00 459	B1-51043	Extended (Part 3)	Master File	120202/002/68	075945/031/68
D-00 460	B2-51043	Extended (Part 3)	ODP File	120432/002/68	075945/031/68

LUNAR ORBITER 1 THRU 5 SELENODESY MERGED TAPES

D-00619	L.O.I	MASTER FILE 8-10-66 to 10-28-66	D-00386 D-00388 D-00390 D-00392 D-00396
D-00620	L.O. I	ODP FILE 8-10-66 to 10-28-66	D-00387 D-00389 D-00391 D-00393 D-00394 D-00395 D-00397
D-00621	L.O. II	MASTER FILE 11-06-66 to 10-11-67	D-00398 D-00400 D-00402 D-00405 D-00408 D-00411 D-00413
D-00622	L.O. II	ODP FILE 11-06-66 to 10-11-67	D-00399 D-00401 D-00403 D-00404 D-00406 D-00407 D-00409 D-00410 D-00412 D-00414
D-00623	L.O. III	MASTER FILE 02-05-67 to 10-09-67	D-00415 D-00417 D-00419 D-00423 D-00428 D-00430
D-00624	L.O. III	ODP FILE 02-05-67 to 10-09-67	D-00416 D-00418 D-00420 D-00421 D-00422 D-00424 D-00425 D-00426 D-00427 D-00429 D-00431

LUNAR ORBITER 1 THRU 5 SELENODESY MERGED TAPES (Cont'd)

D-00625	L.O. IV	MASTER FILE 05-04-67 to 07-11-67	D-00432 D-00434 D-00438 D-00441 D-00443
D-00626	L.O. IV	ODP FILE 05-04-67 to 07-11-67	D-00433 D-00435 D-00436 D-00437 D-00439 D-00440 D-00442 D-00444
D-00627	L.O. V	MASTER FILE 08-01-67 to 01-31-68	D-00445 D-00447 D-00449 D-00453 D-00455 D-00457 D-00459
D-00628	L.O. V	ODP FILE 08-01-67 to 01-31-68	D-00446 D-00448 D-00450 D-00451 D-00452 D-00454 D-00456 D-00458 D-00460

4.2 MISSION I

4.2.1 CISLUNAR PHASE

- Data quality good
- ETR data not on Master File
- All data from Station 51 unusable (failure to obtain suitable lockup)
- Angle data (HA/DEC) ignored via ODGX 21 hours launch for all stations
- Usable data types were HA/DEC, doppler, and ranging
- 10 second data processed during midcourse and deboost maneuvers
- Timing and doppler biases accounted for

4.2.2 FIRST ELLIPSE PHASE

- Data quality excellent
- Usable data types were doppler and ranging
- 10 second data processed during deboost and first transfer maneuvers
- Timing and doppler biases accounted for

4.2.3 SECOND ELLIPSE PHASE

- Data quality average - hampered by Photo Readout and inability to maintain constant power levels in the signal
- Only usable data type was doppler. Ranging was not attempted
- 10 second data processed during first and second transfers
- 20 second sample rate maintained most of the time after 0530, Day 255
- Timing and doppler bias accounted for

4.2.4 THIRD ELLIPSE PHASE

- Data quality bad from DAY 242 to DAY 257 (post-bimat cut photo readout). No data was processed while a readout was in progress
- Data quality average Days 237 to 242 and Days 257 to 260
- Ranging was not attempted prior to DAY 257

4.2.4 THIRD ELLIPSE PHASE (continued)

- 10 second data processed during second transfer burn
- 20 second sample rate used during photo readout
- Timing and doppler bias accounted for

4.2.5 EXTENDED MISSION PHASE

- Data quality average - continuous tracking halted on DAY 260
- Best coverage on the following days: 273-274, 278, 280, 285-286 (with ranging), 292-293, 300, 301
- Usable data types were doppler and ranging
- 10 second data processed for terminal transfer maneuver
- Doppler bias not accounted for
- Timing bias accounted for
- PASSID controls not utilized in the ODGX deck

4.3 MISSION II

- Large RU correction required to compensate for inverted range code
- Doppler bias not calculated
- Timing bias accounted for

4.3.1 CISLUNAR PHASE

- Data quality excellent
- ETR data not on Master File
- Angle data ignored via ODGX card input 6 hours after launch
- Usable data types were HA/DEC, doppler, and ranging
- 10 second data processed for midcourse and deboost maneuvers, during time-synchronization ranging periods, and first 31 minutes of Station 51's initial pass
- Station 51 data of good quality

4.3.2 FIRST ELLIPSE PHASE

- Data quality excellent
- Usable data types were doppler and ranging
- 10 second data processed during deboost and transfer maneuvers

4.3.3 SECOND ELLIPSE PHASE

- Data quality average during photo readout periods - good otherwise
- 20 second sample rate maintained during most photo readout periods to aid in counteracting high noise level
- Usable data types are doppler and ranging (ranging after DAY 322 for timing correlation purposes only)
- Station 12 developed maser problems on DAY 322 and Station 11 took its place for a short time. There are 22 points on the Master File from Station 11

4.3.4 EXTENDED MISSION PHASE

- Data quality good where two-station viewing available. Short, one-station-view data arcs frequent.
- Usable data types were doppler and ranging
- 10 second data are on the Master Files for all major maneuvers and time-synchronization periods
- Station 11 transmitted for two and one-half hours on DAY 363
- Station 62 received and transmitted for two hours on DAY 363. Internal identification of 15 used, which ODPL nominally associates with external I.D. 59.
- DSIF 12's entire pass on DAY 007 one-way data
- First data from Station 62 (internal I.D. = 1) occurred on DAY 020
- Constant coverage from DAY 020 to DAY 024. 20 second and 30 second sample rates used extensively
- Mark 1-A ranging first appears on Day 079
- One-second data from Station 62 on Master File for Lifetime Adjust Burn (DAY 178)
- Doppler resolver data first appears on DAY 176 (new formats 05 and 06 employed)

4.4 MISSION III

- New Ranging Data Condition Code (DC6) initialized. DC6 = 0,2 implied good ranging while DC6 = 1,3 implied bad ranging
- Timing bias accounted for

4.4.1 CISLUNAR PHASE

- Data quality excellent
- ETR data on Master File, but "ignored" via ODGX card input
- Usable data types were doppler, ranging, and HA/DEC
- Angle data (HA/DEC) "ignored" by ODGX card input 21 hours and 43 minutes after launch
- 10 second data processed-deboost maneuver
- 1 second data processed for midcourse maneuver
- Doppler bias not calculated

4.4.2 FIRST ELLIPSE PHASE

- Data quality good to excellent
- Usable data types were doppler and ranging
- 10 second data processed for deboost and transfer maneuvers
- Doppler bias not calculated
- Numerous "counter-glitches" were encountered in Station 62 doppler, identifiable by zeroes in the last two columns of the doppler field. All ODGX input deck "IGNORE" cards associated with this "glitch" have the comment $ 00 following the control message.

4.4.3 SECOND ELLIPSE PHASE

- Data quality good-average during photo readout
- Usable data types were doppler and ranging
- 10 second data processed for transfer maneuver
- Doppler bias not calculated
- 20 second sample rate maintained during photo readout periods
- Ranging ceased 2 days after transfer maneuver & not resumed for 22 days

4.4.4 EXTENDED MISSION PHASE

- Data quality generally good, with excellent station overlap. Continuous tracking ceased on DAY 070
- Usable data types were doppler and ranging
- 10 second data processed for all major maneuvers
- One second data processed during phasing maneuver (DAY 102)
- PASSID controls not utilized
- All ranging data after DAY 103 considered to be of Mark 1-A origin (see Section 2.2.3.2 and 3.2.2.2)
- Doppler resolver data first appears on DAY 188 from Station 12. Refer to Section 3.2.1.1 for times of installation of resolver systems at the prime DSIF sites
- Doppler bias accounted for after DAY 240
- All DSIF C3 (three-way) data were ignored via ODGX card input when an MSFN station was transmitting (DAYS 254-255, 261-262, 278-279)

4.5 MISSION IV

4.5.1 CISLUNAR PHASE

- Data quality excellent
- Usable data types were doppler, ranging, and HA/DEC
- Angles ignored via ODGX card input 19 hours after launch
- Doppler and timing biases not calculated
- ETR data on Master File, but "ignored" by ODGX
- 10 second data processed during midcourse and deboost maneuvers, and for a short time after injection
- Station 51 was unable to acquire lock early after injection due to azimuth/elevation constraints
- Station 51 was in an S-Band configuration during its only track on DAY 125
- All ranging data is of Mark 1-A origin (Section 2.2.3.2)
- Approximately three hours and twenty minutes of data were lost from Station 12 on DAY 127 due to a transmitter malfunction

4.5.2 PHOTO ELLIPSE PHASE

- Data quality good to excellent
- Usable data types are doppler and ranging
- Last ranging during this phase was on DAY 131 at 1230 (GMT) from Station 62
- 20 second sample rate during all photo readouts between DAYS 132 & 148
- Doppler bias accounted for up to DAY 138
- Timing bias calculated and used
- 10 second data processed during deboost maneuver
- The doppler "glitch" was again noticed in Station 62's data (refer to Section 4.4.2), although the problem was not as serious

4.5.3 EXTENDED MISSION PHASE

- Data quality excellent to 2045/163 (GMT). MSFN commitments beyond this point limited the usefulness of received data. MSFN transmitting times are noted in Section 6.3.4.3 and on the bar charts in Section 7.1.4
- Available data types were doppler and ranging
- Best tracks after DAY 162 were on DAYS 164-169 and 173-174
- Continuous tracking ended on DAY 152 at 1325 (GMT)
- 10 second sample rate maintained periodically throughout phase, including all major maneuvers. Station 12 tracking between 1120/155 and 2305/155, and between 2250/168 and 0925/169, exclusively 10 second data
- Resolver data, accompanied by new tracking data formats, (Section 4.1.2) were initialized during this phase according to the schedule given in Section 3.2.1.1
- Timing bias accounted for
- Doppler bias not accounted for
- Range unit corrections input via the ODGX control decks were average numbers

4.6 MISSION V

- Large RU correction required to compensate for inverted range code
- Doppler bias accounted for
- All DSIF stations employing formats 05 and 06 with doppler resolver

4.6.1 CISLUNAR PHASE

- Data quality excellent
- Usable data types were doppler, ranging, and HA/DEC
- Angles (HA/DEC) ignored via ODGX control card input 5 hours and 27 minutes after launch
- 10 second sample rate employed for a short time after translunar injection and during the midcourse and deboost maneuvers
- Station 51 did not acquire early lock due to azimuth/elevation angle constraints
- Timing bias not accounted for
- Small blunder points occurred in a data stream when the sending station turned its ranging modulation ON or OFF. All these blunders are ignored via ODGX input deck

4.6.2 FIRST AND SECOND ELLIPSE PHASES

- Data quality good to excellent
- Only usable data type was doppler
- 10 second data processed during deboost and first and second transfer maneuvers
- 20 second sample rate employed during photo readout periods.
- Timing bias not accounted for

4.6.3 THIRD ELLIPSE PHASE

- Data quality good
- Only usable data type was doppler
- Timing bias not accounted for
- 20 second sample rate employed prior to DAY 226 for photo readout phase

4.6.3 THIRD ELLIPSE PHASE (continued)

- 30 second sample rate used for same after DAY 225 to minimize blunder points which occurred whenever ODGX was forced to average doppler data over erratic time intervals.

4.6.4 EXTENDED MISSION PHASE

- This phase will not be completed until Extended Mission V is over. This analysis covers data from DAY 239 through DAY 284 only
- Data quality average to good
- Data types available were doppler and ranging
- Timing bias accounted for
- 10 second data processed for phasing/transfer maneuver

5.0 MASTER LIBRARY FILE DESCRIPTION

Included in this section are the data time span and the corresponding file summary, as it is printed out by the 7094 computer, for each Master Library Save tape. Only the Boeing save tape numbers are listed in the following descriptions. Goddard and Langley tapes are duplicates of the corresponding Boeing tape (the letters G and L, respectively, replace the letter B in the save tape number).

5.2 Master File/ODP File Summaries

5.2.1 Explanation of Terms

5.2.1.1 Master File Terminology

- CURRENT MISSION - Self-explanatory
- GMT OF EPOCH - Input via Link 1 of TDPX, no data may be added to that file with a time earlier than this epoch.
- TIME POINTS SENT TO MASTER FILES - Numbers are cumulative for that file.
- STA - internal station I.D.
- COUNT - Individual time points on file for each station.
- HHMMSS,DAY TO HHMMSS,DAY - first and last points on file for each station in GMT time.
- ELAPSED HHMMSS,DAYS - elapsed time between first and last points on file for each station.
- TIMES IN SECONDS - seconds from epoch for first and last points on file for each station.
- ELAPSED - elapsed time between first and last points on file for each station (in seconds).

5.2.1.2 ODP File Terminology

- DATA NOT USED BECAUSE
  - RANGE DATA CONDITION CODE - DCS $\neq$ 0,2 (large numbers generally reflect the sending of VCO frequency in the range field).
  - LOGICAL TRANSMITTER ERRORS - tracking data messages from a receiving station (affects doppler only) indicating that it was transmitting. Also includes ranging points from a receiving station.
  - ELEVATION ANGLE CONSTRAINTS - angles which failed to meet ODGX constraints.
  - BAD ANGLES NOT IN AUTO TRACK - DC2 = 1 or 5.
  - DSIF DATA IN MANUAL MODE - DC3 = 1 or 5.
  - GOOD DOPPLER IGNORED BY INPUT - Doppler points ignored via ODGX card input.
  - GOOD ANGLES IGNORED BY INPUT - angle points ignored via ODGX card input.

5.2.1.2 ODP File Terminology (continued)

- DATA VALUES ADJUSTED BY POLY - fine adjustment guided by source deck input polynomial.
- END TIME MAY BE IN ERROR BY TC/2 - end times may reflect the ODG's doppler compression (time count/2).
- SUMMARY
  - STA, START TIME, STOP TIME - Same meaning as in the Master File description.
  - R - Range - not used
  - DR - Range Rate - not used
  - EL - Elevation - not used
  - AZ - Azimuth - not used
  - DEC - Declination angle points on file
  - HA - Hour angle points on file
  - C1 - One-way doppler points on file (nominally ignored by the ODG)
  - CC3 - Two-way doppler points on file
  - C3 - Three-way doppler points on file
  - PRU - Planetary Range Units - not used
  - RU - Range Unit points on file

5.2.2 Mission I File Summaries

B1-10411

MISSION I CISLUNAR MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 04 ,GMT OF EPOCH 660801019,2600000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 9523 REPLACED 2905

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
4	3089	201527 222	052702 226		091135 3	2967.0	295262.0	292295.0
5	265	195857 222	072602 223		112705 0	1977.0	43202.0	41225.0
12	3461	114502 223	160702 226		042200 3	58742.0	333662.0	274920.0
13	2708	030702 223	162002 226		131300 3	27662.0	334442.0	306780.0

B2-10411

MISSION I CISLUNAR ODP FILE

DATA NOT USED BECAUSE. STATION =	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	2053	0	0	0	0	0	0	0	2540	2523
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	0	0
ELEVATION ANGLE CONSTRAINTS	0	0	0	2	0	0	0	0	0	0	0	0	33
BAD ANGLES NOT IN AUTO TRACK	0	0	0	11	21	0	0	0	0	0	0	137	157
GOOD DOPPLER IGNORED BY INPUT	0	0	0	447	52	0	0	0	0	0	0	219	70
GOOD ANGLES IGNORED BY INPUT	0	0	0	3769	8	0	0	0	0	0	0	5734	3669

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	201527.000,222	052702.000,226	0	0	0	0	726	719	0	2067	780	0	0
5	022032.000,223	072602.000,223	0	0	0	0	240	240	0	0	197	0	0
12	114502.000,223	160702.000,226	0	0	0	0	273	273	0	2806	553	0	117
13	030932.000,223	162002.000,226	0	0	0	0	503	503	0	1531	885	0	0

5.2.2 Mission I File Summaries (continued)

B1-10421

MISSION I FIRST ELLIPSE MASTER FILE

CURRENT MISSION LO/TBC , S/C ID= 04 , GMT OF EPOCH 660801415,4400000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 9093 REPLACED 848

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY	TO HHMMSS,DAY	ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
	4	3026	213002 226	102502 233	125500	6	20762.0	585662.0	564900.0
	12	3179	154410 226	045102 233	130652	6	10.0	565622.0	565612.0
	13	2888	154408 226	205902 232	051454	6	8.0	537302.0	537294.0

B2-10421

MISSION I FIRST ELLIPSE ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	2591	0	0	0	0	0	0	0	2917	2627
GOOD DOPPLER IGNORED BY INPUT	0	0	0	107	0	0	0	0	0	0	0	136	172
GOOD ANGLES IGNORED BY INPUT	0	0	0	5580	0	0	0	0	0	0	0	6182	5528

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	213032.000,226	102502.000,233	0	0	0	0	0	0	0	1971	921	0	18
12	154415.000,226	045002.000,233	0	0	0	0	0	0	0	2383	603	0	13
13	154503.000,226	205902.000,232	0	0	0	0	0	0	0	1793	811	0	8

5.2.2 Mission I File Summaries (continued)

B1-10431

MISSION I SECOND ELLIPSE MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 04 ,GMT OF EPOCH 660802109,5000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 2955 REPLACED 479

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
	4	4495	095010 233	100632 238		001622	5	10.0	432992.0	432982.0
	12	3029	200502 233	074042 238		113540	4	36902.0	424242.0	387340.0
	13	2431	130102 233	001302 238		111200	4	11462.0	397382.0	385920.0

B2-10431

MISSION I SECOND ELLIPSE ODP FILE

DATA NOT USED BECAUSE. STATION =	1	2	3	4	5	6	7	8	9	10	11	12	13
BAD ANGLES NOT IN AUTO TRACK	0	0	0	1428	0	0	0	0	0	0	0	2549	846
GOOD DOPPLER IGNORED BY INPUT	0	0	0	4355	0	0	0	0	0	0	0	3116	2480
GOOD ANGLES IGNORED BY INPUT	0	0	0	5817	0	0	0	0	0	0	0	960	3167

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	095015.000,233	100632.000,238	0	0	0	0	0	0	0	3660	670	0	0
12	201232.000,233	074042.000,238	0	0	0	0	0	0	0	2661	220	0	0
13	130132.000,233	001302.000,238	0	0	0	0	0	0	0	1886	391	0	0

5.2.2 Mission I File Summaries (continued)

B1-10441
MISSION I THIRD ELLIPSE MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 04 ,GMT OF EPOCH 660802109,5000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 30860 REPLACED 2792

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
	4	11476	160204 237	074732 259		154528 21	367924.0	2239052.0	1871128.0
	12	9138	233942 237	010002 260		012020 22	395382.0	2301002.0	1905620.0
	13	10246	164832 237	180932 259		012100 22	370712.0	2276372.0	1905660.0

B2-10441A
MISSION I THIRD ELLIPSE ODP FILE (PART A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
BAD ANGLES NOT IN AUTO TRACK	0	0	0	4107	0	0	0	0	0	0	0	8606	3145
GOOD DOPPLER IGNORED BY INPUT	0	0	0	17350	0	0	0	0	0	0	0	15724	16493
GOOD ANGLES IGNORED BY INPUT	0	0	0	14669	0	0	0	0	0	0	0	1061	14193

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	160209.000,237	191132.000,242	0	0	0	0	0	0	0	4274	532	0	0
12	235327.000,237	111312.000,242	0	0	0	0	0	0	0	2161	202	0	0
13	164847.000,237	015332.000,242	0	0	0	0	0	0	0	2316	111	0	0

B2-10441B
MISSION I THIRD ELLIPSE ODP FILE (PART B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	0	52
BAD ANGLES NOT IN AUTO TRACK	0	0	0	4107	0	0	0	0	0	0	0	8606	3145
GOOD DOPPLER IGNORED BY INPUT	0	0	0	17961	0	0	0	0	0	0	0	13047	13995
GOOD ANGLES IGNORED BY INPUT	0	0	0	14669	0	0	0	0	0	0	0	1061	14193

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

5.2.2 Mission I File Summaries (continued)

B2-10441B

MISSION I THIRD ELLIPSE ODP FILE (PART B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	132147.000,243	003702.000,257	0	0	0	0	0	0	0	3988	181	0	0
12	030027.000,243	210956.000,256	0	0	0	0	0	0	0	4638	291	0	0
13	200947.000,242	141632.000,256	0	0	0	0	0	0	0	4438	300	0	0

B2-10441C

MISSION I THIRD ELLIPSE ODP FILE (PART C)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	1027	0	0	0	0	0	0	0	1255	587
GOOD DOPPLER IGNORED BY INPUT	0	0	0	18469	0	0	0	0	0	0	0	15263	15419
GOOD ANGLES IGNORED BY INPUT	0	0	0	22882	0	0	0	0	0	0	0	18259	20480

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	071417.000,257	074732.000,259	0	0	0	0	0	0	0	2190	96	0	409
12	173021.000,257	010002.000,260	0	0	0	0	0	0	0	1478	41	0	84
13	061047.000,257	180932.000,259	0	0	0	0	0	0	0	2477	137	0	371

5.2.2 Mission I File Summaries
(continued)

B1-10451
MISSION I EXTENDED MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 04 ,GMT OF EPOCH 660901712,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 13567 REPLACED 1458

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
4	4335	094422 263	122302 301	023840 38	251062.0	3543782.0	3292720.0
12	3840	004702 265	113302 301	104600 36	391622.0	3540782.0	3149160.0
13	5392	122402 260	230702 299	104300 39	1442.0	3409622.0	3408180.0

B2-10451
MISSION I EXTENDED ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	2193	0	0	0	0	0	0	0	905	1920
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	13	0
GOOD DOPPLER IGNORED BY INPUT	0	0	0	78	0	0	0	0	0	0	0	243	300
GOOD ANGLES IGNORED BY INPUT	0	0	0	8670	0	0	0	0	0	0	0	5492	10770

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY
SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	094437.000,263	122302.000,301	0	0	0	0	0	0	0	4065	59	0	482
12	004732.000,265	113302.000,301	0	0	0	0	0	0	0	3072	459	0	130
13	122417.000,260	230702.000,299	0	0	0	0	0	0	0	5102	0	0	644

5.2.3 Mission II File Summaries

B1-20511

MISSION II CISLUNAR MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 05 , GMT OF EPOCH 661100623,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 8038 REPLACED 1131

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
4	2975	001629 311	210902 314	205233 3	4589.0	338942.0	334353.0
5	692	234900 310	112002 311	113102 0	2940.0	44402.0	41462.0
12	2420	121502 311	211002 314	085500 3	47702.0	339002.0	291300.0
13	1951	052902 311	135902 314	083000 3	23342.0	313142.0	289800.0

B2-20511

MISSION II CISLUNAR ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	478	0	0	0	0	0	0	0	301	399
ELEVATION ANGLE CONSTRAINTS	0	0	0	0	1	0	0	0	0	0	0	0	0
COOD DOPPLER IGNORED BY INPUT	0	0	0	359	18	0	0	0	0	0	0	141	129
GOOD ANGLES IGNORED BY INPUT	0	0	0	4564	540	0	0	0	0	0	0	4138	3873

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	001629.000,311	202052.000,314	0	0	0	0	566	566	0	1961	829	0	466
5	234900.000,310	112002.000,311	0	0	0	0	421	421	0	138	504	0	0
12	121532.000,311	210802.000,314	0	0	0	0	0	0	0	1977	363	0	217
13	052932.000,311	135902.000,314	0	0	0	0	0	0	0	1559	196	0	344

5.2.3 Mission II File Summaries (continued)

B1-20521

MISSION II FIRST ELLIPSE MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 661100623,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 6711 REPLACED 901

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
	4	2472	204202 314	010302 320	042100 5	337322.0	784982.0	447660.0
	12	2393	202440 314	010502 320	044022 5	336280.0	785102.0	448822.0
	13	1846	000102 315	175902 319	175800 4	349262.0	759542.0	410280.0

B2-20521

MISSION II FIRST ELLIPSE ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	388	0	0	0	0	0	0	0	334	372
GOOD DOPPLER IGNORED BY INPUT	0	0	0	233	0	0	0	0	0	0	0	99	86
GOOD ANGLES IGNORED BY INPUT	0	0	0	4940	0	0	0	0	0	0	0	4234	3690

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	210832.000,314	010302.000,320	0	0	0	0	0	0	0	2101	205	0	348
12	202445.000,314	010502.000,320	0	0	0	0	0	0	0	1915	360	0	386
13	055932.000,315	175902.000,319	0	0	0	0	0	0	0	1536	176	0	324

5.2.3 Mission II File Summaries (continued)

B1-20531

MISSION II SECOND ELLIPSE MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 661100623,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 24008 REPLACED 1089

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
2	23	233802 321	003202 322	005400 0	952682.0	955922.0	3240.0
4	8771	235202 319	132312 333	133110 13	780722.0	1952592.0	1171870.0
12	7709	223302 319	111702 333	124400 13	775982.0	1945022.0	1169040.0
13	7505	123402 320	041802 333	154400 12	826442.0	1919882.0	1093440.0

B2-20531A

MISSION II SECOND ELLIPSE ODP FILE (PART 1-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	23	0	314	0	0	0	0	0	0	0	99	135
GOOD DOPPLER IGNORED BY INPUT	0	0	0	8110	0	0	0	0	0	0	0	7958	7537
GOOD ANGLES IGNORED BY INPUT	0	45	0	17534	0	0	0	0	0	0	0	15040	15003

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
2	234832.000,321	003202.000,322	0	0	0	0	0	0	0	13	2	0	0
4	235232.000,319	143902.000,326	0	0	0	0	0	0	0	2873	331	0	282
12	223332.000,319	072202.000,326	0	0	0	0	0	0	0	2177	445	0	200
13	123432.000,320	214002.000,326	0	0	0	0	0	0	0	1976	341	0	142

B2-20531B

MISSION II SECOND ELLIPSE ODP FILE (PART 1-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	2542	0	0	0	0	0	0	0	2944	2427
GOOD DOPPLER IGNORED BY INPUT	0	46	0	3746	0	0	0	0	0	0	0	3073	2775
GOOD ANGLES IGNORED BY INPUT	0	45	0	17534	0	0	0	0	0	0	0	15040	15003

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON THE FOLLOWING PAGE)

MISSION II SECOND ELLIPSE ODP FILE (PART 1-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	051832.000,326	132312.000,333	0	0	0	0	0	0	0	4244	1367	0	0
12	051732.000,326	111702.000,333	0	0	0	0	0	0	0	4040	783	0	16
13	155032.000,326	041802.000,333	0	0	0	0	0	0	0	4595	324	0	0

5.2.3 Mission II File Summaries (continued)

B1-20532

MISSION II SECOND ELLIPSE MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 661100623,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 26719 REPLACED 3460

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
	4	8965	153702 333	200602 342	042900 9	1960622.0	2754362.0	793740.0
	12	7964	053302 334	200502 342	143200 8	2010782.0	2754302.0	743520.0
	13	9791	190522 333	133002 342	182440 8	1973122.0	2730602.0	757480.0

B2-20532A

MISSION II SECOND ELLIPSE ODP FILE (PART 2-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	4825	0	0	0	0	0	0	0	4230	6352
GOOD DOPPLER IGNORED BY INPUT	0	0	0	8097	0	0	0	0	0	0	0	7077	5762
GOOD ANGLES IGNORED BY INPUT	0	0	0	5398	0	0	0	0	0	0	0	7153	8150

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	153732.000,333	232702.000,337	0	0	0	0	0	0	0	3446	1295	0	8
12	053942.000,334	095502.000,338	0	0	0	0	0	0	0	3364	679	0	11
13	190532.000,333	095502.000,338	0	0	0	0	0	0	0	5916	286	0	23

B2-20532B

MISSION II SECOND ELLIPSE ODP FILE (PART 2-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13
RANGE DATA CONDITION CODE	0	0	0	4806	0	0	0	0	0	0	0	3518	3355
GOOD DOPPLER IGNORED BY INPUT	0	0	0	7818	0	0	0	0	0	0	0	7736	10373
GOOD ANGLES IGNORED BY INPUT	0	0	0	5398	0	0	0	0	0	0	0	7153	8150

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

MISSION II SECOND ELLIPSE ODP FILE (PART 2-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	144432.000,337	200602.000,342	0	0	0	0	0	0	0	4058	906	0	69
12	133912.000,337	200502.000,342	0	0	0	0	0	0	0	3542	489	0	67
13	000652.000,338	133002.000,342	0	0	0	0	0	0	0	4183	334	0	73

5.2.3 Mission II File Summaries (continued)

B1-20541

MISSION II EXTENDED MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 661100623,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 13049 REPLACED 3457

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
2	149	115402 363	142402 363		023000 0	4539242.0	4548242.0	9000.0
4	7966	200002 342	081602 17		121600 39	2754002.0	6167762.0	3413760.0
12	4148	200002 342	031702 15		071700 37	2754002.0	5977022.0	3223020.0
13	494	053802 343	145202 344		091400 1	2788682.0	2908322.0	119640.0
15	292	192622 363	212622 363		020000 0	4566382.0	4573582.0	7200.0

B2-20541A

MISSION II EXTENDED ODP FILE (PART 1-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RANGE DATA CONDITION CODE	0	88	0	1433	0	0	0	0	0	0	0	654	72	0	170
GOOD DOPPLER IGNORED BY INPUT	0	0	0	3896	0	0	0	0	0	0	0	3138	101	0	0
GOOD ANGLES IGNORED BY INPUT	0	298	0	14337	0	0	0	0	0	0	0	6032	986	0	584

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
2	115432.000,363	142402.000,363	0	0	0	0	0	0	0	146	0	0	20
4	200032.000,342	220002.000,364	0	0	0	0	0	0	0	4048	626	0	844
12	200032.000,342	134702.000,362	0	0	0	0	0	0	0	2000	216	0	403
13	053832.000,343	145202.000,344	0	0	0	0	0	0	0	284	157	0	70
15	192632.000,363	212622.000,363	0	0	0	0	0	0	0	118	169	0	0

B2-20541B

MISSION II EXTENDED ODP FILE (PART 1-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RANGE DATA CONDITION CODE	0	0	0	450	0	0	0	0	0	0	0	774	0	0	0
GOOD DOPPLER IGNORED BY INPUT	0	257	0	7649	0	0	0	0	0	0	0	3981	718	0	462
GOOD ANGLES IGNORED BY INPUT	0	298	0	14337	0	0	0	0	0	0	0	6032	986	0	584

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

MISSION II EXTENDED ODP FILE (PART 1-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	LR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
4	150232.000,003	081602.000,017	0	0	0	0	0	0	0	2310	349	0	211
12	120932.000,003	031702.000,015	0	0	0	0	0	0	0	1359	98	0	220

5.2.3 Mission II File Summaries (continued)

B1-20542

MISSION II EXTENDED MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 670100100,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 11860 REPLACED 1600

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	3407	223102 20 092002 104	104900 83	1722662.0	8932802.0	7210140.0
4	4072	084802 21 092302 104	003500 83	1759682.0	8932982.0	7173300.0
12	4381	222102 20 235202 103	013100 83	1722062.0	8898722.0	7176660.0

B2-20542

MISSION II EXTENDED ODP FILE (PART 2)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	504	0	0	1453	0	0	0	0	0	0	0	2446
BAD ANGLES NOT IN AUTO TRACK	0	0	0	53	0	0	0	0	0	0	0	3
DSIF DATA IN MANUAL MODE	0	0	0	53	0	0	0	0	0	0	0	3
GOOD DOPPLER IGNORED BY INPUT	29	0	0	289	0	0	0	0	0	0	0	188
GOOD ANGLES IGNORED BY INPUT	5827	0	0	6153	0	0	0	0	0	0	0	4238

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	223132.000,020	092002.000,104	0	0	0	0	0	0	0	2526	546	0	137
4	084832.000,021	092302.000,104	0	0	0	0	0	0	0	3104	687	0	265
12	222132.000,020	235202.000,103	0	0	0	0	0	0	0	3912	306	0	116

5.2.3 Mission II File Summaries (continued)

B1-20543

MISSION II EXTENDED MASTER FILE (PART 3)

CURRENT MISSION LO/TBC ,S/C ID= 05 ,GMT OF EPOCH 670400100,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 12382 REPLACED 1495

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS, DAYS	TIMES IN SECONDS		ELAPSED
	1	2216	085002 104	151402 272		062400 168	1155002.0	15693242.0	14538240.0
	4	2801	085002 104	071033 284		222031 179	1155002.0	16701033.0	15546031.0
	12	7365	181901 105	063902 284		122001 178	1275541.0	16699142.0	15423601.0

B2-20543

MISSION II EXTENDED ODP FILE (PART 3)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	1	0	0	582	0	0	0	0	0	0	0	149
LOGICAL TRANSMITTER ERRORS	0	0	0	6	0	0	0	0	0	0	0	131
BAD ANGLES NOT IN AUTO TRACK	24	0	0	56	0	0	0	0	0	0	0	143
DSIF DATA IN MANUAL MODE	24	0	0	56	0	0	0	0	0	0	0	143
GOOD DOPPLER IGNORED BY INPUT	46	0	0	70	0	0	0	0	0	0	0	475
GOOD ANGLES IGNORED BY INPUT	3320	0	0	3242	0	0	0	0	0	0	0	3436

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	085007.000,104	151402.000,272	0	0	0	0	0	0	0	1551	475	0	380
4	085007.000,104	071033.000,284	0	0	0	0	0	0	0	2372	234	0	411
12	194718.000,105	063902.000,284	0	0	0	0	0	0	0	5912	775	0	4421

5.2.4 Mission III File Summaries (continued)

B1-30811

MISSION III CISLUNAR MASTER FILE

CURRENT MISSION LO/TST ,S/C ID= 08 ,GMT OF EPOCH 670200501,1600000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 8102 REPLACED 551

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY		TO HHMMSS,DAY		ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
1	2069	071602	36	163802	39	092200	3	21602.0	314522.0	292920.0
4	2560	020902	36	222302	39	201400	3	3182.0	335222.0	332040.0
5	577	014730	36	074402	36	055632	0	1890.0	23282.0	21392.0
8	114	014005	36	014938	36	000933	0	1445.0	2018.0	573.0
9	47	013242	36	013900	36	000618	0	1002.0	1380.0	378.0
10	503	022516	36	030736	36	004220	0	4156.0	6696.0	2540.0
11	33	012206	36	012854	36	000648	0	366.0	774.0	408.0
12	2199	143002	36	222302	39	075300	3	47642.0	335222.0	287580.0

B2-30811

MISSION III CISLUNAR ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	312	0	0	665	0	0	0	0	0	0	0	225
LOGICAL TRANSMITTER ERRORS	7	0	0	2	0	0	0	0	0	0	0	0
ELEVATION ANGLE CONSTRAINTS	0	0	0	0	1	0	0	0	0	0	0	79
BAD ANGLES NOT IN AUTO TRACK	0	0	0	34	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	34	0	0	0	1	12	16	4	0
GOOD DOPPLER IGNORED BY INPUT	275	0	0	42	11	0	0	226	70	974	58	129
GOOD ANGLES IGNORED BY INPUT	2684	0	0	3989	23	0	0	226	68	974	57	2947

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	071602.000,036	163802.000,039	0	0	0	0	458	444	0	1591	174	0	296
4	023502.000,036	222302.000,039	0	0	0	0	368	368	0	1924	531	0	490
5	014810.000,036	074402.000,036	0	0	0	0	566	564	0	323	223	0	0
12	143032.000,036	222302.000,039	0	0	0	0	410	409	0	1643	468	0	325

5.2.4 Mission III File Summaries (continued)

B1-30821

MISSION III FIRST ELLIPSE MASTER FILE

CURRENT MISSION LO/TST ,S/C ID= 08 ,GMT OF EPOCH: 670200820,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 6140 REPLACED 486

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY TO		HHMMSS,DAY		ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
1	1914	080502	40	193702	43	113200	3	43502.0	344222.0	300720.0
4	2322	205202	39	090302	43	121100	3	3122.0	306182.0	303060.0
12	1904	200302	39	193702	43	233400	3	182.0	344222.0	344040.0

B2-30821

MISSION III FIRST ELLIPSE ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	318	0	0	403	0	0	0	0	0	0	0	298
BAD ANGLES NOT IN AUTO TRACK	0	0	0	28	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	28	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT	222	0	0	54	0	0	0	0	0	0	0	0
GOOD ANGLES IGNORED BY INPUT	3444	0	0	4254	0	0	0	0	0	0	0	193
PLEASE NOTE - DATA VALUES ADJUSTED BY POLY												3156

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	080532.000,040	193702.000,043	0	0	0	0	0	0	0	1239	444	0	266
4	205432.000,039	090302.000,043	0	0	0	0	0	0	0	1615	598	0	268
12	200332.000,039	193702.000,043	0	0	0	0	0	0	0	1489	329	0	157

5.2.4 Mission III File Summaries (continued)

B1-30831

MISSION III SECOND ELLIPSE MASTER FILE (PART 1)

CURRENT MISSION LO/TBC , S/C ID = 08 ,GMT OF EPOCH 670200501,1600000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 17380 REPLACED 3511

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	6548	170702 43	001802 53		071100 9	661862.0	1465322.0	803460.0
4	4892	005602 44	170102 52		160500 8	690002.0	1439102.0	749100.0
12	5940	170502 43	090002 52		165500 8	661742.0	1410242.0	748500.0

B2-30831A

MISSION III SECOND ELLIPSE ODP FILE (PART 1-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE 311		0	0	358	0	0	0	0	0	0	0	559
LOGICAL TRANSMITTER ERRORS 14		0	0	5	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK 0		0	0	47	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE 0		0	0	47	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 9204		0	0	5000	0	0	0	0	0	0	0	6085
GOOD ANGLES IGNORED BY INPUT 12700		0	0	9690	0	0	0	0	0	0	0	11364

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	170732.000,043	213202.000,047	0	0	0	0	0	0	0	1419	817	0	96
4	005932.000,044	110302.000,047	0	0	0	0	0	0	0	1252	579	0	145
12	170532.000,043	040202.000,047	0	0	0	0	0	0	0	2377	7	0	235

B2-30831B

MISSION III SECOND ELLIPSE ODP FILE (PART 1-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
BAD ANGLES NOT IN AUTO TRACK 0		0	0	47	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE 0		0	0	47	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 10019		0	0	5625	0	0	0	0	0	0	0	7174
GOOD ANGLES IGNORED BY INPUT 12700		0	0	9690	0	0	0	0	0	0	0	11364

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

5.2.4 Mission III File Summaries (continued)

B2-30831B

MISSION III SECOND ELLIPSE ODP FILE (PART 1-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	120532.000,047	020502.000,050	0	0	0	0	0	0	0	1326	582	0	0
4	022932.000,047	090802.000,050	0	0	0	0	0	0	0	1511	208	0	0
12	013152.000,047	090522.000,050	0	0	0	0	0	0	0	1832	228	0	0

B2-30831C

MISSION III SECOND ELLIPSE ODP FILE (PART 1-C)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	1	0	0	0	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	0	0	0	47	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	47	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 9234		0	0	5700	0	0	0	0	0	0	0	7023
GOOD ANGLES IGNORED BY INPUT 12700		0	0	9690	0	0	0	0	0	0	0	11364

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	201342.000,049	001802.000,053	0	0	0	0	0	0	0	2001	669	0	0
4	064932.000,050	153502.000,052	0	0	0	0	0	0	0	1259	392	0	0
12	210032.000,049	090002.000,052	0	0	0	0	0	0	0	1626	604	0	0

5.2.4 Mission III File Summaries (continued)

B1-30832

MISSION III SECOND ELLIPSE MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 08 ,GMT OF EPOCH 670200501,1600000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 28532 REPLACED 9174

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY	TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
	1	9608	153113 52		151402 69		234249 16	1433713.0	2901482.0	1467769.0
	4	10493	075002 52		070102 69		231100 16	1406042.0	2871902.0	1465860.0
	12	8431	075302 52		172702 69		093400 17	1406222.0	2909462.0	1503240.0

B2-30832A

MISSION III SECOND ELLIPSE ODP FILE (PART 2-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
BAD ANGLES NOT IN AUTO TRACK	0	0	0	59	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	59	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 16405	0	0	16395	0	0	0	0	0	0	0	13669	
GOOD ANGLES IGNORED BY INPUT 19102	0	0	20861	0	0	0	0	0	0	0	16414	

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	153137.500,052	045502.000,055	0	0	0	0	0	0	0	1774	556	0	0
4	075232.000,052	115542.000,055	0	0	0	0	0	0	0	1700	548	0	0
12	075332.000,052	115502.000,055	0	0	0	0	0	0	0	2320	67	0	0

B2-30832B

MISSION III SECOND ELLIPSE ODP FILE (PART 2-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	2	0	0	0	0	0	0	0	4
BAD ANGLES NOT IN AUTO TRACK	0	0	0	59	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	59	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 15339	0	0	15139	0	0	0	0	0	0	0	13169	
GOOD ANGLES IGNORED BY INPUT 19102	0	0	20861	0	0	0	0	0	0	0	16414	

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON THE FOLLOWING PAGE)

5.2.4 Mission III File Summaries (continued)

B2-30832B

MISSION III SECOND ELLIPSE ODP FILE (PART 2-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	022632.000,055	084302.000,059	0	0	0	0	0	0	0	2793	587	0	0
4	095832.000,055	234602.000,058	0	0	0	0	0	0	0	2777	686	0	0
12	022032.000,055	101402.000,059	0	0	0	0	0	0	0	2645	218	0	0

B2-30832C

MISSION III SECOND ELLIPSE ODP FILE (PART 2-C)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	2	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	0	0	0	59	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	59	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 17167	0	0	16673	0	0	0	0	0	0	0	14479	
GOOD ANGLES IGNORED BY INPUT 19102	0	0	20861	0	0	0	0	0	0	0	16414	

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	230232.000,058	044902.000,063	0	0	0	0	0	0	0	1294	230	0	0
4	205932.000,058	033102.000,063	0	0	0	0	0	0	0	1863	6	0	0
12	072732.000,059	181402.000,062	0	0	0	0	0	0	0	1244	318	0	0

B2-30832D

MISSION III SECOND ELLIPSE ODP FILE (PART 2-D)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE 2132	0	0	1658	0	0	0	0	0	0	0	2290	
LOGICAL TRANSMITTER ERRORS	5	0	0	4	0	0	0	0	0	0	0	6
BAD ANGLES NOT IN AUTO TRACK	0	0	0	59	0	0	0	0	0	0	0	0
DSIF DATA IN MANUAL MODE	0	0	0	59	0	0	0	0	0	0	0	0
GOOD DOPPLER IGNORED BY INPUT 14037	0	0	13687	0	0	0	0	0	0	0	11086	
GOOD ANGLES IGNORED BY INPUT 19102	0	0	20861	0	0	0	0	0	0	0	16414	

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON THE FOLLOWING PAGE)

MISSION III SECOND ELLIPSE ODP FILE (PART 2-D) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	025632.000,063	151402.000,069	0	0	0	0	0	0	0	2138	258	0	83
4	173432.000,062	070002.000,069	0	0	0	0	0	0	0	2929	49	0	166
12	153132.000,062	172702.000,069	0	0	0	0	0	0	0	2277	274	0	89

5.2.4 Mission III File Summaries (continued)

B1-30841

MISSION III EXTENDED MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 08 ,GMT OF EPOCH 670301000,000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 9286 REPLACED 1698

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY	TO HHMMSS,DAY	ELAPSED HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	1852	074702 69	180502 102	101800 33	28022.0	2916302.0	2888280.0
4	2230	214202 69	025102 99	050900 29	78122.0	2602262.0	2524140.0
12	5204	144502 69	180602 102	032100 33	53102.0	2916362.0	2863260.0

B2-30841

MISSION III EXTENDED ODP FILE (PART 1)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	208	0	0	769	0	0	0	0	0	0	0	2991
LOGICAL TRANSMITTER ERRORS	5	0	0	60	0	0	0	0	0	0	0	7
BAD ANGLES NOT IN AUTO TRACK	2	0	0	42	0	0	0	0	0	0	0	31
DSIF DATA IN MANUAL MODE	2	0	0	42	0	0	0	0	0	0	0	31
GOOD DOPPLER IGNORED BY INPUT	21	0	0	69	0	0	0	0	0	0	0	26
GOOD ANGLES IGNORED BY INPUT	3170	0	0	4319	0	0	0	0	0	0	0	4994

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	074732.000,069	180502.000,102	0	0	0	0	0	0	0	1014	695	0	107
4	214332.000,069	025102.000,099	0	0	0	0	0	0	0	1471	514	0	177
12	144532.000,069	180602.000,102	0	0	0	0	0	0	0	4780	233	0	48

5.2.4 Mission III File Summaries (continued)

B1-30842

MISSION III EXTENDED MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 08 ,GMT OF EPOCH 670400100,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 16964 REPLACED 3255

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	4707	163002 102	181602 278		014600 176	1009802.0	16222562.0	15212760.0
4	5892	074752 107	103602 282		024810 175	1410472.0	16540562.0	15130090.0
12	6365	163002 102	042902 282		115900 179	1009802.0	16518542.0	15508740.0

B2-30842

MISSION III EXTENDED ODP FILE (PART 2)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	414	0	0	878	0	0	0	0	0	0	0	293
LOGICAL TRANSMITTER ERRORS	61	0	0	33	0	0	0	0	0	0	0	172
BAD ANGLES NOT IN AUTO TRACK	186	0	0	468	0	0	0	0	0	0	0	288
DSIF DATA IN MANUAL MODE	186	0	0	468	0	0	0	0	0	0	0	288
GOOD DOPPLER IGNORED BY INPUT	493	0	0	1106	0	0	0	0	0	0	0	427
GOOD ANGLES IGNORED BY INPUT	7394	0	0	9752	0	0	0	0	0	0	0	10213

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRJ	RU
1	163032.000,102	181602.000,278	0	0	0	0	0	0	0	3025	723	0	1256
4	074757.000,107	093821.000,282	0	0	0	0	0	0	0	3463	718	0	461
12	163002.000,102	042702.000,282	0	0	0	0	0	0	0	4367	1016	0	371

5.2.5 Mission IV File Summaries

B1-40911

MISSION IV CISLUNAR MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 09 ,GMT OF EPOCH 670500422,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 8497 REPLACED 1843

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
1	2775	044802 125	174402 128	125600	3	24482.0	330242.0	305760.0
4	2540	230920 124	073102 128	082142	3	4160.0	293462.0	289302.0
5	289	225709 124	070102 125	080353	0	3429.0	32462.0	29033.0
6	65	223124 124	223748 124	000624	0	1884.0	2268.0	384.0
7	62	224500 124	225112 124	000612	0	2700.0	3072.0	372.0
8	140	223025 124	235828 124	012803	0	1825.0	7108.0	5283.0
9	139	225600 124	231000 124	001400	0	3360.0	4200.0	840.0
10	243	231112 124	233542 124	002430	0	4272.0	5742.0	1470.0
12	2244	013402 125	184202 128	170800	3	12842.0	333722.0	320880.0

B2-40911

MISSION IV CISLUNAR ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	0	0	0	1	0	0	0	0	0	0	0	1
LOGICAL TRANSMITTER ERRORS	22	0	0	89	0	0	0	0	0	0	0	23
ELEVATION ANGLE CONSTRAINTS	2	0	0	0	0	0	0	0	0	0	0	6
BAD ANGLES NOT IN AUTO TRACK	72	0	0	40	5	0	0	0	0	0	0	33
DSIF DATA IN MANUAL MODE	72	0	0	40	5	2	3	2	13	7	0	38
GOOD DOPPLER IGNORED BY INPUT	166	0	0	88	48	126	118	276	252	472	0	319
GOOD ANGLES IGNORED BY INPUT	3616	0	0	3785	8	126	116	275	252	472	0	3445

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	044902.000,125	174402.000,128	0	0	0	0	594	594	0	1546	919	0	752
4	231030.000,124	070802.000,128	0	0	0	0	606	606	0	1970	363	0	1170
5	225709.000,124	070102.000,125	0	0	0	0	280	280	0	0	228	0	0
12	013402.000,125	184202.000,128	0	0	0	0	188	188	0	1611	252	0	512

5.2.5 Mission IV File Summaries (continued)

B1-40921

MISSION IV PHOTO ELLIPSE MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 09 ,GMT OF EPOCH 670500422,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 26547 REPLACED 2060

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	8026	130002 128	000002 138		110000 9	313202.0	1130402.0	817200.0
4	7063	212902 128	102402 138		125500 9	343742.0	1167842.0	824100.0
12	11458	130802 128	090522 138		195720 9	313682.0	1163122.0	849440.0

B2-40921A

MISSION IV PHOTO ELLIPSE ODP FILE (PART 1-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	662	0	0	400	0	0	0	0	0	0	0	1356
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	4
BAD ANGLES NOT IN AUTO TRACK	108	0	0	92	0	0	0	0	0	0	0	105
DSIF DATA IN MANUAL MODE	108	0	0	92	0	0	0	0	0	0	0	105
GOOD DOPPLER IGNORED BY INPUT	6917	0	0	6798	0	0	0	0	0	0	0	9498
GOOD ANGLES IGNORED BY INPUT	15491	0	0	13925	0	0	0	0	0	0	0	19168

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	130032.000,128	182522.000,132	0	0	0	0	0	0	0	2179	813	0	724
4	213932.000,128	025902.000,133	0	0	0	0	0	0	0	1590	643	0	629
12	133632.000,128	025902.000,133	0	0	0	0	0	0	0	5021	270	0	766

B2-40921B

MISSION IV PHOTO ELLIPSE ODP FILE (PART 1-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	1
BAD ANGLES NOT IN AUTO TRACK	108	0	0	92	0	0	0	0	0	0	0	105
DSIF DATA IN MANUAL MODE	108	0	0	92	0	0	0	0	0	0	0	105
GOOD DOPPLER IGNORED BY INPUT	7898	0	0	7866	0	0	0	0	0	0	0	13434
GOOD ANGLES IGNORED BY INPUT	15491	0	0	13925	0	0	0	0	0	0	0	19168

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

5.2.5 Mission IV File Summaries (continued)

B2-40921B

MISSION IV PHOTO ELLIPSE ODP FILE (PART 1-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	072732.000,132	202912.000,135	0	0	0	0	0	0	0	2688	744	0	0
4	070032.000,132	120902.000,135	0	0	0	0	0	0	0	2020	165	0	0
12	164732.000,132	205952.000,135	0	0	0	0	0	0	0	3168	342	0	0

B2-40921C

MISSION IV PHOTO ELLIPSE ODP FILE (PART 1-C)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	2	0	0	0	0	0	0	0	0	0	0	4
BAD ANGLES NOT IN AUTO TRACK	108	0	0	92	0	0	0	0	0	0	0	105
DSIF DATA IN MANUAL MODE	108	0	0	92	0	0	0	0	0	0	0	105
GOOD DOPPLER IGNORED BY INPUT	8602	0	0	7022	0	0	0	0	0	0	0	13424
GOOD ANGLES IGNORED BY INPUT	15491	0	0	13925	0	0	0	0	0	0	0	19168

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	110132.000,135	000002.000,138	0	0	0	0	0	0	0	2682	73	0	0
4	030232.000,135	101602.000,138	0	0	0	0	0	0	0	2569	463	0	0
12	030032.000,135	090522.000,138	0	0	0	0	0	0	0	2494	1006	0	0

5.2.5 Mission IV File Summaries (continued)

B1-40922

MISSION IV PHOTO ELLIPSE MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 09,GMT OF EPOCH 670500422,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 35471 REPLACED 4799

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
	1	10797	133002 138	101402 152		204400 13	1179002.0	2376842.0	1197840.0
	4	13451	065902 138	023002 152		193100 13	1155542.0	2349002.0	1193460.0
	12	11223	030002 138	132302 152		102300 14	1141202.0	2388182.0	1246980.0

B2-40922A

MISSION IV PHOTO ELLIPSE ODP FILE (PART 2-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	19	0	0	2	0	0	0	0	0	0	0	6
BAD ANGLES NOT IN AUTO TRACK	119	0	0	145	0	0	0	0	0	0	0	121
DSIF DATA IN MANUAL MODE	119	0	0	145	0	0	0	0	0	0	0	121
GOOD DOPPLER IGNORED BY INPUT	13366	0	0	17654	0	0	0	0	0	0	0	12146
GOOD ANGLES IGNORED BY INPUT	21215	0	0	26591	0	0	0	0	0	0	0	22177

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	133132.000,138	205002.000,143	0	0	0	0	0	0	0	4875	332	0	0
4	065932.000,138	204302.000,143	0	0	0	0	0	0	0	4932	1049	0	0
12	030232.000,138	114752.000,143	0	0	0	0	0	0	0	4656	1129	0	0

B2-40922B

MISSION IV PHOTO ELLIPSE ODP FILE (PART 2-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	7	0	0	0	0	0	0	0	0	0	0	3
BAD ANGLES NOT IN AUTO TRACK	119	0	0	145	0	0	0	0	0	0	0	121
DSIF DATA IN MANUAL MODE	119	0	0	145	0	0	0	0	0	0	0	121
GOOD DOPPLER IGNORED BY INPUT	13315	0	0	15833	0	0	0	0	0	0	0	12170
GOOD ANGLES IGNORED BY INPUT	21215	0	0	26591	0	0	0	0	0	0	0	22177

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

MISSION IV PHOTO ELLIPSE ODP FILE (PART 2-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	020052.000,143	101402.000,152	0	0	0	0	0	0	0	4785	400	0	0
4	105642.000,143	023002.000,152	0	0	0	0	0	0	0	7370	400	0	0
12	023532.000,143	132302.000,152	0	0	0	0	0	0	0	4908	826	0	0

5.2.5 Mission IV File Summaries (continued)

B1-40931

MISSION IV EXTENDED MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 09 ,GMT OF EPOCH 670500100,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 7435 REPLACED 116

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	382	112203 155	152902 155		040659 0	2978523.0	2993342.0	14819.0
4	1078	191402 153	005902 159		054500 5	2834042.0	3286742.0	452700.0
12	5975	112255 155	230102 159		113807 4	2978575.0	3366062.0	387487.0

B2-40931

MISSION IV EXTENDED ODP FILE (PART 1)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	0	0	0	0	0	0	0	0	3
BAD ANGLES NOT IN AUTO TRACK	1	0	0	13	0	0	0	0	0	0	0	7
DSIF DATA IN MANUAL MODE	1	0	0	13	0	0	0	0	0	0	0	7
GOOD DOPPLER IGNORED BY INPUT	278	0	0	24	0	0	0	0	0	0	0	125
GOOD ANGLES IGNORED BY INPUT	761	0	0	1968	0	0	0	0	0	0	0	3032

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	112218.000,155	152902.000,155	0	0	0	0	0	0	0	0	342	0	0
4	192432.000,153	005902.000,159	0	0	0	0	0	0	0	633	376	0	358
12	112255.000,155	230102.000,159	0	0	0	0	0	0	0	5788	17	0	3916

5.2.5 Mission IV File Summaries (continued)

B1-40932

MISSION IV EXTENDED MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 09 ,GMT OF EPOCH 670500100,0000000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 15802 REPLACED 776

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	3926	150702 161	205902 191		055200 30	3510422.0	6123542.0	2613120.0
4	2938	232302 159	104502 192		112200 32	3367382.0	6173102.0	2805720.0
12	8938	220002 159	045102 192		065100 32	3362402.0	6151862.0	2789460.0

B2-40932

MISSION IV EXTENDED ODP FILE (PART 2)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	894	0	0	0	0	0	0	0	0	0	0	2
LOGICAL TRANSMITTER ERRORS	1	0	0	0	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	57	0	0	143	0	0	0	0	0	0	0	82
DSIF DATA IN MANUAL MODE	57	0	0	143	0	0	0	0	0	0	0	82
GOOD DOPPLER IGNORED BY INPUT	618	0	0	1772	0	0	0	0	0	0	0	4860
GOOD ANGLES IGNORED BY INPUT	7735	0	0	5589	0	0	0	0	0	0	0	9613

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	150832.000,161	205902.000,191	0	0	0	0	0	0	0	2816	389	0	757
4	232332.000,159	104502.000,192	0	0	0	0	0	0	0	950	212	0	555
12	220032.000,159	045102.000,192	0	0	0	0	0	0	0	6802	897	0	798

5.2.6 Mission V File Summaries

B1-51011

MISSION V CISLUNAR MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 10 ,GMT OF EPOCH 670800122,3300000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 7904 REPLACED 619

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS, DAY TO HHMMSS, DAY	ELAPSED HHMMSS, DAYS	TIMES IN SECONDS		ELAPSED
1	2823	044802 214 184102 217	135300 3	22502.0	331682.0	309180.0
4	2384	231941 213 073602 217	081621 3	2801.0	291782.0	288981.0
5	244	230733 213 080302 214	085529 0	2073.0	34202.0	32129.0
6	64	223924 213 224554 213	000630 0	384.0	774.0	390.0
7	54	225242 213 225948 213	000706 0	1182.0	1608.0	426.0
9	89	230400 213 231324 213	000924 0	1860.0	2424.0	564.0
10	149	231748 213 233318 213	001530 0	2688.0	3618.0	930.0
11	29	223506 213 223800 213	000254 0	126.0	300.0	174.0
12	2068	125502 214 184202 217	054700 3	51722.0	331742.0	280020.0

B2-51011

MISSION V CISLUNAR ODP FILE

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	1	0	0	0	0	0	0	0	0	0	0	1
LOGICAL TRANSMITTER ERRORS	63	0	0	55	0	0	0	0	0	0	0	80
BAD ANGLES NOT IN AUTO TRACK	38	0	0	37	3	0	0	0	0	0	0	24
DSIF DATA IN MANUAL MODE	38	0	0	37	0	0	0	0	9	2	29	24
GOOD DOPPLER IGNORED BY INPUT	223	0	0	164	29	128	108	0	160	294	0	72
GOOD ANGLES IGNORED BY INPUT	4993	0	0	3473	414	127	108	0	160	294	0	3774

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	044932.000,214	184102.000,217	0	0	0	0	0	0	0	1541	934	0	971
4	231941.000,213	073602.000,217	0	0	0	0	483	482	0	1834	264	0	864
5	230733.000,213	080302.000,214	0	0	0	0	34	34	0	0	191	0	0
12	130132.000,214	184202.000,217	0	0	0	0	0	0	0	1597	266	0	957

5.2.6 Mission V File Summaries (continued)

B1-51021

MISSION V FIRST & SECOND ELLIPSE MASTER FILE

CURRENT MISSION LO/TBC ,S/C ID= 10 ,GMT OF EPOCH 670800122,3300000

TIME POINTS SENT TO MASTER FILES - ACCEPTED 9263 REPLACED 669

MASTER FILE DATA SUMMARY. STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED	HHMMSS,DAYS	TIMES IN SECONDS		ELAPSED
1	3357	063002 217	115802 221	052800	4	287822.0	653102.0	365280.0
4	2865	023002 217	112002 221	085000	4	273422.0	650822.0	377400.0
12	3041	150502 217	041402 221	130900	3	318722.0	625262.0	306540.0

B2-51021

MISSION V FIRST & SECOND ELLIPSE ODP FILE

DATA NOT USED BECAUCE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
RANGE DATA CONDITION CODE	2	0	0	0	0	0	0	0	0	0	0	0
LOGICAL TRANSMITTER ERRORS	1	0	0	4	0	0	0	0	0	0	0	1
BAD ANGLES NOT IN AUTO TRACK	63	0	0	43	0	0	0	0	0	0	0	46
DSIF DATA IN MANUAL MODE	63	0	0	43	0	0	0	0	0	0	0	46
GOOD DOPPLER IGNORED BY INPUT	129	0	0	53	0	0	0	0	0	0	0	134
GOOD ANGLES IGNORED BY INPUT	5893	0	0	5050	0	0	0	0	0	0	0	5458

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	063032.000,217	115802.000,221	0	0	0	0	0	0	0	1981	993	0	174
4	023002.000,217	112002.000,221	0	0	0	0	0	0	0	2172	484	0	166
12	150532.000,217	041402.000,221	0	0	0	0	0	0	0	2180	615	0	0

5.2.6 Mission V File Summaries (continued)

B1-51031

MISSION V THIRD ELLIPSE MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 10, GMT OF EPOCH 670800122,3300000

TIME POINTS SENT TO MASTER FILES - ACCEPTED 21677 REPLACED 3206

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
	1	6008	094802 221	040002 231	181200	9	645302.0	1488422.0	843120.0
	4	8793	011502 221	192102 230	180600	9	614522.0	1457282.0	842760.0
	12	6876	002502 221	060202 231	053700	10	611522.0	1495742.0	884220.0

B2-51031A

MISSION V THIRD ELLIPSE ODP FILE (PART 1-A)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	2	0	0	0	0	0	0	0	0	0	0	3
BAD ANGLES NOT IN AUTO TRACK	118	0	0	105	0	0	0	0	0	0	0	95
DSIF DATA IN MANUAL MODE	118	0	0	105	0	0	0	0	0	0	0	95
GOOD DOPPLER IGNORED BY INPUT	3733	0	0	5504	0	0	0	0	0	0	0	4465
GOOD ANGLES IGNORED BY INPUT	11779	0	0	17140	0	0	0	0	0	0	0	13559

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE

PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	094832.000,221	145942.000,224	0	0	0	0	0	0	0	1577	471	0	0
4	011532.000,221	140052.000,224	0	0	0	0	0	0	0	2533	450	0	0
12	002532.000,221	054812.000,224	0	0	0	0	0	0	0	1670	780	0	0

B2-51031B

MISSION V THIRD ELLIPSE ODP FILE (PART 1-B)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	1	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	118	0	0	105	0	0	0	0	0	0	0	95
DSIF DATA IN MANUAL MODE	118	0	0	105	0	0	0	0	0	0	0	95
GOOD DOPPLER IGNORED BY INPUT	4611	0	0	6119	0	0	0	0	0	0	0	5646
GOOD ANGLES IGNORED BY INPUT	11779	0	0	17140	0	0	0	0	0	0	0	13559

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

(NOTE: THIS IS CONTINUED ON FOLLOWING PAGE)

B2-51031B

MISSION V THIRD ELLIPSE ODP FILE (PART 1-B) Continued

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	145000.000,224	183002.000,227	0	0	0	0	0	0	0	960	168	0	0
4	034102.000,224	171002.000,227	0	0	0	0	0	0	0	2175	307	0	0
12	034017.000,224	054032.000,227	0	0	0	0	0	0	0	1024	249	0	0

B2-51031C

MISSION V THIRD ELLIPSE ODP FILE (PART 1-C)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	0	0	0	2	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	118	0	0	105	0	0	0	0	0	0	0	95
DSIF DATA IN MANUAL MODE	118	0	0	105	0	0	0	0	0	0	0	95
GOOD DOPPLER IGNORED BY INPUT	3664	0	0	4965	0	0	0	0	0	0	0	4360
GOOD ANGLES IGNORED BY INPUT	11779	0	0	17140	0	0	0	0	0	0	0	13559

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	225017.000,226	035902.000,231	0	0	0	0	0	0	0	1969	66	0	0
4	051217.000,227	191902.000,230	0	0	0	0	0	0	0	3471	183	0	0
12	002047.000,227	060202.000,231	0	0	0	0	0	0	0	2113	408	0	0

5.2.6 Mission V File Summaries
(continued)

B1-51032

MISSION V THIRD ELLIPSE MASTER FILE (PART 2)

CURRENT MISSION LO/TBC ,S/C ID= 10 ,GMT OF EPOCH 670800122,3300000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 15888 REPLACED 6636

MASTER FILE DATA SUMMARY.	STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
	1	4483	200132 230	022402 240	062230	9	1459712.0	2260262.0	800550.0
	4	6052	100242 231	005202 240	144920	8	1510182.0	2254742.0	744560.0
	12	5353	021252 231	183002 239	161710	8	1481992.0	2231822.0	749830.0

B2-51032

MISSION V THIRD ELLIPSE ODP FILE (PART 2)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
LOGICAL TRANSMITTER ERRORS	1	0	0	0	0	0	0	0	0	0	0	1
BAD ANGLES NOT IN AUTO TRACK	56	0	0	60	0	0	0	0	0	0	0	64
DSIF DATA IN MANUAL MODE	56	0	0	60	0	0	0	0	0	0	0	64
GOOD DOPPLER IGNORED BY INPUT	40	0	0	52	0	0	0	0	0	0	0	90
GOOD ANGLES IGNORED BY INPUT	8854	0	0	11979	0	0	0	0	0	0	0	10577

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C8	PRU	RU
1	200147.000,230	022402.000,240	0	0	0	0	0	0	0	3176	594	0	0
4	100257.000,231	005202.000,240	0	0	0	0	0	0	0	5170	624	0	0
12	021307.000,231	183002.000,239	0	0	0	0	0	0	0	3419	1232	0	0

B1-51041

MISSION V EXTENDED MASTER FILE (PART 1)

CURRENT MISSION LO/TBC ,S/C ID= 10 ,GMT OF EPOCH 670800122,3300000

TIME POINTS SENT TO MASTER FILES- ACCEPTED 5905 REPLACED 7837

MASTER FILE DATA SUMMARY.

STA	COUNT	HHMMSS,DAY TO	HHMMSS,DAY	ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPSED
1	1791	080002 239	221102 283	141100	44	2194022.0	6046682.0	3852660.0
4	924	174102 239	041602 284	103500	44	2228882.0	6068532.0	3839700.0
12	3190	080102 239	050702 284	210600	44	2194082.0	6071642.0	3877560.0

B2-51041

MISSION V EXTENDED ODP FILE (PART 1)

DATA NOT USED BECAUSE. STATION=	1	2	3	4	5	6	7	8	9	10	11	12
BAD ANGLES NOT IN AUTO TRACK	92	0	0	51	0	0	0	0	0	0	0	53
DSIF DATA IN MANUAL MODE	92	0	0	51	0	0	0	0	0	0	0	53
GOOD DOPPLER IGNORED BY INPUT	289	0	0	25	0	0	0	0	0	0	0	772
GOOD ANGLES IGNORED BY INPUT	2825	0	0	1746	0	0	0	0	0	0	0	6271

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	080032.000,239	221002.000,283	0	0	0	0	0	0	0	1093	499	0	0
4	174332.000,239	041402.000,284	0	0	0	0	0	0	0	342	465	0	0
12	080132.000,239	050702.000,294	0	0	0	0	0	0	0	2732	100	0	0

FORMATS OF EDITED DSN TRACKING DATA

TM GTD 900-1 March 28, 1967

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Prepared Under Contract No. NAS 7-100
National Aeronautics & Space Administration

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TABLES

FIGURES

INTRODUCTION

This document presents the magnetic tape formats for any user of the Deep Space Network (DSN) tracking data. It is divided into two sections. The first section describes the master file produced by the Jet Propulsion Laboratories Tracking Data Processor (TDP) which essentially accumulates the raw data without applying or associating any modifications. The second section describes the Orbit Data Generator (ODG) data file in which certain minor modifications and additional information have been applied to or associated with the raw data. Such items as the stripping of the doppler bias, corrections to the angular data to account for antenna hardware calibrations based on a particular pointing direction, associating the proper transmitter frequency with the doppler and range data checking when and what station is transmitting, labeling of various time blocks, shifting of station time tags when time synchronization indicates some millisecond or microsecond shift and adding of a ranging to the ranging data to account for transponder and station delays. This latter tape is the most commonly used for it has all the necessary information for directly processing the data, whereas the former calibration transmitter frequencies, time shifts, etc., would have to be obtained externally from other sources.

SECTION I

TRACKING DATA PROCESSOR

The Master File produced by the Tracking Data Processor Program (TDP)[1] consist of a record of summary information and a series of tracking data records. The following describes each of these records.

The TDP Master File summary record consists of a three-word master file label, a twelve word summary of the master file, fifteen eight-word station summaries, one unused word, a word containing the number of replaced time points in the file, and a word containing the total number of time points in the file. A check sum word is at the end of the summary record. Table I describes in detail the format of the master file summary and the station summary. No discussion of the table is necessary. Figure 1 shows the intermediate structure of the entire TDP Master file.

Following the summary record are a series of data records. The data record consist of a three-word label (the same as the summary file label), a word containing the disc address of the record, two hundred words of time point data, and 25 unused words. A check sum word is at the end of the data record.

Each time point consists of 13 words, so 15 5/13 time points may be stored in one record. The first eight words of the second data record would be the continuation of the last time point of the first data record. Table 2 provides the detailed format of one logical record or one time point on the Master File. A discussion of Table 2 follows.

Word-1. The first word (-1) indicates the number of words remaining in the logical record. The decrement of word -1 = $(14)_8$.

Words 0-1. Words 0 and 1 contain the time of the time point in seconds past an arbitrary epoch in double precision floating point.

$$\text{TIME} = \text{DAY} + \text{HR} + \text{MIN} + \text{SEC} + \text{CYSEC} - \text{LYSEC}$$

CYSEC is the number of seconds from January 1, 1950 to January 1 of the current year. LYSEC is the number of seconds from January 1, 1950 to the arbitrary epoch time.

Table 1. Format of summary record
(Detailed format of a master file label)

Word range	Bit range	Content	Data form
0 - 2	All	TDP MASTER FILE	BCD, left adjusted
Detailed Format of the Master File Summary			
0 - 2	All	TDP STAT SUMMARIES	BCD, left adjusted
3	All	MISSON: The Mission No. for the master file	Fixed point, binary
4 - 5	All	CYSEC: No. of seconds from Jan. 1, 1950	Double-precision, floating point
6	All	CURYR: Current year (YY0100100)	Sexagesimal
7	All	MICODE: Master file identification	BCD, unadjusted
8 - 9	All	LYSEC: No. of seconds from Jan. 1, 1950 to the epoch time	Double-precision, floating point
10 - 11	All	GMTLY: Epoch time, stored backward (NNSSSSS, YYMMODDHH)	Sexagesimal

Table 1 (contd)

Detailed Format of a Station Summary			
Word range	Bit range	Content	Data form
0	Decrement	First usable disc record for the station	Fixed point, binary
	Address	Last Usable disc record for the station	Fixed point, binary
1	Decrement	Next available word in the last disc record used for this station	Fixed point, binary (complimented)
	Address	Last disc record used for this station	Fixed point, binary
2 - 3	All	Last time for the station	Double-precision, floating point.
4 - 5	All	First time for the station	Double-precision, floating point.
6	All	No. of time points for the station	Fixed point, binary
7	All	Unused	

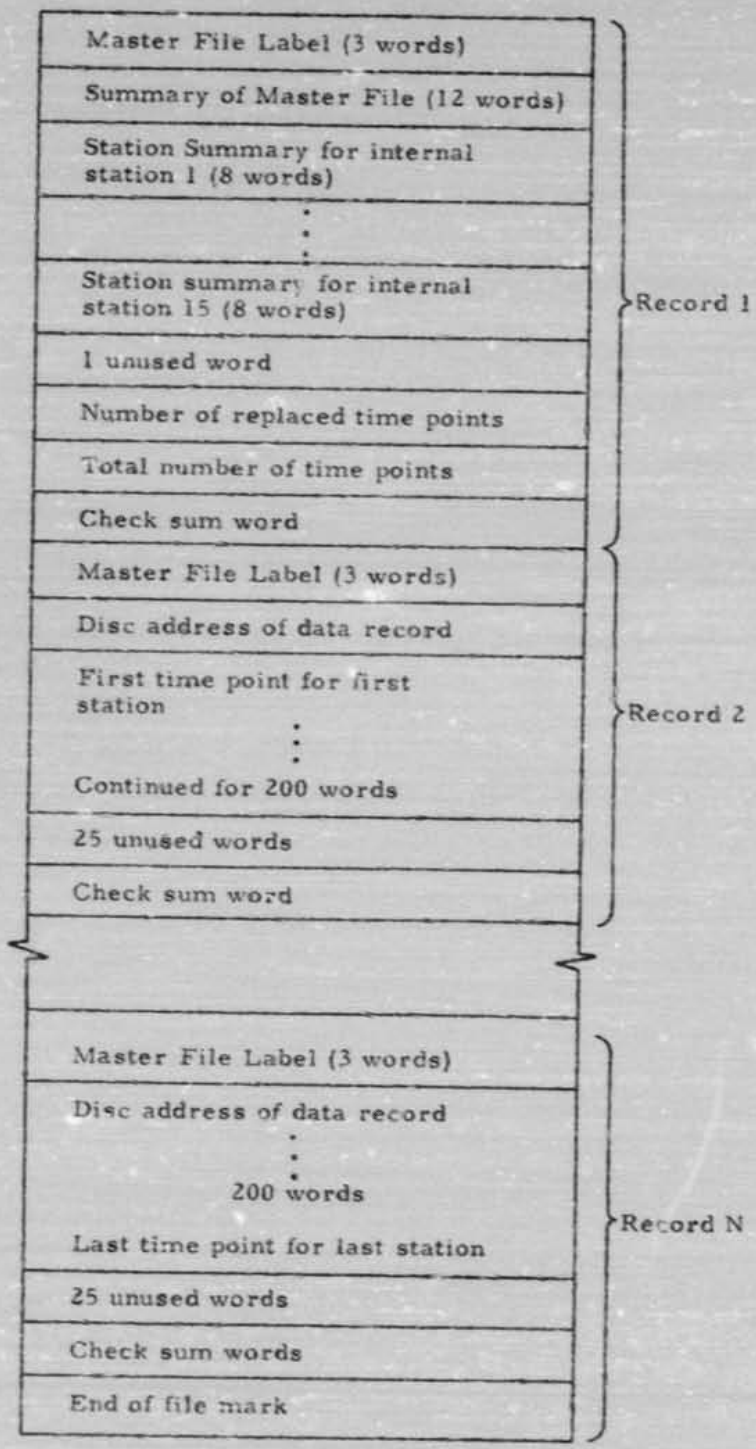

Fig. 1. Master file

Table 2. Detailed format of a master file logical record (with Goddard data)

Word range	Bit range	Contents	Data form
0-1	All	Seconds elapsed since the injection time	Double precision floating point
2	S, 1,2	Data conditions code 3 (DC3)	Binary integer
	3-17	Time resolver (TR)	Binary integer
	18-20	Counter number	Binary integer
	21-35	Internal station number	Binary integer
3	S	S=1 if HA/DEC	---
	1	Manual data bit: 1 means manual track, 0 means automatic track	Binary integer
	2	Bad angles bit: 1 means bad angles, 0 means good angles	Binary integer
	3-6	Data condition code 1 (DC1)	Binary integer
	7-9	Data condition code 2 (DC2)	Binary integer
	18-20	Angle type flag: 0=AZ/EL, 1=X30/Y30, 2=X85, Y85	Binary integer
	21-27	Doppler multiplier	Binary integer
	28	Bias indicator: 0 means biased, 1 means unbiased, 1 mc	Binary integer
	29-35	External station number	Binary integer
4	All	Elevation (EL), Declination (DEC, Y30, or Y85. (See word 3)	Floating point
5	All	Azimuth (AZ), Hour Angle (HA), X30, or X85. (See word 3)	Floating point
6	All	Range rate (RDOT)	Floating point
7	S	Doppler or range flag	---
	1-35	Doppler (DP) if sign is +	Binary integer
		Range (R) if sign is -	Floating point
8	3-17	Input sequence number (CARDNO)	Binary integer
	18-20	Data condition code 5 (DC5)	Binary integer
	21-35	Doppler averaging time (DAT)	Binary integer

Table 2 (contd)

Word range	Bit range	Contents	Data form
9	5-8	Format number (DC7)	Binary integer
	9-11	Data condition code 6 (DC6)	Binary integer
	16-17	Band designation: 0 means L band, 1 means S band, 3 means L/S band	Binary integer
	18-35	C2 Frequency (FREQC2)	Binary integer
10	All	Range units (RU) and (PRU), if DC6 9, Frequency if DC6=9	Binary integer
11	All	Unused	

Word 2. Bits S, 1 and 2 are binary right adjusted and indicate (DC3)*, i. e., the doppler type. Bits 3 through 17 contain the value for Time Resolves, which is defined as the length of time in milleseconds that has elasped since the last doppler count. This data type is not on Master Files generated prior to April 1967.

Bits 18 through 20 indicate the counter number which is determined as follows;

Counter no = 0 if DC3 < 4

Counter no = 1 if DC3 ≥ 4

Bits 21 to 35 indicate the internal station number in binary, right adjusted. A table of internal station numbers vs external station numbers for TDP Version A follows.

Internal Number	External Number	
1	72	
2	11	
3	42	DSS
4	41	
5	51	
6	74	
7	79	
8	77	
9	76	AFETR
10	83	
11	82	
12	12	
13	61	
14	14	DSS
15	13	

* Throughout the discussion of table 2 references are made to data condition codes, for the acceptable range of values of the data condition codes and their interpretation see Appendix A.

Word 3. A one in bit 1 of word 3 indicates manual data. It is set to one if (a) the time point is from an AFETR station, the decrement of the CLASS table is 0 for that station, and DC2 = 0, or (b) the time point is DSS or Goddard and DC2 = 4 or 5. A zero in bit one means auto-track data.

Bit 2 is set to one when the data point is from a DSS or Goddard station and DC2 = 1 or 5.

Bits 3 through 20 are self-explanatory.

Bits 21 through 27 contain the value of the doppler multiplier. At the DSS the doppler data is multiplied by 2^n (not to exceed 64) to reduce truncation error.

Bit 28. Bit 28 indicates if the doppler contains a 1 m bias.

Bits 29 through 35 are self explanatory.

Word 4. The value for elevation (EL), Declination (DEC), Y30 or Y85, whichever is not equal to zero, is loaded into word 4.

Word 5. The value for Azimuth (AZ), Hour Angle (HA), X30 or X85, whichever is not equal to zero, is loaded into word 5.

Word 6. If the time point is from AFETR station range rate (RDOT) is loaded into word 6. If the time point is from a Goddard or DSS station and DC1 $\neq$ 8, the doppler is divided by the doppler averaging time and loaded into word 6.

$$\text{divided doppler} = \frac{DP}{DAT}$$

Word 7. Self-explanatory.

Word 8. Bits 3 through 17 contain the count of the number of control cards and time points received so far in this record.

Bits 18 through 20 are self-explanatory.

Bits 21 through 35 contain the doppler averaging time (DAT) used to compute word 6 if the time point is from a Goddard or DSS station, if not then bits 21 to 35 are zero.

Word 9. Bits 5 - 8 indicate the DSS format identification.

Bits 9 - 11 indicate the Ranging system condition, i. e., DC 6.

Bits 16 - 17 are self explanatory.

Bits 18 - 35 contain the value of the synthesizer check (C2 frequency). This value is five times the difference between the transmitter and receiver frequency synthesizers at an L/S band DSS station.

Word 10. Word 10 contains Range Units (RU) or Planetary Range Units (PRU). The TDP does not differentiate between these two data types. After Nov. 1, 1967 the sign of word 10 will indicate if the range units are from the Mark I receiver-exciter ranging subsystem or the Mark 1A receiver-exciter ranging subsystem.

Word 11. Self-explanatory.

SECTION II

DATA FILE FROM THE ORBIT DATA GENERATOR

The Data File produced by the Orbit Data Generator (ODG) consists of a record labeling the data file, a series of station summary records, and a series of data records. The following describes each of these records.

The first record contains an Data File label in 9 words of BCD and a check sum word. The label includes the date, time and computer on which the Data File was written.

Each station summary record contains 201 words with the last word being a check sum word. The first record of the series of station summary records contains the following.

Word 0-8. Word 0 equals the mission number. Words 1 to 3 should be ignored. Words 4 through 8 are used by the ODG DISCBU subroutine.

Word 9. Unused.

Words 10-39. Words 10 through 39 contain the last time of the last point for each station in seconds elapsed since the TDP Master File epoch in double precision, floating point. Internal station 15 is first, with internal station 1 listed last.

Words 40-199. Words 40 through 199 contain station summary information. There are 17 words for each station, in which up to 15 data types and station start times may be indicated. Internal station 15 is listed first.

Example:

Word	
40	= Number of data type 1 observables for station 15.
41	= Number of data type 2 observables for station 15.
42	= Number of data type 3 observables for station 15.
.	
.	
.	

Word

55-56 = Start time of station 15 in seconds elapsed since the TDP Master File epoch.

57 = Number of data type 1 observables for station 14.

Word 200. Word 200 is a check sum word.

Record 3. Record three continues with the station summaries from word 0 through 94.

Example:

Word

0 = Number of data type 8 observables for station 6.

.

.

.

92 = Number of data type 15 observables for station 1.

93-94 = Start time of station 1 in seconds elapsed since the TDP Master File epoch

Word 95 is unused and word 96 is a check sum word.

The following are data types in the ODG:

		Units
Data type 1	Range (R)	Kilometers
Data type 2	Range Rate (DR)	
Data type 3	Elevation (EL)	Degrees
Data type 4	Azimuth (AZ)	Degrees
Data type 5	Declination (DEC)	Degrees
Data type 6	Hour Angle (HA) or Right Ascension (RA)	Degrees
Data type 7	One-way Doppler (C1)	CPS
Data type 8	Two-way Doppler (CC3 or C2)	CPS
Data type 9	Three-way Doppler (C3)	CPS
Data type 10	Time Resolver (TR)	Microseconds
Data type 11	Range Units (RU)	
Data type 12	Planetary Range Units (PRU)	Nonoseconds
Data type 13-15	Not used	

Data Records

Following the station summary records are a series of data records; each contain 201 words. Word 201 is a check sum word. The format of the logical record, which is variable in length, is described in Table 3. The intermediate structure of the Data File is shown in Fig. 2.

Table 3. Data file logical record

Word	Bit range	Contents	Data form
0	Decrement	Number of words in logical record	Binary integer
1-2		Seconds past January 1, 1950	Double precision floating point
		MSP of time in word 1	
		LSP of time in word 2	
3		Frequency increment	Single precision, floating point
4		Pass ID	BCD
5	S	Specifies doppler band	Binary integer
	1	Range (R)	Binary integer
	2	Range Rate (DR)	Binary integer
	3	Elevation (EL)	Binary integer
	4	Azimuth (AZ)	Binary integer
	5	Declination (DEC)	Binary integer
	6	Hour Angle (HA) or Right Ascension (RA)	Binary integer
	7	One-way Doppler C1	Binary integer
	8	Two-way Doppler CC3 or C2	Binary integer
	9	Three-way Doppler C3	Binary integer
	10	(TR)	Binary integer
	11	Range Units	Binary integer
	12	(PRU)	Binary integer
	13 - 15	Not used	Binary integer
	16	Specifies doppler band	Binary integer
	17	Specifies HA or RA	Binary integer
	18 - 21	Transmitter ID	Binary integer
	22 - 25	Receiver ID	Binary integer
	26 - 35	Doppler averaging time	Binary integer
6	All	Observable (No. 1)	Single precision, floating point
7		Weight code word (No. 1)	Binary integer
	S-17	A priori weighting	Binary integer
	18 - 20	Not used	Binary integer
	21 - 35	Data type sample interval	Binary integer
8	All	Observable (No. 2)	Single precision, floating point
9		Weight code word (No. 2)	Binary integer
10		Continued similarly for as many pairs as there are bits in the code word	

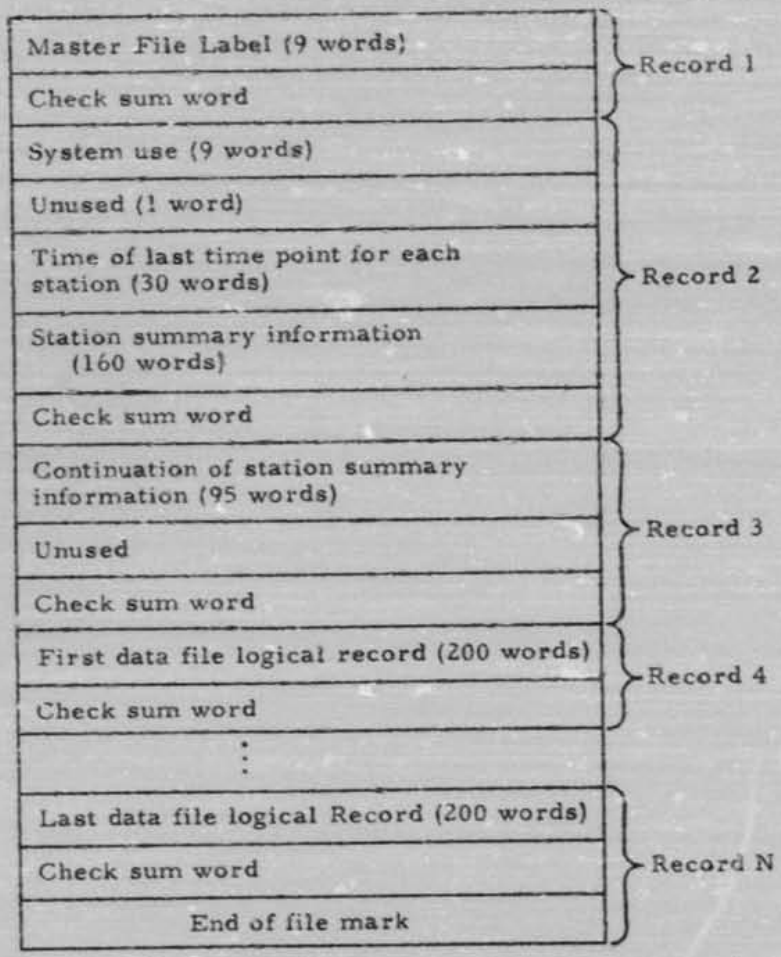

Fig. 2. Data File

APPENDIX A

DSS tracking data contain seven Data Condition Codes (DC1 - DC7). These may be interpreted as follows:

DC1 - Doppler Counting Mode

0-7 - Destructive counter readout

8 - Non-destructive ("continuous") counter is not reset at the end of the count period

DC2 - Data Condition

0 - Good doppler, good angles

1 - Good doppler, bad angles

2 - Bad doppler, good angles

3 - Bad doppler, bad angles

4 - Good doppler, good angles, suspicious data

5 - Good doppler, bad angles, suspicious data

6 - Bad doppler, good angles, suspicious data

7 - Bad doppler, bad angles, suspicious data

DC3 - Doppler type

0 - Two-way coherent

1 - One-way non coherent

2 - Three-way non coherent

3 - Three-way coherent

4-7 - Same as 0 - 3 except alternate counter is being used

DC4 - Mission Number

Value indicates what spacecraft the data was received from

DC5 - Atomic Standard Condition

0 - Rubidium standard and synthesizer VCO loop in lock

1 - One of above out of lock

2 - Not applicable

DC6 - Ranging System Condition

0, 2 - Range units are good

1, 3 - Range units are bad

4, 6 - Planetary range units are good

5, 7 - Planetary range units are bad

9 - Ground station transmitter reference frequency in Range Unit field.

DC7 - Format Number

Value indicates the DSS format where each format defines the fields of the tracking data.

REFERENCE

1. R. E. Holzman, "Users Guide to the Tracking Data Processor and Orbit Data Generator Programs," TM 65-205, May 27, 1965.

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ODG USERS GUIDE

CWO C015000 Task C015018

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TABLE OF CONTENTS

I. JPTRAJ Source Deck

The JPTRAJ source deck is a card input deck which directs the monitoring system to operate the ODG program. Reference to the Users' Guide for JPTRAJ should be made for explanation of system operation and source deck interpretation.

The format of the ODG source deck will be explained as well as the source deck symbol (FILE Card) required for program operation.

A. Source Deck Setup

The ODG source deck has the following format:

Card column	1	8	16
Card number:			
1.	*	DECK	ODGX
2.	*	ODGLK1	*
3.	FILE1=3		
4.	*A	ODGLK2	B, B
5.	*B	ODGLK1	
6.	*	WANT	A, RETURN
7.	*	GO	A
8.	*	END	

Card #1 is required for Mode II and Mode IV. It is not needed for Job Shop Mode. The deck name specified on card #1 can be either ODG or ODP. If any other source deck name is used, the program will abort with the following error message:

ODG CALLED BY ILLEGAL SOURCE DECK

The other source deck cards, with the exception of card #3, are described in detail in the Users' Guide for JPTRAJ. This source deck is designed to transfer control and data from one ODG link to another on an iterative basis.

B. FILE Card

The FILE card is the only input in the ODG source deck which is required for program operation. This card specifies the master file number and mission number of the input data that ODG is to process. The FILE card should reference the same master file and mission number that were used in the TDP source deck when the master file was stored on disc.

There are two master file summaries located on disc. The contents of these summaries are compared with the specified master file and mission number input on the FILE card. When either master file summary contains the correct mission number, the data on the corresponding file is assumed to be correct and that file of data is used in the ODG processing.

The ODG prints out the current status of both TDP Master Files, giving a summary of the data for each station. When the initialization of the master file is correct, ODG prints out the status of the master file selected for processing and continues the operation.

A number of legality checks are made on the master file initialization as specified by the FILE card. The following conditions are errors:

1. No FILE card is present in the source deck.
2. Two FILE cards are present in the source deck, (both FILE1 and FILE2).
3. The FILE card specifies an incorrect mission number.

The ODG outputs the following error message and aborts program operation:

UNABLE TO LOCATE FILE FOR REQUESTED MISSION

In MODE II operation, the user has the option of correcting the mission number by input through the Message Composer after the following message is output:

ENTER DESIRED S/C ID VIA MESSAGE COMPOSER

C. Source Deck Symbols

The ODG allows a number of source deck symbols to be entered through the system before ODG program operation. For the most part, these symbols allow the user a means for specifying variable ODG processing. The source deck symbols, which are input by the user, change nominal program data in specified symbolic locations. The ODG source deck symbols are described in detail in Appendix A.

II. ODG Inputs

The ODG uses a number of inputs during program operation. The inputs consist of cards input by the user, switch manipulation by the user, and a data file located on disc written by previous program operation. The inputs discussed include the following:

1. Source deck symbols
2. ODG control cards
3. Option switches
4. TDP Master File
5. ODP File

A. Source Deck Symbols

The source deck symbols input by the user through the JPTRAJ source deck allow a means for variable ODG processing. All the symbols on a data card which can be included in the source deck must appear in the data symbol table in the program link for which the data are to be used. The source deck

symbols defined in the programs are symbolic locations, containing nominal values, used in ODG processing. These nominal values are changed by the values input on the data cards.

A discription of all source deck symbols and their nominal values are described in Appendix A.

B. Control Card Processing

ODGLK1 is executed during every run in order to process the control cards input by the user. The ODG control card inputs are similar in format to the TDPLK2 input cards in allowing the user a flexible means of inputting data into the ODG processing.

1. Time Bracket

When the control cards are read in and processed, a number of legality checks are made concerning the time bracket on the control card as specified by the user. The time bracket is that time or span of time in which the control card will be in effect. The time bracket has the following formats:

AT HHMMSS, DAY, YEAR
AFTER HHMMSS, DAY, YEAR
FROM HHMMSS, DAY, YEAR TO HHMMSS, DAY, YEAR
BEFORE HHMMSS, DAY, YEAR

The ODG uses the TDP Master File epoch time as the earliest time reference for control card processing. When no time bracket is specified on the control card, the master file epoch time is used as the begin time of the control and the greatest possible time is used as the end time of the control when the ODG processes the control card.

The following are error conditions associated with the time bracket on the control card:

a. The start time in the time bracket precedes the master file epoch time.
b. The stop time in the time bracket precedes the start time.

All control cards are read at one time, processed for error conditions, and sorted and arranged in time sequence. Control cards which specify identical control types, identical data types, and identical station numbers are said to be like controls. In processing like control cards for one run, there are three basic rules:

a. When time brackets overlap, control cards are joined to include all times specified.
b. When a time bracket of one control card entirely spans the time bracket of a second control card, the second control card is lost.
c. When two or more control cards have identical time brackets, the last control card read eliminates those preceding it.

2. Control Card Classification

There are three classifications of control cards in the ODG processing which are dependent upon the length of time that the control stays in effect:

a. Temporary control cards which are executed only once and remain in effect for only one run. These control cards include the PRINT, REMOVE, DELETE, and some CHANGE cards.

b. Semi-permanent control cards which remain in effect

for as long as the ODG operates in a saved condition. Those CHANGE cards which are not classified as temporary form this group.

c. Permanent control cards which reside on disc and remain in effect until they are removed by the user. These control cards are not removed from disc until the user requests their removal; therefore, these control cards are not lost when the program is reinitiated. All cards except the PRINT, REMOVE, CHANGE, AND DELETE belong to this group.

The three classifications of control cards initiate different processing operations within the ODG. The temporary control cards are acted upon immediately, with the exception of the DELETE control; the semi-permanent control cards cause the setting of indicators for use in later processing of input data (see Appendix B, Sense Indicator Usage); and the permanent controls are sorted and written on disc.

3. The Permanent Control File

The permanent control cards on disc are referred to as the Control File. This file does not contain a one-to-one correspondence to the control cards input by the user. A control card may generate more than one entry in the Control File, depending upon the type of permanent control card, or the ODG may combine several cards to create one entry in the Control File. The time brackets of like controls are also a factor in determining the contents of the Control File.

The entries of the Control File are sequentially numbered and in time sequence. With the use of the PRINT control card, the user is able to display the entire contents or

specified portions of the Control File. In a like manner, the user is able to remove the entire contents or specified portions of the Control File with the REMOVE control card. See Appendix C for the Control Record Format on Disc.

4. Delete Control File

A secondary control file containing all DELETE control cards is stored on disc in a like manner as the permanent control cards. Since the DELETE control is classified as a temporary control, in effect for only one run, the Delete Control File is a temporary storage location for the Delete controls until they can be effected at the end of the ODG operations. The user is able to display the contents of the Delete Control File when specifying the printing of all controls with the PRINT ALL CONTROLS card. The REMOVE control card has no effect on the Delete Control File.

5. Control Card Ordering

The user has the option of ordering the control cards in an input deck for editing and displaying purposes by means of the CHANGE EXECUTE control card. This card has two major functions:

a. All permanent control cards which preceded the CHANGE EXECUTE card are sorted and merged with the Control File on disc.
b. All PRINT and REMOVE cards which preceded the CHANGE EXECUTE card are executed.

Thus, this card allows the user to specify the ordering of the printing, removing, and updating of the Control File. The ordering of cards not separated by a CHANGE EXECUTE

has no effect. The actual contents of the Control File on disc may or may not be effected by the input order of control cards. Since the control records on disc do not have a one-to-one correspondence to the control cards due to like controls, and overlapping or redundant time brackets, the manner in which the Control File is updated could be altered by the order of input of the control cards.

6. Control Card Format

The ODG control card format is designed to allow the user a maximum of flexibility. The following rules apply to the ODG control cards formats:

a. The control card type must appear in columns 1-6 of the card. Note: Control types of less than six characters must be followed by blank spaces (see the FREQ and INFRQ cards).

b. All variable control card data may start in card column 7, or any column thereafter.

c. All numeric fields must be separated from all non-numeric fields by a blank or a comma.

d. Control card information must be contained on one card, columns 1-72.

e. Control information on CHANGE cards may be stacked on a single CHANGE card, provided that the word STATION, if it is to appear on the card, must be the last word on the card. Example:

CHANGE MINIMUM COUNT TIME NO TAPE

is the same as:

CHANGE MINIMUM COUNT TIME
CHANGE NO TAPE

f. Floating point numbers may be input with the decimal point, the exponent convention (E), or both the

decimal point and exponent.

g. Control information applying to more than one station may be specified by stacking the stations on one card. Example:

CHANGE EPOCH HHMMSS, DAY, YEAR, STATION 1,2,3

h. A $ will end the control information on the control card. Therefore, it is possible for the user to punch applicable comments on the control card following the $ sign. Note: The $ sign is not necessary to end the control information. Example:

CHANGE NEW ODP FILE $ SIMULATE C.S.#11

is the same as:

CHANGE NEW ODP FILE

Note: The $ sign immediately following a numeric field will cause an error condition. A blank must be inserted between a number and the $ sign since numeric fields must be separated by a blank or comma.

i. Control card decks must be followed by an END DATA card, which is a (0 in columns 71-72. In Mode II, a blank card must also follow the END DATA card.

j. In specifying station numbers, the internal station number must be used. The internal station number corresponds to the TDP assignment of internal station numbers. (The external station number has been replaced with the internal station number for processing convenience.) See Appendix D for Internal/External Station Numbers.

k. Control cards directly referencing data types as input information on the control card cannot reference data type PRU. All references to PRU are automatic when RU is referenced on the control card. A master file point will never contain both PRU and RU data types. The following control cards are included in this category:

1. ADJUST
2. DELETE

3. IGNORE
4. WEIGHT

7. Acceptable Control Cards

The following list of acceptable ODG control cards is arranged in alphabetic order for easy access to the control card definition and format.

1 - ADJUST
2 - CHANGE EPOCH
3 - CHANGE EXECUTE
4 - a. CHANGE LIGHT TIME
  - b. CHANGE NO LIGHT TIME
5 - a. CHANGE MAXIMUM ELEVATION ANGLE
  - b. CHANGE MINIMUM ELEVATION ANGLE
6 - CHANGE MINIMUM COUNT TIME
7 - CHANGE NEW ODP FILE
8 - CHANGE NO ANGLE CORRECTIONS
9 - CHANGE NO ODP FILE
10 - CHANGE NO RESOLVER CORRECTIONS
11 - CHANGE NO TAPE
12 - CHANGE RANGE RECYCLE
13 - CHANGE RATE
14 - CHANGE READ MORE CARDS
15 - CHANGE RESTORE ODP FILE FROM TAPE
16 - CHANGE UPDATE ODP FILE
17 - CHANGE USE ANGLES NOT IN AUTO TRACK
18 - a. CHANGE USE BAD RANGE
  - b. CHANGE USE BAD RANGE WEIGHTED OUT
19 - CHANGE USE DC2 MANUAL DATA
20 - a. CHANGE USE FREQUENCIES NOT CHECKED
  - b. CHANGE USE ONLY CHECKED FREQUENCIES
21 - CHANGE USE NO DOPPLER NOT IN AUTO TRACK
22 - CHANGE USE OUT OF LOCK ETR DATA
23 - CHANGE USE RANGE

24 - a. CHANGE USE REMAINING RANGE
- b. CHANGE USE REMAINING RANGE WEIGHTED OUT
25 - COUNT TIME
26 - DELETE
27 - FREQ (SYNFREQ)
28 - IGNORE
29 - INFREQ (SEE L TO S BIAS)
30 - INFRQ (SEE L TO S BIAS)
31 - L TO S BIAS (INFREQ, INFRQ)
32 - PASSID
33 - PRINT
34 - RANGE FACTOR
35 - REMOVE
36 - SAMPLE TIME
37 - SHIFT TIME
38 - SYNFREQ (SEE FREQ)
39 - TRANSMITTER ON
40 - WEIGHT

ADJUST Card

The ADJUST control card is used to eliminate bias errors in the tracking data before it has been output on the ODP File. The input value on the control card will be added to all specified data types from the specified stations, within the specified time interval.

The observable output on the ODP File within the specified time range has been modified by:

$$X = X_o + N$$

where:

X = final observable
X_o = processed data point

This control is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

ADJUST XXXXXXX BY K, (TIME BRACKET), STATION N

where:

XXXXXXX = one or more of the following data types:

R, DR, EL, AZ, DEC, HA, C1, CC3, C3, RU, X30, Y30, X85, Y85, ANGLES, ANGLE, DOPPLER

K = amount that the data type is to be adjusted in the same units as the data type specified. The number may be floating or fixed point, positive or negative.

N = station number

For each data point that is adjusted, a notation showing the correction will precede the printing of the data point on both IBM 1401 and SC 3070 output. The notation has the following format:

STATION N XXX CORRECTED. XXXA=±.XXXXXXXX XX
DV=±.XXXXXXXX XX XXXC=±.XXXXXXXX XX
HHMMSS.SSS, DDD GMT

where:

N = station number
XXX = one or more of the following data types:
R, DR, EL, AZ, DEC, HA, CI, CC3, C3, RU, PRU,
X30, Y30, X85, Y85
XXXA = data type to be corrected with its raw value
DV = amount of correction
XXXC = result of adjustment
HHMMSS.SSS, DAY GMT = time of the data point

When a data point has been corrected by ODG, the following comment is printed above the ODP File Summary to inform the user of data modification:

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

CHANGE EPOCH Card

This CHANGE card controls the data output on the ODP File by defining the earliest processing time for a station. No TDP Master File data before the specified time will be output on the ODP File. When no CHANGE EPOCH card is input, the ODG will generate an epoch time for each station which is the time of the last point processed during the previous run, if the program is running saved; or the time of the master file epoch, if the program is running for the first time.

When the epoch time read in for a station is earlier than the time of the last data point previously processed for that station, earlier data may be merged on the ODP File. Duplicated data points are replaced with the data from the current run for each station when this condition occurs.

The CHANGE EPOCH control card is effective for one run.

The format of the control cards is:

CHANGE EPOCH HHMMSS, DAY, YEAR, STATION N

where:

N = station number

Note: The CHANGE EPOCH control card may be used as an IGNORE control when the user desires to ignore all data for a station. The CHANGE EPOCH card is much faster in this case.

CHANGE EXECUTE Card

This control card causes the ODG to sort all permanent control cards, merge them with any existing controls on disc, and write the entire Control File on disc. All PRINT or REMOVE cards which precede the CHANGE EXECUTE card will be executed at this time.

The CHANGE EXECUTE control must be included under the following conditions:

1. All REMOVE control cards must be separated from all permanent controls by a CHANGE EXECUTE card.

   Note: All control cards of the type specified on the REMOVE card, which are read between the REMOVE card and the CHANGE EXECUTE card, or end-of-data card, will be removed, as well as the specified controls in the Control File.

2. All REMOVE cards must be separated from all PRINT cards by a CHANGE EXECUTE card.

The control card has an immediate effect.

The format of the control card is:

CHANGE EXECUTE

CHANGE LIGHT TIME Card

CHANGE NO LIGHT TIME Card

When a spacecraft is a great distance from the earth, the round-trip signal propagation time may be very large. In order to account for the large signal propagation times for interplanetary flights, the user is able to specify that a round-trip propagation time, T, be computed for all two-way doppler points. In testing for logical transmitter errors, all tracking station transmitter begin and end times are moved forward by T seconds. Transmitter-on times for beacon (one-way data) are not altered from the input values by the control card.

The control card, CHANGE LIGHT TIME, is effective for as long as the program runs saved, or until the card, CHANGE NO LIGHT TIME CORRECTIONS is input.

See Section IV, D-5.c, Light Time Correction Processing.

The format of the control cards is:

CHANGE LIGHT TIME CORRECTIONS
CHANGE NO LIGHT TIME CORRECTIONS

Note: The word CORRECTIONS is optional on the control card.

CHANGE MAXIMUM ELEVATION ANGLE Card

CHANGE MINIMUM ELEVATION ANGLE Card

The CHANGE ELEVATION control cards are used to change the maximum and/or minimum elevation limitations used in angle processing. The values input on the control cards set the allowable ranges for angle observables for the specified stations. The input values for maximum or minimum elevation are converted to Sin EL and stored in tables MAXEL or MINEL by station number.

Either one or both control cards may be input for each station. See Appendix A for the nominal values for maximum and minimum elevation limitations for all stations in tables IMAXEL and IMINEL. For further explanation, refer to Section IV,C-4, DSIF and Goddard Angles Tests.

These control cards remain in effect for as long as the program runs saved.

The format of the control cards is:

CHANGE MAXIMUM ELEVATION ANGLE X STATION N
CHANGE MINIMUM ELEVATION ANGLE X STATION N

where:

X = floating point number in degrees
N = station number

Note: No time bracket may be specified on the control card.

CHANGE MINIMUM COUNT TIME Card

This card is used in conjunction with the COUNT TIME card and the SAMPLE TIME card. The CHANGE MINIMUM COUNT TIME card establishes the minimum doppler compression time interval. No doppler points will be compressed over a period of time smaller than the value specified by the user on this card.

The printed summary at the end of the ODG run includes the number of doppler data points eliminated by the CHANGE MINIMUM COUNT card for each station.

The CHANGE MINIMUM COUNT TIME card will be rejected if the value K is greater than all requested input COUNT times.

For further explanation, refer to Section IV, D-5, Continuous Count Doppler Processing

The CHANGE MINIMUM COUNT TIME is effective for as long as the program runs saved.

The format of the control card is:

CHANGE MINIMUM COUNT TIME K

where:

K = fixed or floating point number in seconds

CHANGE NEW ODP FILE Card

This card will cause the existing ODP File Summaries on disc to be cleared, and an entirel, new ODP File will be made from the tracking data processed during the current run. All statio. epochs are reset to the TDP Master File epoch time.

The CHANGE NEW ODP FILE card has the same effect as depressing option switch #11 in Mode II and Mode IV. (For further explanation, refer to Section I-C, ODG Option Switch Usage.)

The card is effective for one run.

The format of the control card is:

CHANGE NEW ODP FILE

CHANGE NO ANGLE CORRECTIONS Card

This control card is used to suppress angle corrections for all stations. DSIF angle pairs are nominally corrected for systematic errors introduced by antenna sag. For a description of angle corrections see Section IV, D-3.

This control card is effective for one run.

The format of the control card is:

CHANGE NO ANGLE CORRECTIONS

CHANGE NO ODP FILE Card

This control card causes the current ODG run to be completed without updating the ODP File. No TDP Master File data will be processed and added to the ODP File on disc. The use of this card allows the user the option of editing the control cards in the Control File on disc without changing the ODP File.

This control card is effective for one run.

The format of the control card is:

CHANGE NO ODP FILE

CHANGE NO RESOLVER CORRECTIONS Card

This control card is used to suppress time resolver corrections to DSIF doppler data. DSIF doppler data are nominally corrected for high frequency noise. For a description of the time resolver equation, see Section IV, D-5d.

This control card is effective for one run.

The format of the control card is:

CHANGE NO RESOLVER CORRECTIONS

CHANGE NO TAPE Card

In the nominal mode, the ODG writes the ODP File on disc and onto a tape unit; in Job Shop Mode the tape unit is B8; in Mode II and Mode IV the tape unit is B2. The user is able to specify no ODP File tape writeoff by entering this control card in the input deck.

This control card is effective for one run.

The format of the control card is:

CHANGE NO TAPE

CHANGE RANGE RECYCLE Card

This card is used to change the nominal values for the range recycle table. This control card is used in conjunction with the RANGE FACTOR control card to correct sawtooth errors in the range observable. For further explanation, refer to Section IV, D-2, Sawtooth Error Correction to ETR Data.

Each station has a range recycle value; these nominal values may also be changed through the ODG Source deck by using the symbolic location RANREC.

This control card is effective for as long as the program runs saved.

See Appendix A, source deck symbol, RANREC, for the nominal range recycle values for each station.

The format of the control card is:

CHANGE RANGE RECYCLE K, STATION N

where:

K = a floating point number in kilometers. This input is quantity M in the sawtooth correction formula.

N = station number

CHANGE RATE Card

This card is used to reduce the number of points output on the ODP File. Only every $(K+1)^{th}$ acceptable data point is sent to the ODP File, where K is the value input by the user. This applies to all data types.

This control card is effective for as long as the program runs saved.

The user may remove the CHANGE RATE control card by inputting the following control card:

CHANGE RATE O

The format of the control card is:

CHANGE RATE K

where:

K = the number of data points to be skipped between each data point sent to the ODP File. , Every $(K+1)^{th}$ data point is output on the ODP File.

CHANGE READ MORE CARDS

This control card causes the ODG to execute a HOLDIT pause (see option switch 32, 33 in Section I, C, ODG Option Switch Usage) pause after reading the control card deck in the card reader. The user is able to read in additional control cards after the pause, if the user chooses to continue.

This card has the same operational effect as the CHANGE EXECUTE control card.

The control card causes the above effect for one time only.

The format of the control card is:

CHANGE READ MORE CARDS

CHANGE RESTORE ODP FILE FROM TAPE Card

This control card specifies the action the ODG is to execute regarding the ODP File. The ODG will use an existing ODP File which was written on tape. The ODG will restore the ODP File onto disc, including the ODP File Summaries, and the tracking data being processed in the current run will be added to the ODP File on disc.

This control card has the same effect as option switch #10 in Mode II and Mode IV. For further explanation refer to Section I-C, ODG Option Switch Usage.

This control card is effective for one run.

The format of the control card is:

CHANGE RESTORE ODP FILE FROM TAPE

CHANGE UPDATE ODP FILE Card

This control card specifies the action the ODG is to execute regarding the ODP File. The tracking data received in the current run will be processed against the ODP File currently on disc.

This card has the same effect as option switch #12 in Mode II and Mode IV. For further explanation, refer to Section I-C, ODG Option Switch Usage.

This card is effective for one run.

The format of the control card is:

CHANGE UPDATE ODP FILE

CHANGE USE ANGLES NOT IN AUTO TRACK Card

This card will cause the ODG to not reject DSIF angles which have the bad angle flag on, DC2=1 or 5.

The control card is effective for one run.

The format of the control card is:

CHANGE USE ANGLES NOT IN AUTO TRACK

CHANGE USE BAD RANGE Cards

The ODG nominally places the N^{th} range unit point of every valid set of range units on the ODP File. Good RU has DC6=0; bad RU has DC6=1. All good range units other than the N^{th} RU are discarded until a new set of good RU has been read. A new set of good RU are those points which follow a bad RU point.

CHANGE USE BAD RANGE

This card causes the ODG to place all range unit data without regard to DC6 on the ODP File. The nominal or user input weight code is used for all RU data points.

CHANGE USE BAD RANGE WEIGHTED OUT

This card has the same effect as the above card except that all data points which are not the N^{th} point of a set of points are assigned a weight code of 777777. In the ODP, this produces a negative weight, which causes the data point to be eliminated from orbit computation.

Both CHANGE USE BAD RANGE cards are effective for one run.

The format of the cards is:

CHANGE USE BAD RANGE
CHANGE USE BAD RANGE WEIGHTED OUT

CHANGE USE DC2 MANUAL DATA Card

This card causes the ODG to not reject DSIF doppler or angles with the manual data flag on, DC2=4 or 5. This data condition code indicates the quality of the data sampled.

The control card is effective for one run.

The format of the control card is:

CHANGE USE DC2 MANUAL DATA

CHANGE USE FREQUENCIES Cards

Normal ODG operations process L-S Band Station frequency data for two-way doppler as follows:

1. A test is made between the user input frequency specified on the L to S BIAS control card and a receiver reference frequency computed from C2 data. When the test fails the doppler data is rejected.
2. The input frequency is used for accepted data points.
3. All data is accepted which has a zero in the C2 doppler field.

CHANGE USE FREQUENCIES NOT CHECKED

This card causes the ODG to modify the normal L-S band frequency processing. This card specifies the ODG to use the control card input frequency for two-way doppler data without performing a validity test on the frequency. Therefore, ODG accepts all points and uses all input frequencies.

CHANGE USE ONLY CHECKED FREQUENCIES

This card causes the ODG to modify the normal L/S band frequency processing. This card specifies the ODG to perform the nominal frequency operations #1 and 2 above, but to reject data points with a zero in the C2 doppler field.

Both cards are effective for one run.

The format of the cards is:

CHANGE USE FREQUENCIES NOT CHECKED
CHANGE USE ONLY CHECKED FREQUENCIES

CHANGE USE NO DOPPLER NOT IN AUTO TRACK Card

This card will cause the ODG to process only good doppler data with DC2=0.

The number of doppler data points that this control card eliminates from the current run will appear in the rejected data summary under GOOD DOP NOT IN AUTO TRACK.

This control card is effective for one run.

The format of the control card is:

CHANGE USE NO DOPPLER NOT IN AUTO TRACK

CHANGE USE OUT OF LOCK ETR DATA Card

This card causes the ODG to not reject ETR data with the manual data flag on (DC2=0). This data condition code indicates the quality of the data sampled.

This control card is effective for one run.

The format of the control card is:

CHANGE USE OUT OF LOCK ETR DATA

CHANGE USE RANGE POINT Card

The nominal mode of ODG operation places the first range unit point on the ODP File out of a set of good data. The set of good range unit data are those points which have DC6=1 and follow a bad RU with DC6=1. The ODG discards all other good Range Unit points of the valid set.

This card specifies which good range unit point is to be output on the ODP File out of a set of good RU data points. The ODG will process and output the N^{th} point of every batch of good RU data points on the TDP Master File. When there are fewer than N points for a set of good ranging points, no RU is selected from the set to be output on the ODF File.

The nominal RU weight code or the user input weight code will be used for all RU data points selected in the above manner.

This control card is effective for as long as the program runs saved.

The following is the card format:

CHANGE USE RANGE POINT K

where:

K = fixed point number less than 16. The nominal value is: K = 1

CHANGE USE REMAINING RANGE Cards

The ODG nominally places the N^{th} range unit point of every valid set of range units on the ODP File. Good RU has DC6=0; other than the N^{th} RU are discarded until a mew set of good RU has been read. A new set of good RU are those points which follow a bad RU point.

CHANGE USE REMAINING RANGE

This card causes the ODG to output all good RU data points, DC6=0, on the ODP File. Nominal or user input weight codes are used for all RU data points.

CHANGE USE REAMINING RANGE WEIGHTED

This card causes the ODG to output all good RU data points, DC6=0, on the ODP File. All RU data points which are not the N^{th} point of the set of points will be assigned a weight code of 777777. In the ODP this produces a negative weight, which causes the point to be eliminated from the orbit computation.

These control cards are effective for one rum.

The format of the control cards is:

CHANGE USE REMAINING RANGE
CHANGE USE REMAINING RANGE WEIGHTED OUT

COUNT TIME Card

This control card is used in conjunction with the SAMPLE TIME card and CHANGE MINIMUM COUNT TIME control cards. The COUNT TIME card specifies the maximum and preferred time interval over which continuous count doppler is to be compressed. The time period over which doppler data is compressed is an interval not greater than the maximum COUNT time and is a multiple of the SAMPLE time. When the CHANGE MINIMUM COUNT TIME control card has been input by the user, the doppler compression time interval will not be less than the time specified on the CHANGE MINIMUM COUNT TIME control card.

The COUNT time is set equal to the SAMPLE time under the following conditions:

1. No COUNT time is input by the user.
2. The COUNT time is less than the SAMPLE time.

This control card is a permanent control on disc and remains in effect until the user removes it.

For further explanation, refer to the CHANGE MINIMUM COUNT TIME and SAMPLE TIME control cards, and Section IV, D-5, Continuous Count Doppler Processing.

The format of the control card is:

COUNT TIME K (TIME BRACKET), STATION N

where:

K = fixed point number in seconds, not greater than 1023
N = station number

DELETE Card

This card is used to eliminate specified data points from the ODP File after all data has been processed and added to the ODP File by ODG. Every deleted data point will be reflected in the Delete Summary by station number.

The DELETE control cards will be temporarily stored on disc until they are needed at the end of the ODG processing. This Delete Control File will contain the time ordered DELETE control cards which are sequenced relative to the DELETE controls only. The Delete Control File will be printed separately upon a PRINT ALL CONTROLS request.

This control card is effective for one run.

The format of the control card is:

DELETE XXXXXXX, (TIME BRACKET), STATION N

where:

XXXXXXX = one or more of the following data types:
R, DR, EL, AZ, DEC, HA, C1, CC3, C3, RU, ANGLES, ANGLE, DOPPLER

n = station number

Note: Angles X30, Y30, X85, Y85 will have no effect on the control card input as this system of angles will have been converted to the AZ/EL angle system by the time the delete process is effected.)

FREQ Card

SYNFREQ Card

These control cards, which are synonomous in meaning and interchangeable in use, allow the user to specify a frequency for the spacecraft and the station which is currently receiving or transmitting data.

When using the FREQ control card for L-BAND stations, the user inputs the ground station transmitter reference frequency, f_q. For S-BAND stations, this control card specifies both the transmitter reference frequency, f_q, and the receiver reference frequency, f_i. (That is, $f_q = f_i$.)

When using the FREQ control card for the beacon, the user inputs the spacecraft auxiliary oscillator frequency, f_{sc}.

These control cards are permanent controls on disc and remain in effect until the user removes them.

The format of the control card is:

FREQ F(TIME BRACKET), STATION N
FREQ G(TIME BRACKET), BEACON

where:

F = 8 digits giving f_q minus 20×10^6 cycles per second, with an assumed decimal place before the last digit. Thus, if f_q is 22048763.0 cps, the frequency entry would be 20487630.

G = 7 digits giving f_{sc} minus 2290×10^6 cycles per second, with an assumed decimal place after the last digit. Thus, if f_{sc} is 229784391.0 cps, the frequency entry would be 7843921.

N = station number

Note: FREQ must be followed by <u>two</u> blanks because of the six-character control type convention.

IGNORE Card

This control card allows the user the option of ignoring specified data from specified stations for a specified time interval. The data is not used in ODG computations and is not output on the ODP File.

The control is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

IGNORE XXXXXXX (Time Bracket), Station N

where:

XXXXXXX = one or more of the following data types:

R, DR, EL, AZ, DEC, HA, C1, CC3, C3, RU, X30, Y30, X85, Y85, ANGLES, ANGLE DOPPLER

N = station number

Note: Certain restrictions must be followed when IGNORE cards are used due to program errors and poor program code. The merging of IGNORE cards onto the Control File does not work properly; consequently all existing IGNORE controls on disc should be removed from the file and reentered with the new controls. (When all the new IGNORE control cards are for one station, only the existing controls for that station should be removed and then reentered.)

All IGNORE cards for any one station must be inserted in one input deck. Since the control cards are merged onto the Control File in a batch of 100 cards, the limit of IGNORE cards for one station is 100.

L TO S BIAS Card
INFREQ Card
INFRQ Card

These control cards, which are synonomous in meaning and interchangeable in use, are used to input the receiver reference frequency, f_i, for L/S Band Stations.

These control cards are permanent controls and remain in effect until the user removes them.

The frequency specified on the control is usually constant throughout a mission.

The format of the control card is:

L TO S BIAS F, (TIME BRACKET), STATION N

where:

F = 8 digits giving f_q minus 20×10^6 cycles per second, with an assumed decimal place before the last digit. Thus if f_q is 22048763.0 cps, the frequency entry would be 20487630

N = station number

Note: The format of the L TO S BIAS control requires that the blank spaces be present.

PASSID Card

This card is used by the ODG to label output data. The ODG does not perform any computations with the data included on the control card, but outputs it with the specified data on the ODP File. This identification has no effect on orbit computations; it merely classifies data into a series of logical groups. In the ODP, certain statistical quantities are computed separately for each block of data defined by a PASSID card.

The PASSID can consist of five or six alpha-numeric characters. When the user specifies only five characters, the ODG will insert a slash after the second character. Thus, if 01242 is inserted on a PASSID card, the output of the PASSID on the ODP File will read 01/242.

When no PASSID control card is entered for data in a time bracket, the word "NONE" is output as the PASSID on the ODP File.

This control card is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

PASSID P, (TIME BRACKET), STATION N

where:

P = five or six alpha-numeric characters, blanks are not allowed

N = station number

PRINT Card

This control card will cause the ODG to display all or a part of the Control File on disc. Each control entry in the Control File is accompanied by an entry number which was assigned to the control when it was time-ordered and initially sequenced. The external entry number of the control entry may alter on subsequent runs when additional controls are added to the Control File.

The Control File may be printed in its entirety, by station number, by the control type, or by control number. The PRINT card will not be executed until a CHANGE EXECUTE control card has been read.

There are two basic rules the user should follow when using the PRINT control card:

1. All PRINT cards should be separated from all REMOVE cards by a CHANGE EXECUTE card.
2. All PRINT cards should be separated from all permanent control cards by a CHANGE EXECUTE card.

When two or more PRINT cards are placed together in the input deck, the controls will produce a single table in the printout containing all the requested Control File entries intermixed in time sequence. When the PRINT controls are separated by a CHANGE EXECUTE control card, the PRINT cards will produce separate time-ordered tables of requested Control File entries.

When a PRINT ALL CONTROL request is made by the user, the entire Control File will be displayed, as well as a separate printout of the Delete Control File, if the Delete Option has been requested during the current run.

The PRINT control has the following formats:

PRINT ALL CONTROLS
PRINT X
PRINT X STATION N
PRINT CONTROL I

where:

X = one of the following control card types:
IGNORES, FREQS, L TO S BIASES, TRANSMITTERS, COUNTS, SAMPLES, PASSIDS, WEIGHTS, ADJUSTS, RANGE FACTORS, SHIFTS

N = station number

I = control entry number in the Control File

Note: When the station field is omitted, the PRINT card will be applied for all stations.

RANGE FACTOR Card

This card is used in conjunction with the CHANGE RANGE RECYCLE control card to eliminate sawtooth errors in the range observable. Ground equipment at the ETR stations introduce this random error in the tracking data. The input value on the RANGE card is used in the sawtooth correction formula. For further explanation, refer to Section IV, D-2, Sawtooth Error Correction to ETR Data.

This control card is a permanent control on disc and remains in effect until the user removes it.

See Appendix A, source deck symbol, RANREC for the nominal range recycle values for each station.

The format of the control card is:

RANGE FACTOR K,(TIME BRACKET),STATION N

where:

K = dimensionless floating point number, (this input is quantity N in the sawtooth correction formul)
N = station number

For each data point that is corrected, a notation showing the correction will precede the printing of the point on both IBM-1401 and SC-3070 output. The notation has the following format:

STATION N RANGE CORRECTED. RANGEA±. XXXXXXXX XX
DV±XXXXXXXX XX RANGEC±. XXXXXXXX XX HHMMSS. SSS,
DDD GMT

where:

N = station number
RANGEA = uncorrected range value
DV = amount of the correction
RANGEC = corrected range value
HHMMSS. SSS, DDD = GMT time of the data point

When a data point has been corrected by ODG, the following comment is printed above the ODP File Summary to inform the user of data modification:

PLEASE NOTE-DATA VALUES ADJUSTED BY POLY

REMOVE Card

This control card is used to clear the entire contents, or a portion, of the permanent Control File on disc. The REMOVE control card should always be used when restarting the ODG initially, or when the Control File on disc has been destroyed between runs. The control card may also be used to edit the control file. The user should use the REMOVE control with care since removing a part of the Control File can cause changes in the remaining control entries and their relative sequence on disc.

The REMOVE control card does not take effect until a CHANGE EXECUTE card has been read, or until all controls and an end-data has been read. Therefore, when new cards are to be read to replace the controls being removed, the remove and CHANGE EXECUTE cards should precede the new control cards to be added to the Control File.

There are two basic rules the user should follow when using the REMOVE:

1. All REMOVE cards should be separated from all permanent control cards by a CHANGE EXECUTE card.
2. All REMOVE cards should be separated from all PRINT cards by a CHANGE EXECUTE card.

The REMOVE control has the following formats:

REMOVE ALL CONTROLS
REMOVE CONTROL I
REMOVE X
REMOVE X (TIME BRACKET), STATION N

where:

I = control entry number in the Control File
X = one of the following control card types:

IGNORES, FREQS, L TO S BIASES, TRANSMITTER, COUNTS, SAMPLES, PASSIDS, WEIGHTS, ADJUSTS, RANGE FACTORS, SHIFTS

N = station number

Note: When the station field is omitted, the REMOVE card will be applied to all stations. When the time bracket is omitted the REMOVE card will be applied for all times.

SAMPLE TIME Card

This control card is used in conjunction with the COUNT TIME card and CHANGE MINIMUM COUNT TIME card to establish the actual time interval over which continuous count doppler is compressed. The SAMPLE time serves as a data validation function. The time interval between adjacent continuous count doppler points on the master file is compared with the SAMPLE time input by the user. When the time intervals are not equal, the ODG does not compress the doppler data over the interval, and the data point is ignored.

When the user has not input the SAMPLE time, the ODG computes the SAMPLE time by differencing the times between adjacent doppler points on the TDP Master File.

The ODG will not compress doppler over a COUNT time determined by a computed SAMPLE time greater than 60 seconds.

For further explanation refer to the CHANGE MINIMUM COUNT TIME and COUNT TIME control cards, and Section IV, D-5, Continuous Count Doppler Processing.

This control card is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

SAMPLE TIME S, (TIME BRACKET), STATION N

where:

S = fixed point number of seconds
N = station number

SHIFT TIME Card

This card causes the ODG to shift the time label for both DSIF, GODDARD and ETR data. The correction to the time is made for all data types from the specified station. The time correction is applied to doppler data after the doppler has been compressed.

This control card is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

SHIFT TIME K, (TIME BRACKET), STATION N

where:

K = amount that the time is to be shifted in seconds. The number may be floating or fixed point, positive or negative.
N = station number

For each data point that is time corrected, a notation showing the correction will precede the printing of the point of both IBM 1401 and SC 3070 output. The notation has the following format:

STATION N TIME CORRECTED. TIME K=HHMMSS.SSS, DAY
GMT DV=±.XXXXXXXX XX TIME C=HHMMSS.SSS, DAY GMT

where:

N = station number
TIME K= time before correction in GMT
DV = amount of the time correction
TIME C= result of the time correction in GMT

When a data point has been time shifted by ODG, the following comment is printed above the ODP File Summary to inform the user of data modification:

PLEASE NOTE-DATA VALUES ADJUSTED BY POLY

TRANSMITTER ON Card

This control card is used to specify the transmitter identification for doppler computations. The time specified on the control card establishes the time at which a station has turned on its transmitter.

All station transmitters are off unless the user has turned them on with the TRANSMITTER control card. Only one station may be transmitting in a time interval. When a spacecraft (BEACON) is transmitting, no station may be transmitting.

There is a table within the ODG which defines acceptable stations for transmitting and receiving coherent three-way doppler (CC3). The user has the option of entering acceptable stations through the ODG source deck. The station which receives CC3 data must appear in the CC3RC table, and the station which transmits the data must appear in the same entry in the CC3XM table. (See Appendix A for further information for CC3RC and CC3XM nominal table values.)

This control card is a permanent control on disc and remains in effect until the user removes it.

The format of the control card is:

TRANSMITTER ON (TIME BRACKET), STATION N
TRANSMITTER ON (TIME BRACKET), BEACON

where:

N = station number

Note: When the word "AT" is specified in the time bracket, the ODG interprets it as meaning "AFTER".

WEIGHT Card

This control card allows the user to assign a priori weighting to the specified data types, for the specified stations, within the specified time interval. The a priori weighting is an assigned number indicating the statistical reliability of the data point. The number is used by the ODP in assigning a weight to the data point; the ODG does not perform any computations with the weight code, but outputs it with the data point on the ODP File.

When the user specifies a weight code with the first digit equal to seven, the ODP will give data points within the specified time range a negative weight which causes the point to be eliminated from the orbit computations.

This control card is a permanent control on disc and remains in effect until the user removes it.

See Appendix G for the nominal weight codes for all data types.

The format of the control card is:

WEIGHT XXXXXXX DATA TYPE Q(TIME BRACKET)STATION N

where:

XXXXXXX = one or more of the following data types:
R, DR, EL, AZ, DEC, HA, C1, CC3, C3, RU, X30, Y30, X85, Y85, ANGLES, ANGLE, DOPPLER

Q = Six digit octal weight code. Usually, each digit is in the range 0-4.

Note: The words DATA TYPE may be shortened to DATA, TYPE, or DT.

C. ODG Option Switch Usage

The user is given a limited amount of real time program control by manipulation of the option switches in Mode II and Mode IV. (Option switches are non-functional in Job Shop Mode.) Option switch entry varies between Mode II and Mode IV as follows:

1. Mode II - Option switches are entered by depressing the specified switches and transmitting the ENTER OPTION SWITCHES command to the ODG.

2. Mode IV - Option switches are entered by depressing the corresponding console keys on the 7094 console. Some option switches are tested continuously during program operation; they may be turned on or off at any time. Under certain circumstances, the program will pause and request option switch entry. The desired option switches should be entered, followed by a momentary depression of the sign key.

Option switch functions are as follows:

Option Switch	Function
1	When depressed, the ODG will not select the card reader to read the control cards.
2	When depressed, the ODG will suppress the line-by-line printout of points sent to the ODP File on the on-line or 3070 printers. The associated correction printout which precedes the line of print is also suppressed. Off-line printout is not affected. The switch is tested before each line is output. (In Mode II and Mode IV, option switch 2 should be entered at all times unless the user requires to see the 3070 output. The ODG running time will be drastically increased if the user requests 3070 output.)

3 When depressed, the ODG will not printout the frequency test rejection message of a data point on the on-line and 3070 printers. Off-line printout is not affected. The switch is tested before each line is output.

4 When depressed, the ODG will not output the logical transmitter error rejection message of a data point on the on-line or 3070 printers Off-line printout is not affected. The switch is tested before each line is output.

10 When depressed, the program will read the ODP File on tape unit B2 onto disc before processing any tracking data. This switch entry has the same affect as entering the CHANGE RESTORE ODP FILE FROM TAPE control card. This switch is tested once in ODGLK2. (Refer to Section III. A, ODP File.)

11 When depressed, the ODG will make an entirely new ODP File. This switch entry has the same effect as entering the CHANGE NEW ODP FILE control card. This switch is tested once in ODGLK2. (Refer to Section III. A, ODP File.)

12 When depressed, the ODG will update the ODP File currently on disc with the tracking data from the current run. This switch entry has the same effect as entering the CHANGE UPDATE ODP FILE control card. This switch is tested once in ODGLK2. (Refer to Section III. A, ODP File.)

32 - 33

These switches are used in the switch loop during a pause, called a HOLDIT Pause. When certain error conditions occur during ODG processing, program operation will be interrupted. Following the error message, the following message will be output on the administrative printer:

ENTER SWITCHES, 33 ABORTS, 32 CALL FINSYS. OTHERWISE PROGRAM CONTINUES.

The program will then pause for option switch entry. When option switch 32 is depressed, FINSYS will be called and will save the program on disc, as it is with all current operating information. The next time ODG is called to operate, it will resume operation where it left off. When option switch 33 is depressed, ENDSYS will be called and the program will be aborted. The next time ODG is called to operate, it will be reinitiated.

When option switch 33 is depressed during ODG processing, the above HOLDIT pause will occur independently of error conditions. In this case, the following message is output before the pause:

ODG HAS BEEN MANUALLY INTERRUPTED. ENTER SWITCHES, 33 ABORTS, 32 CALL FINSYS. OTHERWISE PROGRAM CONTINUES

35 This switch is used in conjunction with the disc failure routine. The ODG outputs the following error message after a disc failure:

LIKELY DISC FAILURE NOTED BY READN.
ENTER SWITCHES TO SELECT OPTION.

When option switch 35 is depressed, a disc recovery attempt is skipped and processing is continued.

D. TDP Master File

The ODG processes the tracking data output on disc by the TDP program. The data file on disc is referred to as the TDP Master File. The TDP program also writes the master file on tape as a backup to the data file on disc.

The tracking data is arranged in time sequence by internal station number on the master file. Associated with the tracking data is a master file summary, which gives the number of data points and the time period for each station.

Tracking data consists of a series of logical records containing the following information:

1. Spacecraft Data - A set of readings from the spacecraft tracking devices, indicating the position and velocity of the spacecraft.

2. Data Condition Code Information - A set of indications as to the condition of the tracking equipment, and, hence, the quality of the data, at the time the spacecraft data were taken.

3. Time - The time at which the spacecraft data were taken.

4. Identification Information - The identification of the station at which the spacecraft data were taken, the types of data in the time point, the spacecraft being tracked, and the individual master file.

The disc allocation for the TDP Master File is as follows:

JPLTDP+1-3000	Master File 1
JPLTDP+3001	Master File 1 Summary
JPLTDP+3002	Master File 2 Summary
JPLTDP+3003-6002	Master File 2

When the ODG and the TDP are run alternately, each ODG run processes only that tracking data which were added to the TDP Master File during the latest TDP run.

See Appendix F for the Format of a Master File Logical Record. See Appendix E for the Format of the TDP Master File Summary. See Appendix J, Data Type Descriptions, for the allowable data types currently handled by the ODG which are included on the master file. See also Appendix K, Data Condition Codes, for a detailed description of the quality of the tracking data.

E. ODP File

The ODP File can be considered as an input to the ODG when the program uses an existing ODP File previously written on disc or on tape. When the ODG processes tracking data to update the existing ODP File, the program will process only that tracking data with times later than the last time of the previously processed data for a given station. For further explanation, refer to Section III. A., ODP File.

III. ODG Outputs

There are three basic outputs resulting from ODG operations. The ODG's major function is to process tracking data and output it in strict format on disc and tape for orbit computations for the ODP. This data is called the ODP File and will be discussed in detail. All other output of the ODG is designed to display the process of creating the ODP File from the input data from the TDP Master File to the output data of the ODP File. This output is in the form of listings and summaries and each will be discussed in its relationship to the ODP File.

See Figure 1 for the data flow of the ODG output. See also Appendix L, Sample ODG Output, for the format and content of ODG output.

A. ODP File

1. User Options

The user has three options concerning the operations of the ODG in creating the ODP File:

a. The user may specify that the ODG clear the current ODP File on disc and create an entirely new file from tracking data processed during the current run received from the TDP Master File. This option is available only if the program is running for the first time after initialization. This option is requested by the control card, CHANGE NEW ODP FILE, or depressing option switch #11 when the program requests option switch entry in Mode II and Mode IV.

b. The user may specify that the ODG read a previously written ODP File from tape unit B2. (The tape unit is B8 in Job Shop Mode.) The contents of this tape is restored on disc, and the tracking data processed during the current run received from the TDP Master File is used to update the ODP File. This option is available only if

the program is running for the first time after initialization. This option is requested by the control card, CHANGE RESTORE ODP FILE FROM TAPE, or depressing option switch #10 when the program requests option switch entry in Mode II and Mode IV.

c. The user may specify that the ODG update the existing ODP File on disc with the tracking data processed during the durrent run received from the TDP Master File. This mode of operation is used when the ODG is running saved. This option is requested by the control card, CHANGE UPDATE ODP FILE, or depressing option switch #12 when the program requests option switch entry in Mode II and Mode IV.

2. ODP Logical Records

The ODP File is written on disc, locations JPLODP+1001-2000. The ODP logical records are output on disc by the ODG subroutine DISCBU. The ODP File records are sorted and written on disc in time sequence. When two or more stations have data points with the same time, the data points are written on disc in ascending sequence of the internal station number.

The ODP data record is a variable length record. The length of each record is dependent upon the number of observables for each data point. Theoretically, the maximum number of words in an ODP record is 35; five words used for required information, and 30 words for the data types, each of the 15 data types requiring two words. However, all 15 data types will never appear in the same data point. See Appendix H, for the format of the ODP Logical Record on Disc.

3. ODP File Summaries

For each ODP File, the ODG also outputs a summary of the data that is present on the ODP File. The ODP File Summaries contains the first and last times of the data points for each

station, as well as the number of each data type present for each station.

The ODP File Summaries are written on disc, locations JPLTDP+7898-7899, for a total of 400 words, but only 295 are used. The ODP File Summaries on disc have the following format:

Word	Content
1 - 30	DPFP time in seconds past injection for the last data point for each station, in inverse order (from station 15 to station 1)
31	Number of data type 1 observables for station 15
.	
.	
45	Number of data type 15 observables for station 15
46-47	DPFP time in seconds past injection for the first data point for station 1
48-285	Similar to words 31-47 for all remaining stations.
286-295	Ten words of BCD information used as labeling information for the ODP File

4. Tape Output

The ODG writes the ODP Summaries and the ODP data file on tape after every update run. The tape unit is B2 in Mode II and Mode IV, and tape unit B8 in Job Shop Mode.

When the user has requested the Delete Option during the current run, the ODP File is written onto tape twice during the run. The ODG writes the ODP File on tape before the deletions are made to the file, and rewrites the ODP File on the same tape after the deletions are made to the file. This is done in order to minimize the possibility of destroying the ODP File on disc with no tape backup in case there was a disc error or program malfunction during the delete process.

The format of the ODP File on tape is as follows:

a. ODP File Label

The first record contains an ODP File label consisting of nine BCD words, followed by a checksum word.

b. Station Summary Records

Each station summary record contains 200 words of data followed by a checksum word. The first record of the station summary records contains the following information:

Word	Information
0	Mission number
1-3	Mission identification (Ranger, Surveyor, etc.)
4-8	DSCBU FCB information
9	Unused
10-39	DPFP time in seconds since injection for the last data point on the ODP File for each station, in inverse order (from station 15 to 1)
40	Number of data type observables for station 15
.	
.	
.	
54	Number of data type 15 observables for station 15
57-199	Similar to words 40-56 for all the stations to station 6 data type 8 observables
200	Checksum word

The second record of the station summary records contains the following information:

Word	Information
0	Number of data type 8 observables for station 6
.	
.	
.	
92	Number of data type 15 observables for station 1

93-94	DPFP time in seconds since injection for the first data point on the ODP File for station 1
95	Unused
96	Checksum word

c. Data Records

Following the station summary records are the ODP data records, each record consisting of 201 words. The data records contain a variable number of logical records, followed by a checksum word.

B. ODG Detail Processing Listings

1. Version Identification

The ODG will output the date, time, and computer identification, as well as the version number and modification or revision number of the operating ODG program.

2. Control Cards

All control cards which have been input by the user are initially listed in the order which they were read by the program.

When a PRINT control card was included in the input deck, all or a specified portion of the Control File will be displayed. The control records listed will reflect the edited control records in time sequence.

The Delete Control File will be listed separately upon a PRINT ALL CONTROLS user request. This listing reflects the edited Delete control records which were included in the current run.

3. Data Points

The ODG outputs a line of data for every tracking data point

processed and placed on the ODP File. The information output in this line of data is obtained from both the TDP Master File and ODG user input control cards. The line of data reflects the data point after all ODG processing, except the Delete Option.

It should be noted that when the user specifies the Delete Option, the deletions to the ODP File take place after the data points have been output on the ODP File. An entirely new ODP File is written after all deletions have been made. Therefore, the detail processing listing of the data points does not reflect the contents of the ODP File after the delete process.

The detail processing listing of the data points on the ODP File shows when a data point from the current run replaces a data point on the ODP File from a previous run. This replacement occurs when the data points have identical data types, station ID, and time label. The ODG prints the word "NEW" at the end of the line of output to indicate the replacement.

The line of output for each data point contains the following information:

a. Internal transmitting station number
b. Time of the data point, HHMMSS.SSS, DAY GMT
c. Identification of the data type
d. Value of the observable, to eight significant decimal places in exponential notation
e. Count time - the desired length of time that the doppler tone was counted input by the user
f. Sample time - the length of time between doppler counter readings, usually equal to the count time
g. Weight code, used by the ODP to determine the validity of the data

h. Transmitting frequency of the tracking station
i. Receiving frequency of the tracking station
j. Passid - the label used by the ODP to separate data into logical blocks for statistical summaries
k. The word "NEW" when the data point has replaced an existing data point on the ODP File

4. Data Point Corrections

When the ODG makes corrections to the observable, as specified by the user on a control card, a notation showing the correction is output preceding the printing of the data point. This correction notation contains the following information:

a. Internal transmitting station number
b. Identification of the data type corrected
c. Value of the observable before correction, expressed to eight significant decimal places, in exponential notation
d. Amount of the correction, expressed to eight significant decimal places, in exponential notation
e. Value of observable after correction, expressed to eight significant decimal places, in exponential notation
f. Time of the data point, HHMMSS.SSS, GMT

When the ODG makes corrections to the time label of any observable, as specified by the user on a control card, a notation showing the correction is output preceding the printing of the data point. This correction notation contains the following information:

a. Internal transmitting station number, identified as being TIME CORRECTED
b. Time before correction in HHMMSS.SSS, DAY, GMT
c. Amount of correction, expressed to eight significant decimal places, in exponential notation

d. Time after correction in HHMMSS.SSS, DAY, GMT

When the observable or the time label has been corrected by the ODG, the following comment is printed before the output of the ODP File Summary to inform the user of data modification.

PLEASE NOTE-DATA VALUES ADJUSTED BY POLY

5. Data Rejection

Whenever doppler is rejected by the L/S frequency check or by a logical transmitter error, a line of print appears, giving the following information:

a. Reason for error: LOGICAL TRANSMITTER ERROR or FREQUENCY CHECK FAILED
b. Time label of data point in HHMMSS, DAY, GMT
c. Internal station number
d. Data value and input value for frequency check failures

   or

   Data type from transmitting station or beacon for logical transmitter errors

6. Tape Label Identification

The ODG prints out the label of the tape upon which the ODP File was saved, along with the date, time, and computer identification.

C. ODG Summary Listings

1. TDP Master File Summaries

When the ODG is running for the first time, the program prints a summary of each of the two TDP Master Files on disc. When the program is initialized correctly, the program will reprint the summary of the TDP Master File the

user selected on the FILE card. When the program is running saved, only the summary of the Master File being processed will be printed.

The TDP Master File summary contains the following information:

a. Mission number
b. MICODE designation
c. Epoch time (GMT)
d. Station number
e. Number of time points for the station
f. GMT of the earliest time point for the station
g. GMT of the latest time point for the station
h. Elapsed GMT for the station
i. Seconds elapsed since the epoch for the earliest time point for the station
j. Seconds elapsed since the epoch for the latest time point for the station
k. Seconds elapsed between the earliest and latest times for the station

2. Summary of Data not Used

At the end of each ODG run, the program outputs a summary of rejected data for each station. This summary is incomplete as it does not include a total of doppler points not used because of the sample time test.

The following rejection criteria are included in the summary:

a. BAD FREQ OR BAD INPUT - An acceptability test is made on L/S Band stations between the user input frequency and a receiver reference frequency computed from C2 data. When the test fails, the doppler is rejected

and the BAD FREQ OR BAD INPUT count is incremented. See Section III. C. 4. for further information.

b. RANGE DATA CONDITION CODE - The ODG nominally places the N^{th} range unit of every valid set of RU on the ODP File. A valid set of RU are those range units which have DC6=0, after a bad range unit point with DC6=1. The RANGE DATA CONDITION CODE counter is incremented when DC6=1 and when a valid RU is discarded because it is not the N^{th} point of a valid set.

c. LOGICAL TRANSMITTER ERRORS - The ODG makes a number of tests on the transmitting and receiving of doppler and RU data. The LOGICAL TRANSMITTER ERRORS counter is incremented when any of the following conditions are found:

1) More than one station is transmitting at the same time.
2) The transmitter has not been turned on for a station and the station is receiving doppler or RU data. A further test is made to check for light time correction in order to account for the large signal propagation times. When there is no light time correction and no transmitter on for a station, a logical transmitter error results.
3) A transmitter has been turned on, but no station has been identified on the control card.
4) The stations transmitting and receiving coherent, three-way doppler (CC3) have not been identified in the CC3XM and CC3RC tables. (See Appendix A, Source Deck Symbols for CC3XM, CC3RC.)
5) An RU point has DC3=2, meaning three-way doppler (C3).
6) A beacon is transmitting, and the station receiving the data is not receiving two-way doppler (C2).

7) One station is both transmitting and receiving coherent three-way doppler (CC3).

8) More than one station is transmitting and receiving two-way doppler (C2).

d. ELEVATION ANGLE CONSTRAINTS - The angle pairs from DSIF stations is tested against minimum and maximum acceptable elevation angle. When the test fails, the angle is rejected and the ELEVATION ANGLE CONSTRAINTS counter is incremented.

e. GOOD DOP NOT IN AUTO TRACK - The user is able to specify on the CHANGE USE NO DOPPLER NOT IN AUTO TRACK control card that the ODG is to process only doppler data with DC2=0. The number of doppler points rejected by this stipulation is counted and appears in the summary under GOOD DOP NOT IN AUTO TRACK.

f. BAD ANGLES NOT IN AUTO TRACK -The ODG rejects angles when DC2=1, or 5, angles not in auto track. The BAD ANGLES NOT IN AUTO TRACK counter is incremented when this condition exists for angle pairs.

g. DATA BEFORE EPOCH TIME - The ODG does not process any tracking data with a specified time preceding the stations' epochs. The station epoch is established by one of the following:

1) The injection time on the TDP Master File, when the program is running for the first time

2) The time of the last data point for the station when the program is running saved

3) The time specified by the CHANGE EPOCH control card, when the user has included it in the input deck for the current run

The DATA BEFORE EPOCH TIME counter is incremented

each time a data point is rejected which has a time preceding the station epoch.

h. DSIF DATA IN MANUAL MODE - The ODG rejects doppler when DC2=5, 6, 7, manual data. The DSIF DATA IN MANUAL MODE counter is incremented for each doppler data point which is rejected.

i. ETR DATA OUT-OF-LOCK - The ODG rejects ETR data when DC2=0, data out-of-lock. The ETR DATA OUT-OF-LOCK counter is incremented for each ETR data point which is rejected.

j. GOOD DOPPLER IGNORED BY INPUT - The ODG allows the user a control card option for ignoring specified data types, all angles, or all doppler. The ODG increments the GOOD DOPPLER IGNORED BY INPUT counter when any of the following data types are ignored: R, DR, C1, CC3, C3, PRU, RU.

k. GOOD ANGLES IGNORED BY INPUT - The ODG allows the user a control card option for ignoring specified data types, all angles, or all doppler. The ODG increments the GOOD ANGLES IGNORED BY INPUT counter when any of the following data types are ignored: EL, AZ, DEC, HA, X30, Y30, X85, Y85.

l. MINIMUM COUNT TIME - The ODG allows the user to specify the minimum doppler compression interval with the CHANGE MINIMUM COUNT TIME control card. The number of doppler points eliminated from compression by using this control card is counted for each station and appears under MINIMUM COUNT TIME.

3. The ODP File Summary

The ODG outputs a summary reflecting the contents of the ODP File by station number. The start and end times in the summary reflect the times of the first and last data point on the ODP File for that station. The number of each data type present for each station is also listed.

It should be noted that data types X30, Y30, X85, Y85 have been converted to the AZ/EL system of angles, so they are not included under the data type heading X30, Y30, X85, Y85. The number of these data types is included under AZ and EL headings.

When there is no data for a station, the station is excluded from the summary.

The ODP File Summary is also output before the ODG Detail Processing Listing of Data Points when the ODG is running saved to show the user the contents of the ODP File before tracking data from the current run is added to the ODP File.

4. The Delete Summary

The Delete Summary is output after the ODP File. The Summary will specify the number of data points deleted for each station. When there have been no deletions for a station, the station is excluded from the summary.

IV. ODG Tracking Data Processing

The ODG program reads tracking data from the TDP Master File, makes acceptability tests on the data, modifies data values, and adds auxiliary quantities to the data, as specified by the user. This processing of tracking data will be discussed in detail.

A. Types of Tracking Stations

Tracking data is currently received from three types of stations:

1. Deep Space Instrumentation Facility Stations (DSIF) receive and transmit tracking data in missions which are in deep space.

2. Eastern Test Range Stations (ETR) receive and transmit tracking data in missions which are in near vicinity to earth.

3. Goddard Stations - (MSFN - Manned Space Flight Network) - receive and transmit tracking data, similarly to DSIF stations, in manned space missions.

The difference in tracking stations is due to actual differences in equipment in transmitting and receiving tracking data. The types of tracking data differ, and the interpretation of the data condition codes also differ. Therefore, it follows that the ODG performs different validity tests and calculations on the tracking data.

B. TDP Master File

The ODG reads tracking data from the master file by ascending station number. The ODG processes one station at a time, placing all data for the station on the ODP File, before reading data for the next station. The ODG makes two passes through a station's tracking data when the station is DSIF or Goddard. On the first pass, all doppler data is processed; on the second pass, all other data is processed. The ODG makes only one pass through the data when the station is ETR.

The ODG processes only that tracking data which has a time label which does not precede the TDP Master File epoch time, unless the user has changed the epoch time with a CHANGE EPOCH control card.

The ODG also saves the time of the last data point processed and output on the ODP File for each station for the current run. During successive runs of the ODG, the program will process only that tracking data with times later than the last time of the previously

processed data for the station. Thus, when the TDP and ODG are run alternately, each ODG run processes only that tracking data which were added to the master file during the latest TDP run. Therefore, data points are never processed a second time unless the user has provided control cards which specify reprocessing.

For further explanation of the TDP Master File, refer to Section I. D., TDP Master File.

C. Acceptability Tests

The ODG performs various acceptability tests on the tracking data. Some of the acceptability tests are applied to all tracking data, while other tests are applied to specific data types, or specific types of tracking stations. Tracking data which do not pass the acceptability tests are eliminated from further processing and are not output on the ODP File. Either all or a portion of the tracking data point can be rejected.

1. Tests Applied to All Data

a. Data Before Epoch

Each data points time label is compared with the station epoch time. When the time label precedes the station's epoch, the data point is rejected.

The station's epoch is set by one of the following:

1) TDP Master File epoch time, when the ODG is running for the first time
2) User specified time input on the CHANGE EPOCH control card
3) Time of the last data point for the station processed on a previous run, when the ODG is running saved

b. Control Card Inputs

The user is able to specify rejection of tracking data points by inputting the IGNORE control card. The user may ignore any, or all, of the tracking data from the specified stations, at the specified time.

Other control cards cause the ODG to reject data points; these controls are discussed in the Control Card Processing Section.

2. ETR Data Test

a. All ETR data with DC2=0, manual data flag on, are rejected unless the user has specified otherwise with a control card.

3. DSIF and Goddard Angles Tests

a. All angles with DC2=4 or 5, manual data flag on, or DC2=1, bad angle flag, are rejected unless the user has specified otherwise with a control card input.
b. All angle pairs are rejected when the observables are not within the limitations of the minimum and maximum acceptable elevation angle. When one angle pair is missing, no test can be made.

For stations which use the AZ-EL angle system, direct comparison of the elevation angle (EL) with the values stored for that station determines the validity of the angle pair.

For stations which use the HA-DEC angle system, the elevation angle must be computed. The approximate value of the elevation is computed from the hour angle,

the declination, and the station latitude. The approximation to sin (EL) is:

$$\sin(EL) = \cos(HA)\cos(DEC)\cos\Phi + \sin(DEC)\sin\Phi$$

where:

$\Phi \triangleq$ geodetic latitude of the station

For stations which use the X30-Y30, X85-Y85 angle systems, the elevation angle is also computed. The approximation to sin (EL) is:

$$\sin(EL) = \cos x \cos y$$

See Appendix A, Source Deck Symbols, SINL-COSL, for nominal values for the geodetic latitude of all stations.

4. DSIF Range Units Tests

a. When the range unit field has a value of zero, the range unit is not used.

b. The ODG processes only the N^{th} range unit point of a set of good range units. A set of good range unit points are those which have DC6=0 and follow a bad range unit point with DC6=1. All other range units are rejected.

The nominal value of N is one. Therefore, the ODG processes only the first good range unit which follows a bad range unit until the next bad range unit is encountered.

c. A range unit point with DC3=2, meaning three-way doppler data, will be rejected as a logical transmitter error.

5. DSIF and Goddard Doppler Tests

The ODG processing of doppler data is the most complex processing in the ODG. Since the doppler quantity which is received on the TDP Master File is entirely different in form then when it is output on the ODP File, it will be necessary for the user to refer to Section IV, 5, Continuous Count Doppler Processing in this discussion of acceptability tests.

a. All DSIF doppler with DC2=5, 6, 7, manual data flag on, are rejected unless the user has specified otherwise with a control card.

b. A doppler point is rejected when more than one station is transmitting at one time. This condition is a logical transmitter error.

c. A doppler point is rejected when no transmitter has been turned on for a station and the station is receiving doppler data. This condition is a logical transmitter error.

d. When tables CC3XM and CC3RC do not identify the correct stations for transmitting and receiving coherent three-way doppler (CC3), all CC3 doppler data will be rejected. See Appendix A, Source Deck Symbols for the meaning of CC3XM and CC3RC. This condition is a logical transmitter error.

e. Doppler data which is not two-way doppler (C2) is rejected when a beacon is transmitting and the station receiving the data is not receiving C2 data. This condition is a logical transmitter error.

f. Coherent three-way doppler (CC3) is rejected when one station is both transmitting and receiving CC3. This condition is a logical transmitter error.

g. Two-way doppler (C2) is rejected when a station receives C2 data from another station. This condition is a logical transmitter error.

h. A frequency check is made on L/S Band Stations for two-way

doppler. Messages from these stations normally contain a field referred to as the C2 frequency. (When the Short Format is used, the C2 frequency does not appear and the test described here is not made.) The C2 frequency is the last five digits of a number which lies between 7,850,000 and 7,950,000. Thus in the ODG:

FREQ	$\triangleq$	card input transmitter reference frequency
INFREQ	$\triangleq$	card input receiver reference frequency
f_q	$\triangleq$	calculated transmitter reference frequency
C_2	$\triangleq$	tracking data input frequency number $(0 \leq C_2 \leq 99999)$

Let $C_2' = C_2 + 7,800,000$ if $C2 \geq 50,000$

$C_2' = C_2 + 7,900,000$ if $C2 > 50,000$

1) If the station is on the atomic standard, the data is in-lock (DC5=0), and

$|f_q - FREQ| < CONST5$, where CONST5 = .4 (nominally)

Then:

The frequency check is successful.

2) If the station is on the atomic standard and the data is out-of-lock (DC5= 0), or the station is on the crystal oscillator, and

$|f_q - FREQ| < CONST6$, where CONST6 = 2. (nominally)

$f_q = INFREQ + \frac{C_2'}{CONST4}$, $CONST4 = -5.3$

Then:

The frequency check is successful.

i. If K4 or PK4 is present, must have FREQ input.

j. In compressing continuous count doppler, the ODG tests for a number of criteria which the doppler points must have before compression is made. When the criteria are not met, the doppler points are rejected Refer to Section IV. D-5, Continuous Count Doppler Processing, for a discussion of the criteria.

D. Data Modifications

The ODG performs a number of data modifications, applied either to all data, or specific data types, from specific types of tracking stations.

1. Control Card Modification to all Data

The following data type modifications are arbitrary and are effected by the ODG only after the user has requested them:

a. The value of any observable may be changed by an amount as specified by the user on the ADJUST control card. The value of the increment is input as a constant over a specified time interval, for a specified data type or types, from a specified station or stations.

b. The value of the time label of an observable may be changed by an amount as specified by the user on the SHIFT TIME control card. The value of the time increment is input as a constant over a specified time interval for a specified station or stations.

The user is also able to specify that the ODG add parameters to the data point which do not modify the value of the observable, but are output on the ODG listings and on the ODP File. These parameters are usually specified on control card inputs. Not all the parameters are used directly by the ODG in calculations;

some are output, and some are used in processing. The necessary parameters include the following:

a. Count Time - the maximum and preferred time interval over which doppler data are to be compressed
b. Sample Time - the length of time between doppler readings
c. Weight Code - an assigned number indicating the statistical reliability of the data point
d. Passid - an assigned identification for labeling blocks of data
e. Frequency Increment - frequency of the tracking station transmitter
f. Transmitter I.D. - internal station number of the transmitting station, which could or could not be the same as the receiving station

2. Sawtooth Error Correction to ETR Range Data

Ground equipment at some ETR stations introduces a sawtooth shaped error (random noise) in the range observable. This error is removed by the following expression:

$$R = NR_o - (N-1)KM$$

where:

$R_o \triangleq$ value of the range of observable from the master file

$R \triangleq$ value of the range observable sent to the ODP File

$N \triangleq$ dimensionless floating point number, input on the RANGE FACTOR control card, nominally, $N = 1.0$

$M \triangleq$ floating point number in kilometers, input on the CHANGE RANGE RECYCLE control card.

The nominal values of M are stored in the Range Recycle Table, RANREC. See Appendix A for the nominal values.

$K \triangleq$ integer portion of the ratio $R_o/_M$

When no value is input for the correction formula, the correction is 0.

3. Angle Correction Polynomial for DSIF Angles

DSIF angles are corrected for systematic errors introduced by antenna sag. The general form of the correction equation is that of a 6th degree polynomial in HA and DEC:

$$\delta HA = \sum_{i,j} A_{i,j} (HA)^i (DEC)^j \qquad i,j = 0,1,2,3$$

$$\delta DEC = \sum_{i,j} B_{i,j} (DEC)^i (HA)^j \qquad i,j = 0,1,2,3$$

where the final observable output on the ODP File is:

$HA_c = HA_a - \delta HA$

$DEC_c = DEC_a - \delta DEC$

a = Apparent

c = Corrected

See Appendix A, Source Deck Symbols, for the coefficients (Feary constants) for stations 3, 4, 5.

4. MSFN Angle Conversion Equations

The X-Y angle system (X30/Y30, X85/Y85) used by the Goddard tracking stations are not transferred directly to the ODP File. The ODG converts the X-Y angles to the AZ-EL angles so that they can be processed by the ODP

ac AZ-EL angles.

The following relations are used in the conversion:

X/Y85 System:

$$\sin EL = \cos X \cos Y \qquad 0 \leq EL \leq 90^\circ$$

$$\sin AZ = \frac{\sin Y}{\cos EL} \qquad 0 \leq AZ \leq 360^\circ$$

X/Y30 System:

$$\sin EL = \cos X \cos Y \qquad 0 \leq EL \leq 90^\circ$$

$$\sin AZ = \frac{\sin X \cos Y}{\cos EL} \qquad 0 \leq AZ \leq 360^\circ$$

5. Continuous Count Doppler Processing

The logic concerned with continuous count doppler processing is the most complex processing in the ODG. To process doppler data, the ODG converts raw cycle counts to frequency. Thus, the quantity sent to the ODP File has a new form and meaning from the quantity received from the TDP Master File.

Doppler recorded in the continuous count mode means that when the doppler readings are taken, the doppler counter is not reset to zero. Counter readings give a cycle count of the electromagnetic signal from the spacecraft. Doppler compression consists of dividing the difference between two counter readings by the elapsed time between the readings, yielding frequency in cycles per second. The equation for computing the doppler observable is:

$$f_o = \frac{N_1 - N_2}{t_2 - t_1}$$

where:

$f_o \triangleq$ raw divided doppler count

$t_1 \triangleq$ time of first doppler count reading

$t_2 \triangleq$ time of second doppler count reading

$N_1 \triangleq$ raw doppler count reading at time t_1

$N_2 \triangleq$ raw doppler count reading at time t_2

As the time interval increases, the truncation error decreases. For example, when the doppler reading is sampled at one-second intervals, and is differenced across one sample time, an uncertainty of one cycle per second results. When the doppler reading is differenced across ten sample times, or ten seconds, the uncertainty is decreased to 0.1 cycles per second.

Doppler may be compressed to any multiple of the sample time up to 1023 seconds. This limit is imposed because of size restrictions in the ODP logical record, which allows only ten bits.

a. Required Information

Before doppler compression can be effected in the ODG, the following quantities must be available:

1) Count Time. This is the interval between counter readings used in doppler compression, $(t_2 - t_1)$. (Desired count time may be input by the user.)

2) Sample Time. This is the actual time interval between the doppler counter readings which appear in the master file. This must be less than or equal to the count time, or the compression cannot be made. (Valid sample time may be input by the user.)

3) Transmitter reference frequency of the station. (Input by the user.)

4) Receiver reference frequency of the station (Input by the user.)

5) The internal station number of the transmitting station (Input by the user.)

6) The doppler type must be specified as C1, C2, C3, or CC3 (included in the master file data).

7) The value of the doppler multiplier and a doppler bias indicator.

8) Minimum Count Time - The minimum time interval over which doppler compression can be made. (May be input by the user.)

When the count time and sample time are not input by the user, they are computed in the following manner:

1) The sample time is computed by differencing the times of adjacent doppler points on the master file. When the sample time is input, doppler points will be rejected unless the computed sample time is equal to the input sample time.

2) When the count time is not input, it is set equal to the sample time.

3) When the count time is input and the computed sample time is greater than the input count time, the count time will be set equal to the sample time.

4) When no sample time is input the program will not compress doppler over a computed sample time greater than 60 seconds.

b. Compression Criteria

Before doppler compression can be effected in the ODG, certain criteria for selection of the counter reading pairs must be met. The ODG initially selects the first counter reading which contains all the required quantities necessary for doppler compression. This reading is used as N_1. The program then examines successive data points

in an attempt to find a point with a time label differing from the time of N_1 by exactly the desired count time. When a point has a time label which gives a difference in time less than the count time, it is discarded and the next point in the file is checked. When a point is found which gives exactly the desired count time, it is used as reading N_2. When one point gives too small a time difference and the next point gives a time difference greater than the desired count time, the reading N_1 is discarded and the search is started again with the last point examined being the new N_1 reading.

After the N_1 reading has been selected, tests are made on each data point in the selection of N_2. The following conditions must be present:

1) The doppler readings must be monotone increasing from N_1 to the current point.
2) The receiver reference frequency must remain constant over the time interval from the time of N_1 to the time of the current point.
3) The doppler type and mode must remain constant over the time interval.
4) The transmitter ID and the transmitter reference frequency must remain constant over the time interval, after it has been adjusted by the light time correction. See Section IV. D-5. c for the light time correction equation.
5) The transmitter and receiver ID's must be consistent with the doppler type.
6) The requested count time must remain constant over the time interval.
7) The time difference between successive points must be constant and equal to the input sample time throughout the interval. When the sample time was not input, this test does not apply.

If at any time, one of these conditions fails, the search is terminated and the last point which satisfies all conditions is used as N_2. If the lists fail on the first point after N_1, no pair is selected, and the search is restarted with that point being used as N_1. When this occurs, a count time less than the requested time is obtained. If this time is less than the minimum acceptable count time input by the user, the pair is discarded.

Once a pair of readings has been selected, they are used in the doppler compression formula. When the program is ready for a new pair of points, the above procedure is repeated. The point used as N_2 in the previous pair, is used as N_1 in the new process.

c. Light-Time Correction Processing

When a doppler counter reading is being examined, the transmitter frequency associated with the time of the reading must be obtained. For a spacecraft which is a great distance from earth, the round-trip signal propagation time may be very large. When this occurs, the transmitter frequency must be obtained at a time which is earlier than the time by which the counter reading is labeled. Specifically, for a master file point at time T, the transmitter frequency is evaluated at time T-t, where:

$$t = a_0 + a_1 (T-T_0) + a_2 (T-T_0)^2 \text{ seconds}$$

Source deck symbols

a_0 = seconds, nominally 0

a_1 = seconds/seconds, nominally 0

a_2 = seconds/seconds^2, nominally 0

T_0 = starting epoch, YYMMOOOHH,MMSSsss

where:

sss = fractional parts of a second, nominally 0

d. Time Resolver

There is a new device in DSIF tracking stations which is intended to reduce the high frequency noise on doppler data. When the device is in operation, master file logical records will contain a field containing the information called time resolver.

The ODG should apply the time resolver formula to the doppler value, after the compression and the bias frequency stripping has been done.

The following definitions are used in the equation.

where:

$R_1, R_2 \triangleq$ the time resolver readings at time T_1, T_2

The time resolver equation is:

$$f_o' = f_o \overline{\gamma} \Delta f$$

where:

$$f_o = \frac{N_2 - N_1}{T_2 - T_1}$$

$$\Delta f = \frac{R_2 - R_1}{\frac{R_2 - R_1}{T_2 - T_1}} \quad (f_o \times 10^{-8})$$

The time resolver equation will be applied to all doppler data unless the user has specified otherwise with the control card, CHANGE NO RESOLVER CORRECTIONS.

e. Doppler Multiplier

The frequency of the signal received from the spacecraft is sometimes increased at the station by a factor called the doppler multiplier (M). This alteration of frequency occurs before the signal enters the counter.

The value of the doppler multiplier is usually included in the master file data. When the doppler multiplier is zero, the program uses a doppler multiplier of eight.

In order to convert the raw divided doppler (f'_o) to the true signal frequency, the following equation must be applied:

$$f''_o = \frac{f'_o}{M}$$

f. Bias Stripping

Sometimes the frequency of the signal is increased as an additive bias frequency before the multiplication of the frequency.

This bias is removed by one of the equations below in order to reduce the magnitude of the number to the amount induced by the range-rate of the spacecraft. (For L-Band station data, only part, if any, of the bias is removed.)

The destinction between two-way doppler (C2) and coherent three-way doppler (CC3) is dropped in the following equations as they are mathematically equivalent.

The frequencies used in the equations are defined as:

$$f = f''_o - f_B = \frac{f_o}{M} - f_B = \frac{f_c + \Delta_f}{M} - f_B$$

$$= \left[\frac{N_2 - N_1}{T_2 - T_1} \approx \frac{(R_2 - R_1)}{T_2 - T_1}\frac{(N_2 - N_1)}{T_2 - T_1} \times 10^{-8}\right]\frac{1}{M} - f_B$$

$f_i(T) \triangleq$ receiver reference frequency

$f_{sc}(T) \triangleq$ spacecraft auxiliary oscillator frequency

$f_q(T) \triangleq$ transmitter reference frequency

The time arguments are as follows:

$T \triangleq T_1 + \frac{T_2 - T_1}{2}$; a time midway through the counting interval

$t \triangleq t(T)$, the light time correction evaluated at T (See Section IV, D-5. c Light Time Correction Processing.)

The source deck symbols have the following double precision values, which may be changed through the source deck:

CON1 $= \frac{96.0 \times 240.0}{221.0}$

CON2 $= 30.0$

CON3 $= 96.0$

CON4 $= \frac{30.0}{96.0}$

CON5 = 1.0E6
CON6 = 3.0E7

L1BIAS = 0
L2BIAS = .1E6
L3BIAS = 0

1) L-Band Stations

For this data, only part, if any, of the bias may be removed by using a constant. (L-Band stations do not use unbiased data.)

For one-way doppler:

$$f_B \triangleq \text{L1BIAS} \quad .$$

For two-way or coherent three-way doppler:

$$f_B \triangleq \text{L2BIAS}$$

For three-way doppler:

$$f_B \triangleq \text{L3BIAS}$$

2) L/S Band Stations .

For one-way doppler:

$$f_B \triangleq \left[\text{CON6} \div \text{CON3}\ f_i(T) - f_{sc}(T)\right] \text{CON4}$$

For two-way or coherent three-way, and three-way doppler:

$$f_B \triangleq \left[\text{CON6} \div \text{CON3}\ f_i(T) + \text{CON1}\ f_q\ (T-t)\right] \text{CON4}$$

L/S-Band stations do not use unbiased data.

3) S-Band Stations:

For one-way doppler:

$$f_B \triangleq \left[\text{CON1}\ f_i(T) - f_{sc}(T)\right] \div \text{CON5}$$

For two-way or coherent three-way doppler:

$$f_B \triangleq \text{CON1}\left[f_i(T) - f_q(T-t)\right] \div \text{CON5}$$

For three-way doppler:

$$f_B \triangleq \text{CON1}\left[f_q(T) - f_q(T-t)\right] \div \text{CON5}$$

When S-Band station data is marked as unbiased, the CON5 (1.E6) term is omitted.

g. Destructive Doppler Processing

Doppler recorded in the destructive mode means that the doppler counter is reset to zero each time a doppler reading is taken. Therefore, the reading reflects a count of cycles since the last reading. Data condition code one (DC1) on the TDP Master File tells whether the doppler is continuous count (DC1=8) or destructive (DC1≠).

The observed value of destructive doppler is computed by the following relation:

$$f_o = \frac{N}{\Delta T}$$

where:

$f_o \triangleq$ divided doppler

$N \triangleq$ counter reading

$T \triangleq$ time since the last time a doppler reading was taken

where:

The time label associated with f_o is as follows

$$T \triangleq T - \frac{\Delta T}{2}$$

Destructive doppler does not have the time resolver, multiplier or bias frequency equations applied to it.

h. Destructive Doppler Processing for Goddard Stations
Destructive doppler is processed as follows:

The following definitions are used in the equation:

$C \triangleq$ doppler value in the master file at time T
$N \triangleq$ 77824, when DC1=0
778240, when DC1=1
$f_o \triangleq$ raw divided doppler value

The equation is:

$$f_o = \frac{N}{C \times 10\text{-}8}$$

The time label to be associated with the doppler observable is:

$$T = t + \frac{T_C}{2} - t_B$$

where:

$T_C \triangleq C \times 10^{-8}$ seconds
$t_B \triangleq .1$ sec. when DC1=0

1.0 sec. when DC1=1

$t \triangleq$ time of the data point in the master file

$T \triangleq$ final time label to output on the ODP File

DATA FLOW OF ODG OUTPUT

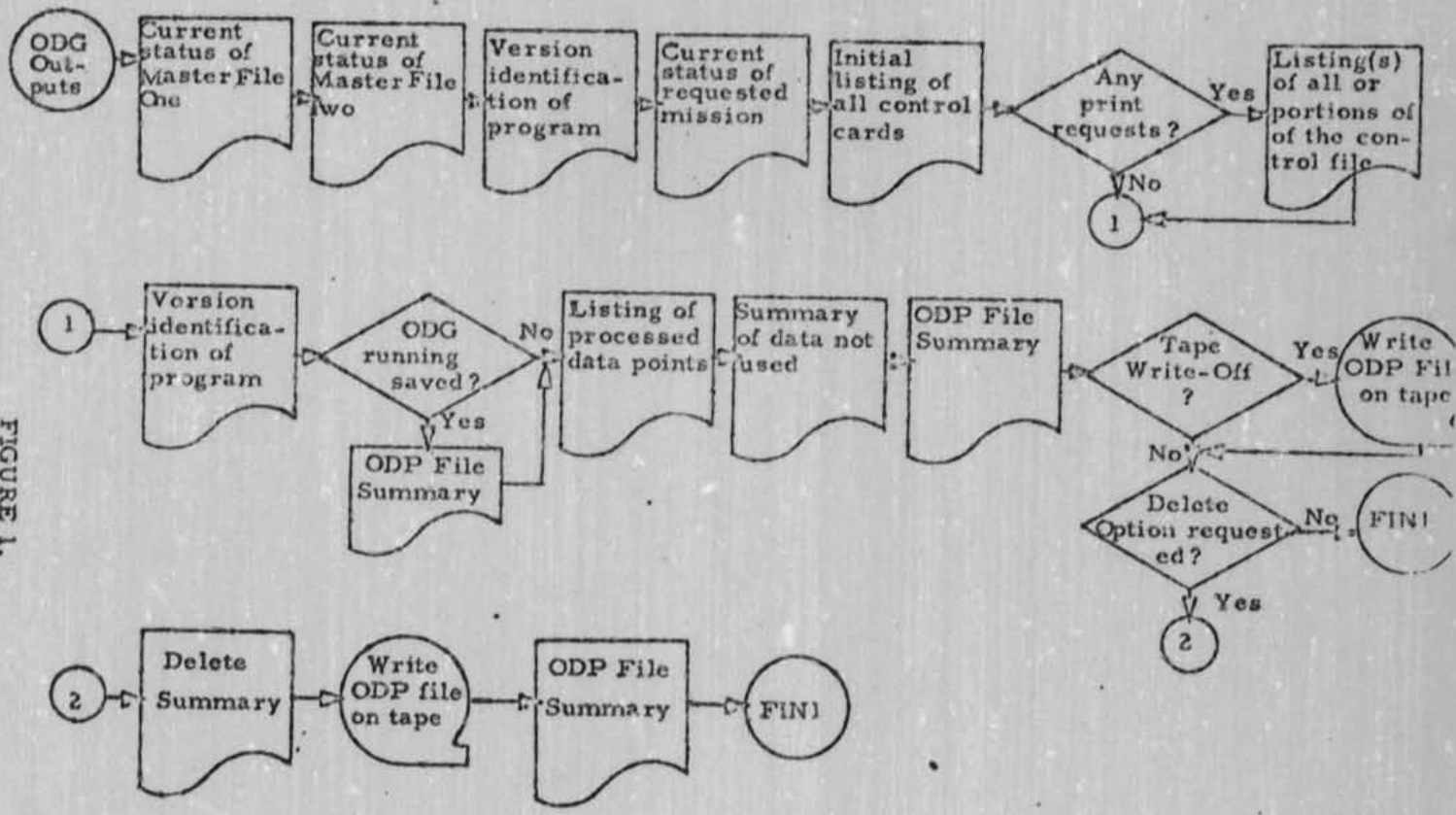

FIGURE 1.

APPENDIX A

Source Deck Symbols

ODGLK1

FILE1 - This symbol references a location which contains the TDP Master File number which is to be read from disc in the current run. The master file number is one. The number specified in the data item is the mission number.

Example:

FILE1 = 4

Nominal: FILE1 = 0

FILE2 - This symbol references a location which contains the TDP Master File number which is to be read from disc in the current run. The master file number is two. The number specified in the data item is the mission number.

Example:

FILE2 = 5

Nominal: FILE2 = 0

ICLASS - This symbol references the station classification table. The tracking stations may be classified as DSIF, ETR, or GODDARD. The number specified in the data item is the code for the classification.

ICLASS + J = DDDDDDDDDDDD/8

where:

J = Internal station number

DDDDDDDDDDDD = +0-DSIF
-0-GODDARD
+≠0-ETR, (HA, DEC)
-≠0-ETR, (RA, DEC)

Note: The decrement of this table is used by the TDP, not the ODC.

Nominal:

STATION	CLASSIFICATION
1	DSIF
2	DSIF
3	DSIF
4	DSIF
5	DSIF
6	ETR
7	ETR
8	ETR
9	ETR
10	ETR
11	ETR
12	DSIF
13	DSIF
14	DSIF
15	DSIF

IMAXEL - This symbol references the maximum elevation angle table. The values specified in the table are the acceptable sines of the maximum angle for each station. The number specified in the data item is the sin of the maximum elevation angle.

IMAXEL+J = sin

where:

J = internal station number

Nominal:

STATION	SIN OF MAXIMUM ELEVATION ANGLE
1	1.0
2	1.0
3	1.0
4	1.0
5	1.0
6	1.0
7	1.0
8	1.0
9	1.0
10	1.0
11	1.0
12	1.0
13	1.0
14	1.0
15	1.0

IMINEL - This symbol references the minimum elevation angle table. The values specified in the table are the acceptable sines of the minimum angle for each station. The number specified in the data item is the sin of the minimum elevation angle.

IMINEL+J = sin

where:

J = internal station number .

Nominal:

STATION	SIN OF MINIMUM ELEVATION ANGLE
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.17365 (angle = 10^{o})
13	0.17365 (angle = 10^{o})
14	0.0
15	0.0

INFREQ - Synonym for MISSK1

INFRQ - Synonym for MISSK1

MARNO - Synonym for FILE1

MISS1 - Synonym for FILE1

MISS2 - Synonym for FILE2

MISSK1 - This symbol cannot be used in the present version of ODG due to a program error.

RANREC - This symbol references the range recycle table. The values specified in the table are the range recycle values used in the range factor computations for each station. The number specified in the data item is the range recycle value in kilometers.

RANREC+J = km

where:

J = internal station number

km = value in kilometers

Nominal:

STATION	RANGE RECYCLE VALUE
1	1. E20
2	1. E20
3	1. E20
4	1. E20
5	1. E20
6	1. E20
7	1. E20
8	1872. 805
9	1872. 805
10	1. E20
11	1. E20
12	1. E20
13	1. E20
14	1. E20
15	1. E20

RETURN- This symbol references a location which is used for communication between the two links of ODG. When ODGLK1 has control returned to it, the program interrogates the symbol to see if the common core area should be reinitialized. When the contents of RETURN are non-zero, COMMON should be reinitialized.

Nominal: RETURN = 0

RUNCO - This symbol references a location which allows the user to stack successive control card decks for test runs in order to operate ODG as running saved. This operating procedure is allowable in Job Shop Mode only. The user should specify the number of iterative runs he desires to make in the data field, as well as providing the ODG with an equal number of control card decks. (Each control card deck is separated by an END DATA.)

Example:

RUNCO = 6

Nominal: RUNCO = 0

SURNO - Synonym for FILE2

ODGLK2

ANGSTA - This symbol references a location which contains the angle correction indicator table for each station. The entries which are non-zero indicate to the program that angle corrections should be made to angle pairs HA-DEC for the station. The number specified in the data field is the code for correction.

ANGSTA+J = non-zero number

where:

J = station number

Nominal:

STATION	ANGLE CORRECTIONS
1	0
2	0
3	1
4	1
5	1
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0

A0, A1, A2 - These symbols reference the coefficients and epoch time of the quadratic polynomial for computing the round trip signal propagation time for light time corrections. The units the symbols should express are seconds, seconds/seconds, and seconds/seconds^2, respectively.

Nominal: A0 = 0

A1 = 0

A2 = 0

BECFRQ - This symbol references leading digits of the transponder frequency. The value is used in the calculations for frequency and bias stripping.

Nominal: BECFRQ = 229. E7 (DPFP)

CC3RC
CC3XM - These symbols reference the transmitter-receiver station table, which define the possible stations which can transmit or receive coherent three way doppler (CC3). Each of these symbols may be set to a data item consisting of one to five internal station numbers. The two tables form a set of five ordered pairs, the Nth entry in the CC3RC table corresponds to the Nth entry in the CC3XM table. A station which receives CC3 data must appear in the CC3RC list; a station which transmits the data must appear in the same position in the CC3XM list. Stations may appear more than once in each list.

Nominal:

CC3RC	CC3XM
2	1
0	0
0	0
0	0
0	0
0	0

CON1
CON2
CON3
CON4
CON5
CON6 - These symbols reference locations containing quantities used for L/S Band and S-Band stations bias frequency.

Nominal:

CON1 = 96.0 x 240.0/221.0	(DPFP)
CON2 = 30.0	(DPFP)
CON3 = 96.0	(DPFP)
CON4 = 30.0/96.0	(DPFP)
CON5 = 1.0E6	(DPFP)
CON6 = 3.0E7	(DPFP)

CONST1 - These symbols reference locations containing quantities
CONST2 used in the frequency (fq) calculations for L-S Band
CONST3 stations using the C2 field of the tracking message.
CONST4
CONST5
CONST6

Nominal:

CONST1 = 50,000
CONST2 = 100,000
CONST3 = 7,800,000
CONST4 = 5.0
CONST5 = 0.4
CONST6 = 2.0

COSL - This symbol references the cosine table, which contains the cosine of the geodetic latitude for each station. The quantities are needed to compute elevation angle from angles HA-DEC.

Nominal:

STATION	COSINE/GEODETIC LATITUDE
1	.81666
2	.81523
3	.81518
4	.85370
5	.89964
6	0
7	0
8	0
9	0
10	0
11	0
12	.81614
13	.76121
14	.81487
15	0

(See SINL for the sine of the geodetic latitude.)

DOPVAL - This symbol references a location containing the quantity used as the doppler multiplier when no doppler multiplier is contained on the master file.

Nominal: DOPVAL = 8.0 (DPFP)

L1BIAS - These symbols reference locations containing quantities used
L2BIAS for L-BAND stations bias stripping.
L3BIAS

Nominal:

L1BIAS = 0.0 (DPFP)
L2BIAS = 1.0E5 (DPFP)
L3BIAS = 0.0 (DPFP)

LEDJET - This symbol references a location containing the leading digit of the VC0 frequency (fq), which is added to the input frequency. The value obtained from the sumation is used for bias stripping of two way doppler.

Nominal: LEDJET = 2.0E7 (DPFP)

LSTW0 - These symbols reference locations containing values which
LTW0 determine whether a particular doppler point is counted at
STW0 every zero crossing or at every other zero crossing.

Nominal:

LSTW0 = 1.0E8 (not currently used by the program)
LTW0 = 1.0E8
STW0 = 0.3E6 (not currently used by the program)

MSFN1 - These symbols reference locations which contain the number
MSFN2 of machine counts (N) used in calculations for Goddard destructive doppler. MSFN1 is used when DC1 = 0; MSFN2 is used when DC1 = 1.

Nominal:

MSFN1 = 77824.0 (DPFP)
MSFN2 = 778240.0 (DPFP)

MSFTB1 - These symbols reference locations which contain the
MSFTB2 time bias (t_b) used in calculating the time label associated with the doppler observable for Goddard stations. MSFTB1 is used when DC1 = 0; MSFT2 is used when DC1 = 1.

Nominal:

MSFTB1 = 0.1 (in seconds)
MSFTB2 = 1.0 (in seconds)

RUNCO - This symbol is non-functional in ODGLK2. It is included in ODGLK2 in order to keep the subroutine FINISH identical in both links of the program.

RETURN - This symbol references a location which is used for communication between the two links of ODG. When ODGLK2 returns control to ODGLK1, the first link interrogates the symbol to see if the common core area should be reinitialized. When the contents of RETURN are non-zero, COMMON should be reinitialized.

Nominal: RETURN = 0

SINL - This symbol references the sine table, which contains the sine of the geodetic latitude for each station. The quantities are needed to computer elevation angle from angles HA-DEC.

Nominal:

STATION	SINE/GEODETIC LATITUDE
1	.57711
2	.57913
3	-.57929
4	-.52076

5	-.43663
6	0
7	0
8	0
9	0
10	0
11	0
12	.57785
13	.64851
14	.57963
15	0

(See COSL for the cosine of the geodetic latitude.)

STA1 - These symbols reference the Feary constant tables. The values in the data item are the angle correction coefficients for each station. The coefficients must be input in the following order:

STA15

A00, B00, A10, B10, A20, B20, A30, B30, A01, B01, A11, B11, A21, B21, A31, B31, A02, B02, A12, B12, A22, B22, A32, B32, A03, B03, A13, B13, A23, B23, A33, B33.

Nominal:

STA3

The following coefficients are used for station 3 (external station 42):

A_{00} = 4.259387851E-03
A_{01} = 7.221454302E-04
A_{02} = 2.920199637E-05
A_{03} = -8.445076754E-07
A_{10} = -6.601939216E-04
A_{11} = 1.439349502E-05
A_{12} = -2.422685603E-08
A_{13} = 8.890787676E-10
A_{20} = 5.210332235E-07
A_{21} = -1.566050243E-07
A_{22} = 2.274453747E-09
A_{23} = -6.282093510E-13
A_{30} = 6.080743069E-08
A_{31} = -6.699017927E-10
A_{32} = -1.751412553E-10
A_{33} = 7.697260010E-12

B_{00} = 4.923429884E-02
B_{01} = 8.209084228E-04
B_{02} = 1.333144087E-04
B_{03} = -3.116225341E-06
B_{10} = -2.371782004E-04
B_{11} = -1.047196831E-05
B_{12} = -5.921994989E-07
B_{13} = 1.902953524E-08
B_{20} = -1.235032494E-05
B_{21} = 9.929890094E-08
B_{22} = 1.491575397E-08
B_{23} = -3.428093371E-10
B_{30} = -1.089880122E-07
B_{31} = 5.093787433E-09
B_{32} = 6.289516821E-10
B_{33} = -1.784080800E-11

STA4

The following coefficients are used for station 4 (external station 41):

A_{00} = 1.319021E-2
A_{01} = 5.45289422E-4
A_{02} = 2.48249580E-6
A_{03} = 2.24566914E-7
A_{10} = 9.5974100E-6
A_{11} = 8.69584098E-6
A_{12} = -6.52074417E-7
A_{13} = -1.59490382E-8
A_{20} = -1.5262404E-6
A_{21} = -7.89511508E-8
A_{22} = -7.4116079E-9
A_{23} = 1.23595449E-10
A_{30} = -5.4803092E-8
A_{31} = 1.90513748E-9
A_{32} = 3.95248319E-10
A_{33} = 9.57751208E-12

B_{00} = 7.4519889E-2
B_{01} = 1.34214922E-4
B_{02} = -1.41108901E-5
B_{03} = 0.0
B_{10} = -5.7615403E-4
B_{11} = 3.34771543E-6
B_{12} = 1.01895206E-7
B_{13} = 0.0
B_{20} = -1.7448991E-5
B_{21} = 4.53942058E-9
B_{22} = 2.09578021E-9
B_{23} = 0.0
B_{30} = -5.5657391E-9
B_{31} = 0.0
B_{32} = 0.0
B_{33} = 0.0

STA5

The following coefficients are used for station 5, external station 51.

A_{00} = -2.686980522E-02
A_{01} = 1.125984424E-04
A_{02} = -2.606788177E-05
A_{03} = -2.261534154E-07
A_{10} = -2.442257734E-04
A_{11} = 2.155710203E-05
A_{12} = -9.601854075E-09
A_{13} = -7.872682479E-09
A_{20} = 6.205836478E-07
A_{21} = 1.644769969E-07
A_{22} = 1.942160358E-09
A_{23} = -4.068918117E-10
A_{30} = 2.384904780E-08
A_{31} = 6.539187350E-10
A_{32} = 2.026731512E-11
A_{33} = -2.538357538E-12

B_{00} = 1.660600739E-02
B_{01} = 7.042453298E-04
B_{02} = -4.088224295E-06
B_{03} = -1.656793817E-07
B_{10} = -1.531357318E-04
B_{11} = -2.490294707E-06
B_{12} = 7.477794730E-08
B_{13} = 2.754780118E-09
B_{20} = -1.187885989E-05
B_{21} = -4.826095969E-08
B_{22} = -1.140105165E-10
B_{23} = -1.139846063E-11
B_{30} = -2.634816810E-08
B_{31} = 3.582093356E-10
B_{32} = -4.025522866E-12
B_{33} = 8.867759716E-14

STWO See I.STWO

TO This symbol references the location containing the starting epoch for the light time propagation polynomial. The format:

TO = YYMMODDHH, MNSS, sss

where sss = fractional parts of a second

Nominal: none

APPENDIX B

SENSE INDICATORS USAGE

LEFT INDICATORS	ODG LK1	ODG LK2	ON	OFF
1		X	Angle's and Range processing	Doppler processing
2		X	Process last doppler point (DRIVEC)	
4				
10	X	X	Light Time correction	No Light Time correction
20	X	X	No B2 write of ODP File	Write B2 of ODP File
40	X	X	ETR data processing	DSIF/GODDARD data processing
100		X	Scratch (ANGCOR)	
	X		Decimal point found(NDIGT)	Blank or comma found
		X	Scratch (PACKD) data present	
200				
400	X		End of card image reached	End of card not reached
1000		X	Scratch (TRSTST)	
	X		Set minimum elevation angle	Set maximum elevation angle
	X		End of card image before a digit	No end of image (NDIGT)
2000	X	X	Use frequencies not checked	Do not use frequencies not checked
4000	X	X	Use only checked frequencies	Do not use only checked frequencies
10000				
20000		X	Make angle corrections	Do not make angle corrections
40000	X	X	DELETE OPTION	NO DELETE OPTION
100000				
200000	X	X	Minimum count time	No minimum count time
400000				

APPENDIX B continued.

RIGHT INDICATORS	ODG LK1	ODG LK2	ON	OFF
1	X	X	All RU data with DC6=0 should be placed on data file	Only N^{th} RU point should be put on data file
2	X	X	All RU data except the N^{th} points should be weighted out	RU should be weighted normally
4	X	X	All RU data with DC6=1 or N^{th} RU point should be placed on data file	Only N^{th} RU point should be put on data file
10	X	X	Update ODP file	Do not update ODP File
20	X	X	Restore ODP file from tape	Do not restore ODP File from tape
40	X	X	New ODP File	No new ODP File
100	X	X	No Resolver Computation	Resolver Computation
200				
400				
1000				
2000				
4000	X	X	Use out-of-lock ETR data	Do not use out-of-lock ETR data
10000	X	X	Use angles not in auto track (DC2=1)	Use no angles not in auto track (DC2=1)
20000	X	X	Use DC2 manual data (DC2=4, 5)	Do not use DC2 manual data.
40000	X	X	Use doppler not in auto track (DC2=1, 5)	Do not use doppler not in auto track.
100000				
200000				
400000	X	X	Do not make or update the ODP input file.	Make or update the ODP input file.

APPENDIX C

CONTROL RECORD FORMAT ON DISC

Word	Bits	Function
0	3-17	Contains number of words in DISCBU record = 6.
1	S, 1, 2	Unused
	3-17	External control number
	18-20	Unused
	21-28	Control Record Type 101 = Freq 102 = Transmitter 103 = Passid 105 = Sample Time 106 = Ignore 107 = Infreq Bias 108 = Range Factor 110 = Shift Time 111 = Delete 1-15 = Weight (Specifies Data Type) 16-30 = Adjust (Specifies Data Type)
	29-35	Station ID (Station ID is zero for Transmitter)
2-3	0-35	Double Precision Start Time
4-5	0-35	Double Precision Stop Time
6	0-35	Control Information: Frequency (Floating point) Transmitter ID (Beacon = 127) Passid (BCD) Count Time (Floating point) Sample Time (Floating point) Shift Time (Floating point) Range Factor (Floating point) Adjust (Floating point) Ignore, Delete - Specified data type, in the following assignment:

BIT Number	DATA TYPE
1	Range (R)
2	Range Rate (DR)
3	Elevation (EL)
4	Azimuth (AZ)
5	Declination (DEC)
6	Hour Angle (HA)
7	One-way Doppler (C1)
8	Two-way Doppler (CC3 or C2)
9	Three-way Doppler (C3)
10	Planetary Range Units (PRU)
11	Range Units (RU)
12	Angel X30 (X30)
13	Angel Y30(Y30)
14	Angle X85 (X85)
15	Angel Y85 (Y85)

APPENDIX D

INTERNAL / EXTERNAL STATION NUMBERS

INTERNAL STATION NUMBER	EXTERNAL STATION NUMBER
1	72
2	11
3	42
4	41
5	51
6	74
7	79
8	77
9	76
10	83
11	82
12	12
13	61
14	14
15	13

APPENDIX E

DETAILED FORMAT OF THE MASTER FILE SUMMARY

Word Range	Bit Range	Content	Data Form
0 - 2	All	TDP STAT SUMMARIES	BCD, left adjusted
3	All	MISSION: The Mission No. for the master file	Fixed point, binary
4 - 5	All	CYSEC: No. of seconds from Jan. 1, 1950 to Jan. 1, current year	Double-precision, floating point
6	All	CURYR: Current year (YY0100100)	Sexagesimal
7	All	MICODE:MASTER file identification	BCD, uradjusted
8 - 9	All	LYSEC: No. of seconds from Jan. 1, 1950 to the epoch time	Double-precision, floating point
10 - 11	All	GMTLY: Epoch time, stored backward (NNSSSSS, YYMMODDHH)	Sexagesimal

DETAILED FORMAT OF A STATION SUMMARY

Word Range	Bit Range	Content	Data Form
0	Decrement	First usable disc record for the station	Fixed point, binary
	Address	Last usable disc record for the station	Fixed point, binary
1	Decrement	Next available word in last disc record used for this station	Fixed point, binary (complemented)
	Address	Last disc record used for this station	Fixed point, binary
2 - 3	All	Last time for the station	Double-precision, floating point
4 - 5	All	First time for the station	Double-precision, floating point
6	All	No. of time points for the station	Fixed point, binary
7	All	Unused	

Structure of Master File on Disc

MASTER FILE SUMMARY
STATION SUMMARY FOR FIRST STATION
⋮
STATION SUMMARY FOR LAST STATION
1 UNUSED WORD
NO. OF REPLACED TIME POINTS IN FILE
TOTAL NO. OF TIME POINTS IN FILE

Structure of Data Record

DISC ADDRESS	
15 5/13 TIME POINTS	200 words
25 UNUSED	25 words

APPENDIX C

NOMINAL WEIGHT CODES

DATA TYPE	WEIGHT CODE
R	314340
DR	314333
EL	121300
AZ	121300
DEC	121300
HA	121300
C1	314333
CC3	314333
C3	314333
PRU	211244
RU	211244
X30	121300
Y30	121300
X85	121300
Y85	121300

APPENDIX H

FORMAT OF ODP LOGICAL RECORD ON DISC

WORD RANGE	BIT RANGE	CONTENTS	DATA FORM
0	3-17	Number of words in logical record, output by DISCBU.	Binary integer
1-2	all	Time of data point in seconds past 1950, GMT	DPFP
3	all	Transmitter frequency	SPFP
4	all	PASSID	BCD
5 Code Word	S and 16	Type of station which received this data: S | 16 0 | 0 L-BAND 1 | 1 L/S-BAND 0 | 1 S-BAND	Binary integer
	1-15	Data type in data point. See Figure H. 1. for data type assigned.	Binary integer
	17	0=Data type #6 is HOUR ANGLE 1=Data type #6 is RIGHT ASCENSION	Binary integer
	18-21	Internal transmitter station number	Binary integer
	22-25	Internal receiver station number	Binary integer
	26-35	Doppler averaging time (COUNT TIME) Less than 1024 secs.	Binary integer
6	all	Value of observable No. 1	SPFP
7 Weight Code Word	S - 2 3-5 6-8 9-11 12-14 15-17	Indices used by the ODP for a priori weighting by table lookup	Binary integer
	18-20	Not used	
	21-35	Data type sample interval	Binary integer
8-9	See word 6-7	Succeeding observables occurring in pairs with the associated weight codes; as many pairs as there are bits in the code word. The order of the observables correspond to the bit number in the code word.	

Data type assignment for the ODP File

BIT NUMBER	DATA TYPE
1	RANGE (R)
2	RANGE RATE (DR)
3	ELEVATION (EL)
4	AZIMUTH (AZ)
5	DECLINATION (DEC)
6	HOUR ANGLE (HA)
7	ONE-WAY DOPPLER (C1)
8	TWO-WAY DOPPLER (CC3 OR C2)
9	THREE-WAY DOPPLER (C3)
10	NOT USED
11	RANGE UNITS (RU)
12	PLANETARY RANGE UNITS (PRU)
13	NOT USED
14	NOT USED
15	NOT USED

APPENDIX I

ODG DISC ALLOCATION

General

This appendix describes the allocation of ODG Disc Storage.

JPLTDQ (The "SCROD" File)

JPLTDQ is a block of 1000 records on Module 1 of the disc file. It is used as a scratch disc buffer by the ODG. When data is to be merged onto the ODP File, the ODP File is transferred to the SCROD File and the data streams are merged back onto the ODP File. This merge is necessary whenever new data is to be added to the ODP File which has times earlier than the last time on the ODP File.

JPLODP

JPLODP is a block of 2000 records assigned to the ODP. The ODP File is written starting in JPLODP + 1001. The ODP File may never be longer than 1000 records. The total number of points possible on the ODP File is variable since the size of the logical records on the File is variable. Assuming only one observable per logical record, the maximum number of points is 25, 000. Only 200 words are written on each 225-word disc record.

JPLTDP

JPLTDP is a block of 8234 records on Module 3 of the disc. It contains the following logical files:

Record	Contents
1-3000	MASTER FILE 1
3001	MASTER FILE 1 STATION SUMMARIES
3002	MASTER FILE 2 STATION SUMMARIES
3003-6002	MASTER FILE 2
6003-6202	CONTROL TABLE FOR FILE 1
6203-6402	CONTROL TABLE FOR FILE 2
6403-6406	DELETE CONTROL FILE
6407-7794	UNUSED
7795-7897	TDP REJECTED DATA
7898-7899	ODP FILE SUMMARIES
7900-8099	(USED BY TDP)
8100-8234	INPUT BUFFER FOR CONTROL CARDS (SHARED WITH TDP ALLOCATION)

DATA TYPE DESCRIPTION

Data Type	Occurrence			Units	Limits	Description
	DSIF	ETR	MSFN			
RANGE R	NO	OP	NO	km		The radial distance from the station to the spacecraft. The signal originates from the station and is bounced off the spacecraft.
RANGE RATE DR	NO	OP	NO	km/sec		The radial velocity of the spacecraft relative to the station. Currently DR is simulated.
AZIMUTH AZ	OP	YES	NO	degrees	$0 \leq AZ \leq 359$	Angular deviation of the spacecraft from north, measured eastward along the plane of the horizon
ELEVATION EL	OP	YES	NO	degrees	$0 \leq EL \leq 89$	Angular deviation of the spacecraft from the plane of the horizon, measured toward the zenith
DECLINATION DEC	OP	NO	NO	degrees	$0 \leq DEC \leq 359$	Angular deviation of the spacecraft from the plane of the earth's equator, measured toward the north pole. (DEC is measured past the north pole 360° to avoid transmitting negative value.)
HOUR ANGLE HA	OP	NO	NO	degrees	$0 \leq HA \leq 359$	Angular deviation of the spacecraft from the local meridian, measured westward along the plane of the earth's equator
X30	NO	NO	OP	degrees	$0 \leq X30 \leq 89$	Angular deviation of the spacecraft measured along the plane of the horizon
Y30	NO	NO	OP	degrees	$0 \leq Y30 \leq 89$	Angular deviation of the spacecraft measured toward the zenith
X85	NO	NO	OP	degrees	$0 \leq X85 \leq 359$	Angular deviation of the spacecraft measured along the plane of the horizon
Y85	NO	NO	OP	degrees	$0 \leq Y85 \leq 89$	Angular deviation of the spacecraft measured toward the zenith
Range Units RU	OP	NO	OP	RU		Elapsed time of a signal to and from the spacecraft. The signal originates from the spacecraft in response to a command from the station
Planetary Range PRU	OP	NO	OP	nanoseconds 10^{-9} sec		Observed topocentrice round-trip light time

APPENDIX J continued.

Doppler C1, C2, CC3	OP	NO	OP	Cycles/ second		Count of frequency cycles per second of a signal from the spacecraft. It is used to calculate radial velocity. The signal originates either from the spacecraft or the station

DATA CONDITION INFORMATION

Data Type	Occurrence DET/COD	Occurrence ETR	Units	Limits	Description
DATA CONDITION CODE 1-DC1	YES	NO	NONE	DC1=0, 1, . . . , 8	Indicates that the doppler count is continuous or destructive. (See Appendix K. 1.) DC1=8 means continuous, DC1<8 means destructive.
DATA CONDITION CODE 2 DC2	YES	NO	NONE	DC2=0, 1, . . . , 7	Indicates that the tracking equipment is in RF lock, and if it is in auto track. This is an indication of the quality of the tracking data. DC2 also indicates whether the data has been manually marked as bad data. (See Appendix K. 2.)
DATA CONDITION CODE 3-DC3	YES	NO	NONE	DC3=0, 1, . . . , 7	Indicates the doppler ground mode (See Appendix K. 3.)
DATA CONDITION CODE 5 DC5	YES	NO	NONE	DC5=0 ≠0	Indicates whether the transmitter frequency is in lock to the atomic frequency standard. This indicates the quality of the data. DC5=0 means in lock. DC5≠0 means out of lock.
DATA CONDITION CODE 6-DC6	OP	NO	NONE	DC6=0, 1, . . ., 7	Indicates the quality of the RANGE UNITS data. (See Appendix K. 4.)

K. 1.

DC1 FOR DESTRUCTIVE DOPPLER

DC1	DOPPLER AVERAGING TIME
0	1 second
1	5 seconds
2	10 seconds
3	20 seconds
4	30 seconds
5	40 seconds
6	50 seconds
7	60 seconds

K. 2.

DC2

DC2	MEANING
0	Good data, in RF lock, in auto track.
1	Good data, in RF lock, in aided track.
2	Good data, not in RF lock, in auto track.
3	Good data, not in RF lock, in aided track.
4	Bad data, in RF lock, in auto track.
5	Bad data, in RF lock, in aided track.
6	Bad data, not in RF lock, in auto track.
7	Bad data, not in RF lock, in aided track.

APPENDIX K continued.

K.3.

DC3

DC3	MEANING
0	Two-way, one station, coherent, 1st counter being used.
1	One-way, 1st counter being used.
2	Two-way, two station, noncoherent, 1st counter being used.
3	Two-way, two station, coherent, 1st counter being used.
4	Two-way, one station, coherent, 2nd counter being used.
5	One-way, 2nd counter being used.
6	Two-way, two station, noncoherent, 2nd counter being used.
7	Two-way, two station, coherent, 2nd counter being used.

K.4.

DC6

DC6	TYPE OF RANGE UNITS
0	Good RU
1	Bad RU
2	Good RU
3	Bad RU
4	Good PRU
5	Bad PRU
6	Good PRU
7	Bad PRU

APPENDIX L
SAMPLE ODG OUTPUT

```
        SOURCE PROGRAM LISTING                                  4/15/67     PAGE 1
    *       TOPLK1  *
   FILE2=4, MICODE=(TSTFIL)
    *       ODGLK1  *
   FILE2=4
    ICLASS+1=4000000000000/8
    ICLASS+14=4000000000000/8
    *     A ODGLK2  B,6
    CC3XR=1 CC3RC=14
    *B      ODGLK1
    *       WANT    A,RETURN
    *       GO      A
    *       END

                  THERE WERE NO GLARING SOURCE DECK ERRORS.

                  THE OBJECT STRING HAS 00050 OCTAL OR   40 DECIMAL WORDS.

TDP OPERATING ON  4/15/67, AT 02 34 00, ON COMPUTER W
VERSION A - REV 1

 TDP-TRACKING DATA PROCESSOR-HAS ENTERED RECOVERY MODE.
TDP IS INITIALIZED FOR  TSTFIL.MASTER FILE STATUS IS ON 3070
                  CURRENT STATUS OF MASTER FILE ON DISK

                        CURRENT MISSION    TSTFIL ,S/C ID= 04 ,GMT OF EPOCH   640100100,0000000

TIME POINTS SENT TO MASTER FILES-  ACCEPTED     REPLACED
                                      63            0

MASTER FILE DATA SUMMARY, STA COUNT  HHMMSS,DAY TO HHMMSS,DAY  ELAPSED HHMMSS,DAYS      TIMES IN SECONDS        ELAPSE
                          1     7  110000 100    120000 366     010000  266  8593200.0  31579200.0  22986000.
                          2     5  120000 100    120030 200     000030  100  8596800.0  17236830.0   8640030.
                          3     2  120000 100    120010 100     000010    0  8596800.0   8596810.0        10.
                          4     2  120000 100    120010 100     000010    0  8596800.0   8596810.0        10.
                          5     2  120000 100    120010 100     000010    0  8596800.0   8596810.0        10.
                          6     2  120000   5    120010   5     000010    0   388800.0    388810.0        10.
                          7     2  120000   5    120010   5     000010    0   388800.0    388810.0        10.
                          8     2  120000   5    120010   5     000010    0   388800.0    388810.0        10.
                          9     2  120000   5    120010   5     000010    0   388800.0    388810.0        10.
                         10     2  120000   5    120010   5     000010    0   388800.0    388810.0        10.
                         11     3  120000   5    120020   5     000020    0   388800.0    388820.0        20.
                         12    11  120000 100    120110 100     000110    0  8596800.0   8596870.0        70.
                  121    13     3  100000 100    120000 100     020000    0  8589600.0   8596800.0      7200.
                         14    14  120000 100    180050 200     060050  100  8596800.0  17258450.0   8661650.
                         15     4  120000 100    120050 300     000050  200  8596800.0  25876850.0  17280050.
```

```
TOP***READY CARDS IN READER TO SELECT DESIRED OPTION.
TOP***MASTER FILE DISPOSITION
     INITIALIZE MASTER FROM TAPE
 TOP OPERATING ON  4/15/67, AT 02 34 10, ON COMPUTER W
 VERSION A - REV 1

                    CURRENT MISSION   TSTFIL ,S/C ID= 04 ,GMT OF EPOCH   640100100,0000000

TIME POINTS SENT TO MASTER FILES-  ACCEPTED      REPLACED
                                      63             0

MASTER FILE DATA SUMMARY. STA COUNT  HHMMSS,DAY TO HHMMSS,DAY  ELAPSED HHMMSS,DAYS      TIMES IN SECONDS      ELAPSE
                          1     7  110000 100    120000 366        010000  266  8593200.0  31579200.0  22986000.
                          2     5  120000 100    120030 200        000030  100  8596800.0  17236830.0   8640030.
                          3     2  120000 100    120010 100        000010    0  8596800.0   8596810.0        10.
                          4     2  120000 100    120010 100        000010    0  8596800.0   8596810.0        10.
                          5     2  120000 100    120010 100        000010    0  8596800.0   8596810.0        10.
                          6     2  120000   5    120010   5        000010    0   388800.0    388810.0        10.
                          7     2  120000   5    120010   5        000010    0   388800.0    388810.0        10.
                          8     2  120000   5    120010   5        000010    0   388800.0    388810.0        10.
                          9     2  120000   5    120010   5        000010    0   388800.0    388810.0        10.
                         10     2  120000   5    120010   5        000010    0   388800.0    388810.0        10.
                         11     3  120000   5    120020   5        000020    0   388800.0    388820.0        20.
                         12    11  120000 100    120110 100        000110    0  8596800.0   8596870.0        70.
                         13     3  100000 100    120000 100        020000    0  8589600.0   8596800.0      7200.
                         14    14  120000 100    180050 200        060050  100  8596800.0  17258450.0   8661650.
                         15     4  120000 100    120050 300        000050  200  8596800.0  25876850.0  17280050.
TOP**LINK 1 HAS PREPARED MISSION  4.

                                   CURRENT STATUS OF MASTER FILE ONE

                    CURRENT MISSION    RAPCK2 ,S/C ID= 03 ,GMT OF EPOCH   660100500,0000000

MASTER FILE DATA SUMMARY. STA COUNT  HHMMSS,DAY TO HHMMSS,DAY  ELAPSED HHMMSS,DAYS      TIMES IN SECONDS      ELAP
                          2 13340  064402 336    171954 353        103552   17  28622642.0  30129594.0   150695
                         13     9  021002  94    062702 353        041700  259   7697402.0  30090422.0  2239302
                         15     1  015602 123    015602 123        000000    0  10202162.0  10202162.0

                                   CURRENT STATUS OF MASTER FILE TWO

                    CURRENT MISSION    TSTFIL ,S/C ID= 04 ,GMT OF EPOCH   640100100,0000000

MASTER FILE DATA SUMMARY. STA COUNT  HHMMSS,DAY TO HHMMSS,DAY  ELAPSED HHMMSS,DAYS      TIMES IN SECONDS      ELAP
                          1     7  110000 100    120000 366        010000  266  8593200.0  31579200.0  22986000
                          2     5  120000 100    120030 200        000030  100  8596800.0  17236830.0   8640030
                          3     2  120000 100    120010 100        000010    0  8596800.0   8596810.0         1
                  122     4     2  120000 100    120010 100        000010    0  8596800.0   8596810.0         1
                          5     2  120000 100    120010 100        000010    0  8596800.0   8596810.0         1
                          6     2  120000   5    120010   5        000010    0   388800.0    388810.0         1
```

11	3	120000	5	120010	5	000010	0	388800.0	388810.0	10
12	11	120000	100	120110	100	000020	0	388800.0	388820.0	20
13	3	100000	100	120000	100	000110	0	8596800.0	8596870.0	70
14	14	120000	100	180050	200	020000	0	8589600.0	8596800.0	7200
15	4	120000	100	120050	300	060050	100	8596800.0	17258450.0	8661650
						000050	200	8596800.0	25876850.0	17280050

ODG-ORBIT DATA GENERATOR-NOW OPERATING

ODG OPERATING ON 4/15/67, AT 02 34 10, ON COMPUTER W
VERSION A - MOD 1

CURRENT MISSION TSTFIL ,S/C ID= 04 ,GMT OF EPOCH 640100100,0000000

MASTER FILE DATA SUMMARY,

STA	COUNT	HHMMSS,DAY		TO HHMMSS,DAY		ELAPSED HHMMSS,DAYS		TIMES IN SECONDS		ELAPS
1	7	110000	100	120000	366	010000	266	8593200.0	31579200.0	22986000
2	5	120000	100	120030	200	000030	100	8596800.0	17236830.0	8640030
3	2	120000	100	120010	100	000010	0	8596800.0	8596810.0	10
4	2	120000	100	120010	100	000010	0	8596800.0	8596810.0	10
5	2	120000	100	120010	100	000010	0	8596800.0	8596810.0	10
6	2	120000	5	120010	5	000010	0	388800.0	388810.0	10
7	2	120000	5	120010	5	000010	0	388800.0	388810.0	10
8	2	120000	5	120010	5	000010	0	388800.0	388810.0	10
9	2	120000	5	120010	5	000010	0	388800.0	388810.0	10
10	2	120000	5	120010	5	000010	0	388800.0	388810.0	10
11	3	120000	5	120020	5	000010	0	388800.0	388810.0	10
12	11	120000	100	120110	100	000020	0	388800.0	388820.0	20
13	3	100000	100	120000	100	000110	0	8596800.0	8596870.0	70
14	14	120000	100	180050	200	020000	0	8589600.0	8596800.0	7200
15	4	120000	100	120050	300	060050	100	8596800.0	17258450.0	8661650
						000050	200	8596800.0	25876850.0	17280050

PLEASE READY CONTROL CARDS IN READER ***ODG

ODG SAMPLE RUN

REMOVE ALL CONTROLS	CARD NO. 1 REMOVE TYPE CONTROL CAR
CHANGE EXECUTE	CARD NO. 2 CHANGE TYPE CONTROL CAR
CHANGE NEW ODP FILE	CARD NO. 3 CHANGE TYPE CONTROL CAR
CHANGE EPOCH 000000,000,65,STATION 5 $ ALL DATA WILL BE IGNORED	CARD NO. 4 CHANGE TYPE CONTROL CAR
CHANGE NO ANGLE CORRECTIONS	CARD NO. 5 CHANGE TYPE CONTROL CAR
TRANSMITTER ON BEFORE 120000,100,64,BEACON	CARD NO. 6 TRANSM TYPE CONTROL CAR
FREQ 20388245 BEFORE 120000,100,64,BEACON	CARD NO. 7 FREQ TYPE CONTROL CAR
TRANSMITTER ON AFTER 120000,100,64,STATION 14	CARD NO. 8 TRANSM TYPE CONTROL CAR
FREQ 20389200 AFTER 120000,100,64,STATION 14	CARD NO. 9 FREQ TYPE CONTROL CAR
COUNT TIME 10 AFTER 120000,200,64,STATION 14	CARD NO. 10 COUNT TYPE CONTROL CAR
SAMPLE TIME 60 AFTER 120000,200,64,STATION 14	CARD NO. 11 SAMPLE TYPE CONTROL CAR
PASSID ABCDE BEFORE 120000,300,64,STATION 1	CARD NO. 12 PASSID TYPE CONTROL CAR
PASSID ABCDEF AFTER 120010,300,64,STATION 1	CARD NO. 13 PASSID TYPE CONTROL CAR
IGNORE STATION 6	CARD NO. 14 IGNORE TYPE CONTROL CAR
SHIFT TIME 502116 AT 120000,005,64,STATION 9	CARD NO. 15 SHIFT TYPE CONTROL CAR

```
RANGE FACTOR 1.1 STATION 9                                          CARD NO. 16 RANGE  TYPE CONTROL C
ADJUST X30,Y30 BY -01.000, AT 120000,200,64,STATION 1               CARD NO. 17 ADJUST TYPE CONTROL C
WEIGHT X30,Y30 BY 141111 STATION 1                                  CARD NO. 18 WEIGHT TYPE CONTROL C
DELETE AZ AT 120010,100,64,STATION 1                                CARD NO. 19 DELETE TYPE CONTROL C
DELETE R,CC3,RU AT 120000,005 STATION 7                             CARD NO. 20 DELETE TYPE CONTROL C
DELETE ANGLES FROM 120000,005,64, TO 120020,005,64,STATION 11       CARD NO. 21 DELETE TYPE CONTROL C
DELETE R STATION 11                                                 CARD NO. 22 DELETE TYPE CONTROL C
DELETE EL AT 120050,300,64,STATION 15                               CARD NO. 23 DELETE TYPE CONTROL C
```

CONTROL NUMBER	1	TRANSMITTING	FROM	INJECTION	TO 115959,100,64	BEACON
CONTROL NUMBER	2	FREQUENCY 2038245.0	FROM	INJECTION	TO 120000,100,64	BEACON
CONTROL NUMBER	3	PASSID AB/CDE	FROM	INJECTION	TO 120000,300,64	STATION 1
CONTROL NUMBER	4	IGNORE ALL DATA	FROM	INJECTION	TO END OF MISSION	STATION 6
CONTROL NUMBER	5	RANGE FACTOR .1100 01	FROM	INJECTION	TO END OF MISSION	STATION 9
CONTROL NUMBER	6	WEIGHT X30 141111	FROM	INJECTION	TO END OF MISSION	STATION 1
CONTROL NUMBER	7	WEIGHT Y30 141111	FROM	INJECTION	TO END OF MISSION	STATION 1
CONTROL NUMBER	8	SHIFT TIME .502116 06	FROM	120000,005,64	TO 120000,005,64	STATION 9
CONTROL NUMBER	9	TRANSMITTING	FROM	120000,100,64	TO END OF MISSION	STATION 14
CONTROL NUMBER	10	FREQUENCY 2038920.0	FROM	120000,100,64	TO END OF MISSION	STATION 14
CONTROL NUMBER	11	COUNT TIME 10	FROM	120000,200,64	TO END OF MISSION	STATION 14
CONTROL NUMBER	12	SAMPLE TIME 60	FROM	120000,200,64	TO END OF MISSION	STATION 14
CONTROL NUMBER	13	ADJUST X30 -.1000 01	FROM	120000,200,64	TO 120000,200,64	STATION 1
CONTROL NUMBER	14	ADJUST Y30 -.1000 01	FROM	120000,200,64	TO 120000,200,64	STATION 1
CONTROL NUMBER	15	PASSID ABCDEF	FROM	120010,300,64	TO END OF MISSION	STATION 1

CONTROL NUMBER	1	DELETE RANGE	FROM	INJECTION	TO 115959,005,64	STATION 11
CONTROL NUMBER	2	DELETE RANGE CC3 PRU RU	FROM	120000,005,64	TO 120000,005,64	STATION 7
CONTROL NUMBER	3	DELETE ANGLES	FROM	120000,005,64	TO 120020,005,64	STATION 11
CONTROL NUMBER	4	DELETE RANGE	FROM	120020,005,64	TO END OF MISSION	STATION 11
CONTROL NUMBER	5	DELETE AZ	FROM	120010,100,64	TO 120010,100,64	STATION 1
CONTROL NUMBER	6	DELETE EL	FROM	120050,300,64	TO 120050,300,64	STATION 15

```
PRINT ALL CONTROLS                                                  CARD NO. 24 PRINT  TYPE CONTROL
CHANGE EXECUTE                                                      CARD NO. 25 CHANGE TYPE CONTROL
PRINT FREQS                                                         CARD NO. 26 PRINT  TYPE CONTROL
```

```
CONTROL NUMBER    2     FREQUENCY  20388245.0 FROM   INJECTION     TO 120000,100,64          BEACON
CONTROL NUMBER   10     FREQUENCY   2038920.0 FROM 120000,100,64  TO END OF MISSION        STATION 14


CHANGE EXECUTE                                                                  CARD NO. 27 CHANGE TYPE CONTROL CA
 ODG OPERATING ON  4/15/67, AT 02 34 10, ON COMPUTER W
 VERSION A - MOD 1


 ODG***LINK 2 NOW PROCESSING MISSION  4.
LOGICAL TRANSMITTER ERROR AT 110000,100  STA  1 RECEIVING  C2  FROM SBEACON  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120000,100  STA  1 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120010,100  STA  1 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120030,100  STA  1 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120010,300  STA  1 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 110000,100  STA  1 RECEIVING  RU  FROM SBEACON  DATA TYPE IGNORED.
STATION  1 AT 120010.000,100   EL .89998999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID AB/(
STATION  1 AT 120010.000,100   AZ .35999899 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID AB/(
STATION  1   X30 CORRECTED.   X30A=  .30000000 01      DV= -.10000000 01    X30C= .20000000 01 120000.000,200 GMT
STATION  1   Y30 CORRECTED.   Y30A=  .72000000 02      DV= -.10000000 01    Y30C= .70999999 02 120000.000,200 GMT
STATION  1 AT 120000.000,200   EL .18987981 02 TC   0 TS  60 CODE 141111 XMFRQ 2038920.0  RCFRQ          .0 PASSID AB/(
STATION  1 AT 120000.000,200   AZ .68848221 00 TC   0 TS  60 CODE 141111 XMFRQ 2038920.0  RCFRQ          .0 PASSID AB/(
STATION  1 AT 120010.000,300   EL .89998999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID ABCI
STATION  1 AT 120010.000,300   AZ .35999899 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID ABCI
STATION  1 AT 120000.000,366   EL .16957333 02 TC   0 TS  60 CODE 141111 XMFRQ 2038920.0  RCFRQ          .0 PASSID ABCI
STATION  1 AT 120000.000,366   AZ .12217433 01 TC   0 TS  60 CODE 141111 XMFRQ 2038920.0  RCFRQ          .0 PASSID ABCI
LOGICAL TRANSMITTER ERROR AT 120000,100  STA  2 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120010,100  STA  2 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120000,200  STA  2 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120020,200  STA  2 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120030,200  STA  2 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120000,100  STA  2 RECEIVING  RU  FROM STA  14  DATA TYPE IGNORED.
STATION  2 AT 120000.000,100   DEC .35999899 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120000.000,100   HA .35999899 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
LOGICAL TRANSMITTER ERROR AT 120000,200  STA  2 RECEIVING  RU  FROM STA  14  DATA TYPE IGNORED.
STATION  2 AT 120000.000,200   DEC .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120000.000,200   HA .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120020.000,200   DEC .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120020.000,200   HA .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120030.000,200   DEC .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
STATION  2 AT 120030.000,200   HA .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NOI
LOGICAL TRANSMITTER ERROR AT 120000,100  STA  3 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120010,100  STA  3 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120000,100  STA  3 RECEIVING  RU  FROM STA  14  DATA TYPE IGNORED.
STATION  3 AT 120010.000,100   DEC .30000000 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ          .0 PASSID  NO
STATION  3 AT 120010.000,100   HA .30000000 03 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ -125-    .0 PASSID  NO
```

```
LOGICAL TRANSMITTER ERROR AT 120010,100  STA  4 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
NO DATA EXIST AFTER EPOCH OF 000000,366,STATION  5
STATION  7 AT 120000.000,005    R .10000000 05 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  7 AT 120000.000,005   EL .80000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  7 AT 120000.000,005   AZ .80000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  8 AT 120000.000,005    R .30000000 05 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  8 AT 120000.000,005   EL .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  8 AT 120000.000,005   AZ .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  9  TIME CORRECTED.  TIME A=120000.000,005 GMT   DV= .50211599 06 TIME C=072836.000,011 GMT
STATION  9     R CORRECTED.     RA=  .50000000 03      DV=  .49999992 02      RC= .54999999 03 072836.000,011 GMT
STATION  9 AT 072836.000,011    R .54999999 03 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  9 AT 072836.000,011   EL .80000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION  9 AT 072836.000,011   AZ .80000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 10 AT 120000.000,005    R .10000000 05 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 10 AT 120000.000,005   EL .88999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 10 AT 120000.000,005   AZ .45000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120000.000,005    R .10000000 05 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120000.000,005   EL .20000000 01 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120000.000,005   AZ .10000000 01 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120020.000,005    R .40000000 05 TC   0 TS  60 CODE 314340 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120020.000,005   EL .30030000 01 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 11 AT 120020.000,005   AZ .20020000 01 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
LOGICAL TRANSMITTER ERROR AT 120000,100  STA 12 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
STATION 12 AT 120000.000,100  DEC .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 12 AT 120000.000,100   HA .30000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 12 AT 120100.000,100   EL .16957308 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 12 AT 120100.000,100   AZ .88773307 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 12 AT 120110.000,100   EL .17974214 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 12 AT 120110.000,100   AZ .89025795 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
LOGICAL TRANSMITTER ERROR AT 100000,100  STA 13 RECEIVING  CC3 FROM SBEACON  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 110000,100  STA 13 RECEIVING  CC3 FROM SBEACON  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120000,100  STA 13 RECEIVING  CC3 FROM STA  14  DATA TYPE IGNORED.
STATION 14 AT 120037.705,200  CC3=.99987432 06 TC  77 TS  77 CODE 314333 XMFRQ 2038920.0  RCFRQ 2038920.0 PASSID  NO
STATION 14 AT 170157.705,200  CC3=.99899463 06 TC  77 TS  77 CODE 314333 XMFRQ 2038920.0  RCFRQ 2038920.0 PASSID  NO
STATION 14 AT 120000.000,100   RU .10000000 06 TC   0 TS  60 CODE 211244 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180000.000,200   EL .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180000.000,200   AZ .30000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180010.000,200   EL .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180010.000,200   AZ .30000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180010.000,200   RU .20000000 10 TC   0 TS  60 CODE 211244 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180020.000,200   EL .59999999 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180020.000,200   AZ .30000000 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 14 AT 180040.000,200   RU .20000000 10 TC   0 TS  60 CODE 211244 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
LOGICAL TRANSMITTER ERROR AT 120000,100  STA 15 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
LOGICAL TRANSMITTER ERROR AT 120010,100  STA 15 RECEIVING  C2  FROM STA  14  DATA TYPE IGNORED.
STATION 15 AT 120000.000,200   EL .49998095 00 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 15 AT 120000.000,200   AZ .60003778 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 15 AT 120050.000,300   EL .49998095 00 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
STATION 15 AT 120050.000,300   AZ .60003778 02 TC   0 TS  60 CODE 121300 XMFRQ 2038920.0  RCFRQ        .0 PASSID  NO
```

RANGE DATA CONDITION CODE	0	2	0	0	0	0	0	0	0	0	0	0	3	
LOGICAL TRANSMITTER ERRORS	6	7	3	2	0	0	0	0	0	0	0	1	3	
ELEVATION ANGLE CONSTRAINTS	0	0	0	2	0	0	0	0	0	0	0	0	0	0
BAD ANGLES NOT IN AUTO TRACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DATA BEFORE EPOCH TIME	0	0	0	0	2	0	0	0	0	0	0	0	3	2
OSIF DATA IN MANUAL MODE	0	0	0	0	0	1	1	1	1	1	1	0	0	0
GOOD DOPPLER IGNORED BY INPUT	0	0	0	0	0	2	0	0	0	0	0	0	0	4
GOOD ANGLES IGNORED BY INPUT	0	0	0	0	0	2	0	0	0	0	0	0	0	0

PLEASE NOTE - DATA VALUES ADJUSTED BY POLY

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	120010.000,100	120000.000,366	0	0	4	4	0	0	0	0	0	0	0
2	120000.000,100	120030.000,200	0	0	0	0	4	4	0	0	0	0	0
3	120010.000,100	120010.000,100	0	0	0	0	1	1	0	0	0	0	0
7	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
8	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
9	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
10	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
11	120000.000,005	120020.000,005	2	0	2	2	0	0	0	0	0	0	0
12	120000.000,100	120110.000,100	0	0	2	2	1	1	0	0	0	0	0
14	120000.000,100	180040.000,200	0	0	3	3	0	0	0	2	0	0	3
15	120000.000,200	120050.000,300	0	0	2	2	0	0	0	0	0	0	0

THE TAPE LABEL ON THE SAVED ODP FILE FOLLOWS....
ODP FILE SAVED ON 4/15/67, AT 02 34 10, ON COMPUTER W

DATA POINTS DELETED FROM THE ODP FILE

STATION	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	0	0	0	1	0	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0
11	0	0	2	2	0	0	0	0	0	0	0
15	0	0	1	0	0	0	0	0	0	0	0

SUMMARY OF DATA TYPES ON THE ODP DATA FILE
PLEASE NOTE - END TIMES MAY BE IN ERROR BY TC/2

STA	START TIME	END TIME	R	DR	EL	AZ	DEC	HA	C1	CC3	C3	PRU	RU
1	120010.000,100	120000.000,366	0	0	4	3	0	0	0	0	0	0	0
2	120000.000,100	120030.000,200	0	0	0	0	4	4	0	0	0	0	0
3	120010.000,100	120010.000,100	0	0	0	0	1	1	0	0	0	0	0
7	120000.000,005	120000.000,005	0	0	1	1	0	0	0	0	0	0	0
8	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
9	120000.000,005	072836.000,011	1	0	1	1	0	0	0	0	0	0	0
10	120000.000,005	120000.000,005	1	0	1	1	0	0	0	0	0	0	0
11	120000.000,005	120020.000,005	2	0	0	0	0	0	0	0	0	0	0
12	120000.000,100	120110.000,100	0	0	2	2	1	1	0	0	0	0	0
14	120000.000,100	180040.000,200	0	0	3	3	0	0	0	2	0	0	3
15	120000.000,200	120050.000,300	0	0	1	2	0	0	0	0	0	0	0

THE TAPE LABEL ON THE SAVED ODP FILE FOLLOWS....
ODP FILE SAVED ON 4/15/67, AT 02 34 10, ON COMPUTER W

```
0173  +000072000000 +005301000000    00175  +000000000000 +000000000000
0177  +000014000000 +224475335400    00179  +171000000000 -200200100004
0181  -140400000051 +202422132071    00183  +207500432477 +000000000000
0185  +051836620537 +000073000000    00187  +005301000000 +000000000000
0189  +000000000000 +000014000000    00191  +224475342400 +171000000000
0193  -200067100004 -140400000051    00195  +202422132071 +207500702436
0197  +000000000000 +051662531132    00199  +000074000000 +005301000000
0201  +000000000000 +000000000000    00203  +000014000000 +224475347400
                WORDS 00205 TO 00228 ARE ALL +000000000000
0229  +000000000000 +200126000626

ECORD 0006, FILE 0001  BINARY, PRINTED IN OCT. 00346   (00230   ) WORDS
                                                  8        10

0001  -232447604421 -226325516026    00003  +314325606060 +000001001571
0005  +171000000000 -200147100004    00007  -140400000051 +202423564426
0009  +207501152375 +000000000000    00011  +051766444603 +000075000000
0013  +005301000000 +000000000000    00015  +000000000000 +000014000000
0017  +224475354400 +171000000000    00019  -200154100004 -140400000051
0021  +202423146314 +207501422335    00023  +000000000000 +052102361373
0025  +000075000000 +005301000000    00027  +000000000000 +000000000000
0029  +000014000000 +224475361400    00031  +171000000000 -200063100004
0033  -140400000051 +202423146314    00035  +207501676355 +000000000000
0037  +052216335366 +000077000000    00039  +005301000000 +000000000000
0041  +000000000000 +000014000000    00043  +224475366400 +171000000000
0045  -200077100004 -140400000051    00047  +202423146314 +207502146314
0049  +000000000000 +052352232623    00051  +000100000000 +005301000000
0053  +000000000000 +000000000000    00055  +000014000000 +224475371400
0057  +171000000000 -200138100004    00059  -140400000051 +202423146314
0061  +207502416254 +000000000000    00063  +052446163400 +000101000000
0065  +005301000000 +000014000000    00067  +000000000000 +000017000000
0069  +224475400400 +171000000000    00071  -200171100004 -140400000051
0073  +202425005075 +207502666213    00075  +000000000000 +052562117542
0077  +000102000000 +005301000000    00079  +000000000000 +000020000000
0081  +000014000930 +224475405400    00083  +171000000000 -200151100004
```

Lunar Orbiter Selen

Mission V Master

B
61-51031

#406 Records 406-415

0230 1 WORDS
10

+000001001571
+202423554426
+000075000000
+000014000000
-140400000051
+052102363373
+000000000000
-200063100004
+000000003000
+000000000000
+171000000000
+207502146314
+005301000000
+224475373400
+202423146314
+000101000000
+000017000000
-140400000051
+052562117542
+000000000000
-200151100004

```
0085 -140400000051 +202423554426                00087 +207503134771 +000000000000
0089 +052576057341 +000103000000                00091 +005301000000 +000000000000
0093 +000000000000 +000114000000                00095 +224475412400 +171000000000
0097 -000113100004 -140400000051                00099 +202424162540 +207503402030
0101 +000000000000 +053012022646                00103 +000110000000 +005301000000
0105 +000000000000 +000000000000                00107 +000014000000 +224475417400
0109 +171000000000 -200130100004                00111 -140400000051 +202423554426
0113 +207503631767 +000000000000                00115 +053125771733 +000111000000
0117 +005301000000 +000000000000                00119 +000000000000 +000014000000
0121 +224475424400 +171000000000                00123 -200075100004 -140400000051
0125 +202423554426 +207504121727                00127 +000000000000 +053241744653
0129 +000112000000 +005301000000                00131 +000000000000 +000000000000
0133 +000014000000 +224475431400                00135 +171000000000 -200164100004
0137 -140400000051 +202423554426                00139 +207504365605 +000000000000
0141 +053355723473 +000113000000                00143 +005301000000 +000000000000
0145 +000000000000 +000014000000                00147 +224475450400 +171000000000
0149 -200132100004 -040000000051                00151 +202423743247 +207505324773
0153 +000000000000 +053721670024                00155 +000114000000 +005301000000
0157 +000000000000 +000000000000                00159 +000014000000 +224475467400
0161 +171000000000 -200133100004                00163 -040000000051 +202423757473
0165 +207506324773 +000000000000                00167 +054265702245 +000115000000
0169 +005301000000 +000000000000                00171 +000000000000 +000014000000
0173 +224475506400 +171000000000                00175 -200146100004 -040000000051
0177 +202423757473 +207507320712                00179 +000000000000 +054631764532
0181 +000114000000 +005301000000                00183 +000000000000 +000000000000
0185 +000014000000 +224475525400                00187 +171000000000 -200112100004
0189 -040000000051 +202425605075                00191 +207510274324 +000000000000
0193 +055170121236 +000117000000                00195 +005301000000 +000000000000
0197 +000000000000 +000014000000                00199 +224475544400 +171000000000
0201 -200162100004 -040000000051                00203 +202426213207 +207511233513
                    WORDS 00205 TO 00228 ARE ALL +000000000000
0229 +000000000000 -144445000026

RECORD 0007, FILE 0001  BINARY, PRINTED IN OCT.  00346   (00230   ) WORDS
```

0005 THRU 0228 ARE ALL +000000000000

0229 +000000000000 +257411000636

RECORD 0015, FILE 0001 BINARY, PRINTED IN OCT. 00346 (00230) WORDS
8 10

0001	-232447604421	-226325516026	00003	+314325606060	+000001004200
0005	+205541361523	+211447019223	00007	+000000000000	+050404613477
0009	+000134000000	+005301000000	00011	+000000000000	+000000000000
0013	+000014000000	+223470141000	00015	+170000000000	-000006100014
0017	-040000000014	+205541422336	00019	+211447211156	+000000000000
0021	+050752101271	+000142000000	00023	+005301000000	+000000000000
0025	+000000000000	+000014000000	00027	+223470177000	+170000000000
0029	-000177100014	-040000000014	00031	+205541402030	+211447414223
0033	+000000000000	+051317371703	00035	+000143000000	+005301000000
0037	+000000000000	+000000000000	00039	+000014000000	+223470236000
0041	+170000000000	-000152100014	00043	-040000000014	+205541402030
0045	+211447521320	+000000000000	00047	+051664665157	+000146000000
0049	+005301000000	+000000000000	00051	+000000000000	+000014000000
0053	+223470273000	+170000000000	00055	-000146100014	-040000000014
0057	+205541503463	+211450015237	00059	+000000000000	+052232163323
0061	+000156000000	+005301000000	00063	+000000000000	+000000000000
0065	+000014000000	+223470331000	00067	+170000000000	-000077100014
0069	-040000000014	+205541523767	00071	+211450223151	+000000000000
0073	+052577453403	+000151000000	00075	+005301000000	+000000000000
0077	+000000000000	+000014000000	00079	+223470367000	+170000000000
0081	-000114100014	-040000000014	00083	+205541605075	+211450422335
0085	+000000000000	+051447.0425	00087	+000154000000	+005301000000
0089	+000000000000	+000000000000	00091	+000014000000	+223470425000
0093	+170000000000	-0000[4100014	00095	-040000000014	+205541666213
0097	+211450521320	+000000000000	00099	+052512277436	+000156000000
0101	+005301000000	+000000000000	00103	+000000000000	+000014000000
0105	+223470463000	+170000000000	00107	-000177100014	-040000000014
0109	+205541706517	+211451021320	00111	+000000000000	+054057611465
0113	+000157000000	+005301000000	00115	+000000000000	+000000000000

```
0117  +0000140000000 +223470521000      00119  +1700000000000 -0000142100014
0121  -0400000000014 +2055417a7635       00123  +211451227432 +0000000000000
0125  +0544251265S0 +0001620000000       00127  +0053010000000 +0000000000000
0129  +0000000000000 +0000140000000       00131  +223470567000 +1700000000000
0133  -0001021000l4 -0400000000014       00135  +2055417676Sf +211451472477
0137  +0000000000000 +0547725445741       00139  +0001640000000 +0053010000000
0141  +0000000000000 +0000000000000       00143  +0000140000000 +2234  15000
0145  +1700000000000 -0001721000l4       00147  -0400000000014 +205542111564
0149  +211451633513 +0000000000000       00151  +0552377720a6 +0001660000000
0153  +0057701000000 +0000000000000       00155  +0000000000000 +0000140000000
0157  +223470653000 +1700000000000       00159  -0000761000l4 -0400000000014
0161  +205542111564 +211452033613        00163  +0000000000000 +0557055320722
0165  +0001700000000 +0053010000000       00167  +0000000000000 +0000000000000
0169  +0000140000000 +223470711000       00171  +1700000000000 -0001031000l4
0173  -0400000000014 +205542152375       00175  +211452240611 +0000000000000
0177  +0562526525?7 +0001710000000       00179  +0053010000000 +0000000000000
0181  +0000000000000 +0000140000000       00183  +223470747000 +1700000000000
0185  -0001011000l4 -0400000000014       00187  +205542172702 +211452440611
0189  +0000000000000 +03e620207705       00191  +0001730000000 +0053010000000
0193  +0000000000000 +0000000000000       00195  +0000140000000 +223471005000
0197  +1700000000000 -0000571000l4       00199  -0400000000014 +205542172702
0201  +211452643656 +0000000000000       00203  +0571655502?3 +0001760000000
                WORDS 00205 TO 00228 ARE ALL +0000000000000
0229  +0000000000000 +3261470006?7

ECC40 0016. FILE 0001  BINARY. PRINTED IN OCT.  00346   (00230    ) WORDS
                                                    8          10
0001  -2324476344?1 -2263256162?6       00003  +3143256060a0 +0000010042?1
0005  +0053010000000 +0000000000000       00007  +0000000000000 +0000140000000
0009  +0223471040000 +1700000000000       00011  -0000541000l4 -0400000000014
0013  +2055422540?0 +211453045706        00015  +0000000000000 +0575331114174
0017  +0001772000000 +0053010000000       00019  +0000000000000 +0000000000000
0021  +0000140000000 +2234?1101000       00023  +1700000000000 -0000541000l4
0025  -0400000000014 +205542436560       00027  +211453256050 +0000000000000
0029  +0660100463441 +0002010000000       00031  +0053010000000 +0000000000000
```