

Real Time Computer Complex

Apollo Programming Systems

BOOK: MISSION SYSTEMS

AS-200 SYSTEMS INTEGRATION

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IBM RTCC APOLLO PROGRAMMING SYSTEMS

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APOLLO PROGRAMMING SYSTEMS

Mission Systems

Contract No. NAS 9-996

**Federal Systems Division
International Business Machines Corporation
1322 Space Park Drive
Houston, Texas 77058**



Insertion Control Sheet

Please turn to the Insertion Control Sheet in Volume 1 to record all revisions.

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6. R00

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MED Format Table

MED Code: R00 Task: RTASPECT
 Purpose: Specify vector to be used to generate RMSPECT
 nominal reentry trajectory NA
 Load Module: RMRRMED QUEID: 550

Desc.	Item	1	2	3	4	5	6
Item Name		Vector code	Threshold time				
Input Format		EBCDIC	Hours				
Input Units		EBCDIC	HH:MM:SS.S				
Program Units		EBCDIC	Hours				
Scale Factor		None	Add				
Checking Option		Exact	MCGMTL				
Missing Item Option		Note 1	Note 2				
Item Destination		Error	Note 2				
		RTATTACH PARAM	RZRCNS(65)				

Initial Logic: None

Final Logic: RTATTACH PARAM

Illegal Phases: Recovery, Mid-course, Launch, Condition for Launch,
 Abort (except mode 3)

Notes: 1. ORB = P ORB invalid in mode 3
 TLM = T PRE and POST invalid in reentry
 HSR = H
 PRE = P
 POST = 3

Note 2: Entry invalid unless item 1 = ORB



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MED Format Table

 Task: RTASPECT
 EP: RMSPECT
 QNAME: NA
 QUEID: 500

 MED Code: R00
 Purpose: Specify Nominal Anchor

Load Module: RMRMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vector Code	Threshold Time				
Input Format		EBCDIC	Hours				
Input Units		EBCDIC	HHH:MMSS.T. GET				
Program Units		Note 1	GMT				
Scale Factor			Add MCGMTL				
Checking Option		Exact (Note 1)	Note 2				
Missing Item Option		ERROR	Note 2				
Item Destination		(All items passed to RTASPECT via Subpool 1.)					

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: 1. ORB = P 2. Valid only for 'ORB'

TLM = T Reentry Only

HSR = H

PRE = P Mode III Only

POST = 3

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MED Format Table

MED Code: R01
 Purpose: Specify guidance mode for reentry
 Load Module: RMRRMED

Task: RTASPECT
 EP: RMSPECT
 QNAME: NA
 QUEID: 551

Desc.	Item	1	2	3	4	5	6
Item Name	Guidance mode	Latitude of target	Longitude of target	Bank angle	GETRB		
Input Format	EBCDIC	Lat.	Long.	fl. pt.	Hours.		
Input Units	EBCDIC	DD:MM:SSS N	DDD:MM:SS	E W Degrees	HH:MM:SS.S		
Program Units	EBCDIC	Radians	Radians	Radians	Hours		
Scale Factor	None	None	None	MCCRPD	Add		
Checking Option	Exact (note 1) Z, M, L, B, P	Min: -90° Max: +90°	Min: -180° Max: +180°	Min: -90° Max: +180°	Min = 0		
Missing Item Option	Insert P	Error	Error	Ignore	Note 2		
Item Destination	RTATTACH PARAM	RZRCNS(11)	RZRCNS(13)	Note 3	RZRCNS(7)		

Initial Logic: Road data table

Final Logic: Write data table; RTATTACH PARAM

Illegal Phases: Recovery, Mid-course, Launch, Condition for launch,
(except mode 3)

- Notes:
1. Z, M, B - decode no items
P - decode items 2 and 3
L - decode items 4 and 5
 2. RTATTACH PARAM = 5 if missing;
otherwise = L
 3. If item 5 is missing - RZRCNS (9)
If item 5 present - RZRCNS (5)

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MED Format Table

Task: RTASPECT
EP: RMSPECT
QNAME: NA
QUEID: 551

MED Code: R01
Purpose: Specify Entry Mode

Load Module: RMRRMED

Desc.	Item	1	2	3	4	5	6
Item Name	Entry Mode	Target Latitude	Target Longitude	Initial Bank Angle	G Level	Bank Angle	
Input Format	EBCDIC	lat.	long.	fl. pt.	fl. pt.	fl. pt.	
Input Units	EBCDIC	DD:MM:SS S ^N	DDD:MM:SSW ^E	degrees	Gravitational Units	DEGREES	
Program Units	Integer (Note 1)	radians	radians	radians	Er/hr. ²	radians	
Scale Factor	---	---	---	MCCRPD	MCCGUN	MCCRPD	
Checking Option	Exact	Min = -90° Max = +90°	Min = 0° Max = 360°	Min = -180° Max = 360°	Min = 0 Max = 360°	Min = -180° Max = 360°	
Missing Item Option	Insert Primary	Note 2	Note 2	Ignore	Ignore	Ignore	
Item Destination	(All items passed to RTASPECT via Subpool 1.)						

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic: NA

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: 1. Min = 1 Max = 2 Bank = 5 2. LAT, LONG must both be present if either is present.

Prim = 3 BMIN = 6

BRB = 4 BMAX = 7

BBRK = 8

BBNK = 9

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MED Format Table

Task:
EP:
QNAME:
QUEID:

MED Code: R01 (cont.)

Purpose:

Load Module:RMRRMED

Desc.	Item	7							
Item Name		Time to reverse bank							
Input Format		hours							
Input Units		HHMMSS.T GET							
Program Units		GMT							
Scale Factor		Add MCGMTL							
Checking Option		Min = 0							
Missing Item Option		Ignore							
Item Destination									

Programmer: J. Massingill

Initial Logic:

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes:

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MED Format Table

MED Code: R02
 Purpose: Specify deorbit maneuver
 Load Module: RMRRMED

Task: RTASPECT
 EP: RMSPECT
 QNAME: (None)
 QUEID: 552

Desc.	Item	1	2	3	4	5
Item Name	Maneuver Option	Threshold Time	GETPI	TYPE	ΔT or ΔV	
Input Format	EBCDIC	Hours	Hours	EBCDIC	FLP	
Input Units	EBCDIC	HH:MM:SS.S	HH:MM:SS.S	EBCDIC	Sec or ft/sec	
Program Units	Fixed point	GMT Hours	GMT Hours	EBCDIC	Hours or Er/hr.	
Scale Factor	None	Add	Add	None	MCCSCU or MCCEHF	
Checking Option	Exact (Note 1)	MIN = 0	MIN = 0	Exact T, V	MIN: 0	
Missing Item Option	ERROR	IGNORE	Note 3	Note 4	Note 4	
Item Destination	Note 2	RZRCNS(65)	RZRCNS(23)	MED Decoder	Note 5	

Initial Logic: Read Data Table

Final Logic: Write Data Table

Illegal Phases: Recovery, Mid-course, Launch, Condition for launch, Abort (Except Mode 3)

Notes: See following page

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Notes:

1. RCS (RCS) = 1
 S (SCS inertial) = 2
 G (G & N) = 3
 MB (Manual - hold body attitudes) = 4
 MSB (Manual - use scribe line) = 4
 MST (Manual - hold thrust direction) = 4
 If G, T, ΔT not allowed in Items 4 and 5

}
 See
 Note 2
2. Set RZRCNS (21. 1)
 to value indicated in Note 1
 For following set RZRCNS (22. 2)
 MB = 1 (Hold body attitudes)
 MSB = 2 (Abort)
 MST = 3 (Deorbit)
3. Set GETPI flag on if present
 off if missing (RZRCNS (64), bit 1)
4. Items 4 and 5 must both be present
 or both be missing, otherwise =
 error
5. ΔT -RZRCNS (27)
 ΔV -RZRCNS (29)



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MED Format Table

MED Code: R02

Purpose: Specify deorbit maneuver

Load Module: RMRRMED

Task: RTASPECT

EP: RMSPECT

QNAME: (None)

QUEID: 552

Desc.	Item	6	7	8	9	10
Item Name		RFSMAT ID	PITCH	YAW	ROLL	RCS THRUSTER
Input Format		EBCDIC	FLP	FLP	FLP	EBCDIC
Input Units		EBCDIC	DEGREES	DEGREES	DEGREES	EBCDIC
Program Units		Fixed point	RADIANS	RADIANS	RADIANS	Fixed point
Scale Factor		None	MCCRPD	MCCRPD	MCCRPD	None
Checking Option		Exact (Note 6)	Min: -360° Max: +360°	Min: -360° Max: +360°	Min: -360° Max: +360°	Exact (Note 8)
Missing Item Option		IGNORE	Note 7	Note 7	Note 7	IGNORE
Item Destination		RZRCNS(63)	RZRCNS(31)	RZRCNS(33)	RZRCNS(35)	RZRCNS(21,2)

Initial Logic:

Final Logic:

Illegal Phases:

Notes:

CUR = 1

PCR = 2

AGC = 3

OST = 4

MED = 5

DMT = 6

DOD = 7

6. Item presence in Mode III

is error - Set RFSMAT FLAG = 1

if item present (RZRCNS(64), bit 3)

7. Set attitude

flag on if any or

all present, off if

all missing.

8. R1 = 1 (+X)

R2 = 2 (-X)

R3 = 3 (+Y)

R4 = 4 (-Y)

R5 = 5 (+Z)

R6 = 6 (-Z)

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MED Format Table

MED Code: R02
Purpose: Specify Deorbit Maneuver

Task: RTASPECT
EP: RMSPECT
QNAME: NA
QUEID: 552

Load Module: RMRRMED

Desc.	Item	1	2	3	4	5	6
Item Name	Maneuver Type	Time of Burn Initiate	Delta - T of Burn	Delta - V of Burn	Pitch	Yaw	
Input Format	EBCDIC	hours	fl. pt.	fl. pt.	fl. pt.	fl. pt.	
Input Units	EBCDIC	HHH:MM:SS.T	seconds	ft. /sec.	deg. (IMU)	deg. (IMU)	
Program Units	Half Word Integers (Note 1)	GMT	hours	Er/hr.	radians	radians	
Scale Factor		Add	MCGMTL	MCCCHPS	MCCCEHF	MCCCRPD	
Checking Option	Exact	Min = 0	Min = 0	None	Min = -180° Max = 360°	Min = -180° Max = 360°	
Missing Item Option	Error	Ignore	See Note 4	Ignore	See Note 2	See Note 2	
Item Destination	(All items passed to RTASPECT via Subpool 1.)						

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: 1. GN2 = H'4, 33, 0' SCS4 = H'1, 33, 1' 2. Pitch, Yaw, Roll must all be present or none present.

GN4 = H'4, 33, 1' NONE = H'0, 0, -1'

GNR2 = H'4, 1, 0' R2 = H'1, 1, 0'

GNR4 = H'4, 2, 1' R4 = H'1, 2, 1'

GN-R2 = H'4, 3, 0' -R2 = H, 1, 3, 0'

GN-R4 = H'4, 4, 1' -R4 = H'1, 4, 1'

SCS2 = H'1, 33, 0'

4. Entry invalid for guided maneuvers.

5. If RCS maneuver type, then ΔV cannot be negative.

Programmer Jayce Massingill

Manager Robert T. Shellenbarger

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MED Format Table

MED Code: R02, (cont.)
Purpose: Specify Deorbit Maneuver

Task: RTASPECT
EP: RMSPECT
QNAME: NA
QUEID: 552

Load Module: RMRRMED

Desc.	Item	7	8	9	10	11
Item Name	ROLL		Reference Matrix Code	Delta-T of Ullage	Threshold Time	Gimbal Option
Input Format	fl. pt.		EBCDIC	fl. pt.	hours	EBCDIC
Input Units	deg. (IMU)		EBCDIC	seconds	HHH:MM:SS:T GET	EBCDIC
Program Units	radians		Integer See Note 3	hours	GMT	EBCDIC
Scale Factor	MCCRPD			MCCHPS		
Checking Option	Min = -180° Max = 360°		EXACT	Min = 0	Min = 0	Exact I, C
Missing Item Option	See Note 2		Ignore	Ignore	Ignore	Ignore
Item Destination						

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: 3. CUR = 1 MED = 5

PCR = 2 DMT = 6

TLM = 3 DOD = 7

OST = 4 LCV = 8



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MED Format Table

MED Code: R03
 Purpose: Specify CM/SM separation conditions
 Load Module: RMRRMED

Task: RTASPECT
 EP: RMSPECT
 QNAME: NA
 QUEID: 553

Desc.	Item	1	2	3	4	5	6
Item Name	Weight		Area	GET of separation			
Input Format	Fl. pt.		Fl. pt.	Hours			
Input Units	Lbs.		Sq. ft.	HHH:MM:SS			
Program Units	Lbs.		Sq. ft.	Hours			
Scale Factor	None		None	Add			
Checking Option	Min = 1000 Max = 20000		Min = 50 Max = 175	MCGMTL			
Missing Item Option	Ignore		Ignore	Ignore			
Item Destination	MCVCMW(4)	MCVCMA(3)	RZRCNS(59)				

Initial Logic: Read data table

Final Logic: Write data table; update system parameters; RTATTACH RTASPECT

Illegal Phases: Recovery, Mid-course, Launch, Condition for launch,

Abort (except mode 3)

Notes: 1. Word 64, byte 2 = FF upon entry of item. Once set, never cleared.

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MED Format Table

MED Code: R03

Purpose: Specify CM/SM Separation Parameters

Load Module: RMRRMED

 Task: RTASPECT
 EP: RMSPECT
 QNAME: NA
 QUEID: 553

Desc.	Item	1	2	3	4	5	6
Item Name		CM Weight	CM Area	Separation Time (CM/SM)			
Input Format		fl. pt.	fl. pt.	HHMMSS.T hours			
Input Units		lbs.	sq. ft.	GET			
Program Units		lbs.	sq. ft.	GMT			
Scale Factor		---	---	Add MCGMTL			
Checking Option		Min = 1000 Max = 20000	Min = 50 Max = 325	Min = 0			
Missing Item Option		Ignore	Ignore	Ignore			
Item Destination		(All items passed to RTASPECT via Subpool 1)					

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: NA

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MED Format Table

MED Code: R04

Purpose: Specify pre-burn weight

Load Module: RMRRMED

Task: RTASPECT
EP: RMSPECT
QNAME: NA
QUEID: 554

Desc.	Item	1	2	3	4	5	6
Item Name		Pre-burn weight	Pre-separation cross-sectional area	Threshold time			
Input Format		Fl. pt.	Fl. pt.	Hours			
Input Units		Lbs.	Ft. 2	HH:MM:SS.S			
Program Units		Lbs.	Ft. 2	Hours			
Scale Factor		None	None	None			
Checking Option		Min = 18000 Max = 75000	Min = 50 Max = 450	Min = 0			
Missing Item Option		Ignore	Ignore	Ignore			
Item Destination		RZRCNS(19)	RZRCNS(17)	RZRCNS(65)			

Initial Logic: Read data table

Final Logic: Write data table, RTATTACH RTASPECT

Illegal Phases: Recovery, Mid-course, Launch, Condition for launch, Pre-launch, Abort (except Mode 3)

Notes: None

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MED Format Table

MED Code: R04

Task: RTASPECT

Purpose: Specify Preburn Parameters

EP: RMSPECT

QNAME: NA

Load Module: RMRMED

QUEID: 554

Desc.	Item	1	2	3	4	5	6
Item Name		CSM Weight	CSM Area	Threshold Time			
Input Format		fl. pt.	fl. pt.	HHMMSS. T hours			
Input Units		lbs.	sq. ft.	GET			
Program Units		lbs.	sq. ft.	GMT			
Scale Factor		---	---	Add MCGMTL			
Checking Option		Min = 18000 Max = 75000	Min = 50 Max = 325	Min = 0			
Missing Item Option		Ignore	Ignore	Ignore			
Item Destination		(All items passed to RTASPECT via Subpool 1)					

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: NA

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MED Format Table

MED Code: R05

Purpose: Confirm Deorbit with External Delta-V Residuals

Load Module:RMRRMED

Task: RTASPECT
EP: RMSPECT
QNAME: NA
QUEID: 555

Desc.	Item	1	2	3	4	5	6
Item Name		E ΔV_x	E ΔV_y	E ΔV_z	Pitch	Yaw	Roll
Input Format		fl. pt.	fl. pt.	fl. pt.	fl. pt.	fl. pt.	fl. pt.
Input Units		ft./sec.	ft./sec.	ft./sec.	deg(IMU)	deg(IMU)	deg(IMU)
Program Units		Er/hr.	Er/hr.	Er/hr.	radians	radians	radians
Scale Factor		MCCEHF	MCCEHF	MCCEHF	MCCRPD	MCCRPD	MCCRPD
Checking Option		None	None	None	Min = -180° Max = +360°	Min = -180° Max = +360°	Min = -180° Max = +360°
Missing Item Option		Error	Error	Error	Note 1	Note 1	Note 1
Item Destination		Note 2	Note 2	Note 2	Note 2	Note 2	Note 2

Programmer: J. Massingill

Initial Logic: Accept MED only if abort phase is Mode III.

Final Logic:

Illegal Phases: Orbit, Launch, Condition for Launch

Notes: 1. All or none must be present

2. All items passed to RTASPECT via Subpool 1.

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MED Format Table

MED Code: S00

Purpose: Change station characteristic indicators

Task: BTLSDC

EP: BMGSTA

QNAME: NA

QUEID: 0

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name	Station ID		Command Indicator	Radar Indicator	Telemetry Indicator	Voice Indicator	
Input Format	EBCDIC		fx. pt.	fx. pt.	fx. pt.	fx. pt.	
Input Units	EBCDIC		fx. pt.	fx. pt.	fx. pt.	fx. pt.	
Program Units	EBCDIC		fx. pt.	fx. pt.	fx. pt.	fx. pt.	
Scale Factor							
Checking Option	4 Char.		0, 1	0, 1	0, 1	0, 1	
Missing Item Option	Error		Insert -1	Insert -1	Insert -1	Insert -1	
Item Destination							

Initial Logic: None

Final Logic: None

Illegal Phases: None

Notes: Indicators 1 = ON

0 = OFF

BLANK (or missing) = NO CHANGE

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MED Format Table

MED Code: S01

Purpose: Change station characteristics values

Task: BTLSDC

EP: BMGSTA

QNAME:NA

QUEID: 1

Load Module: BMQDCMED

Desc.	Item	1	2	3	#3 Remote P1	#3 Remote P2	#3 Remote P3
Item Name		Station ID	Characteristic Number	Values	Longitude	Latitude	FLP
Input Format		EBCDIC	fx. pt.	Remote	DDD:MM:SS ^E _W	DD:MM:SS ^N _S	FLP
Input Units		EBCDIC	fx. pt.		Deg, Min, Sec	Deg, Min, Sec	Variable
Program Units		EBCDIC	fx. pt.		fl. pt. .	fl. pt. .	fl. pt. .
Scale Factor					D.P., radians	radians	D.P.,
Checking Option		4 Char.	3-40				
Missing Item Option		Error	Error	Error	Error	Error	Error
Item Destination							

Initial Logic: None

Final Logic: None

Illegal Phases: None

Notes: For usage of this MED, see program writeup of BMGSTA.

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MED Format Table

MED Code: S02

Purpose: Change station location

 Task: BTLSDC
 EP: BMGSTA
 QNAME: NA
 QUEID: 2

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		Station ID	ϕ	λ	H		
Input Format		CCCB	DD:MM:SS ^N _S	DDD:MM:SS ^E _W	fl. pt.		
Input Units		EBCDIC	deg, min, sec	deg, min, sec	meters		
Program Units			radians	radians	CUL		
Scale Factor							
Checking Option		4 Char.	$-\frac{\pi}{2} \leq \phi \leq \frac{\pi}{2}$	$-2\pi \leq \lambda \leq +2\pi$			
Missing Item Option		Error	Insert -1000.	Insert -1000.	Insert -1000.		
Item Destination							

 Initial Logic: None
 Final Logic: None
 Illegal Phases: None

Notes: Item 1 { CCC — 3 char. station name

B — band type C or S or 0 (zero) if no radar for the station

Items 2, 3, 4 — If missing, the current value will not change

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MED Format Table

MED Code: S03
Purpose: Insert late reporting station - DC
Load Module: BMQDCMED
Task: BTLSDC
EP: BMSMED
QNAME: NA
QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	Repeat sta- tion batch no.	Late station batch no.			
Input Format		FXP	FXP	FXP			
Input Units							
Program Units		FXP	FXP	FXP			
Scale Factor							
Checking Option		>0	0 ≤ B. N. ≤ 999	1 ≤ B. N. ≤ 999			
Missing Item Option		Error	Error	Ignore			
Item Destination		SPI	SPI	SPI			

Initial Logic: None
Final Logic: None
Illegal Phases: L, C, P
Notes: None

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MED Format Table

MED Code: S04 Task: BTLSDC
 Purpose: Exclude and/or include post D. C. stations EP: BMSMED
 Load Module: BMQDCMED QNAME: NA
 QUEID: 4

Desc.	item n sub item	1	2	3	4	5	6
Item Name		Vehicle	Repeat sta- tion batch no.	Exclude sta- batch nos.	Include sta. batch nos.		
Input Format		FXP	FXP	FXP	FXP		
Input Units							
Program Units		FXP	FXP	FXP	FXP		
Scale Factor							
Checking Option		>0	0 ≤ B. N. ≤ 999	1 ≤ B. Nos. ≤ 999	1 ≤ B. Nos. ≤ 999		
Missing Item Option		Error	Error	Ignore	Ignore		
Item Destination		SP1	SP1	SP1	SP1		

Initial Logic: None

Final Logic: Note 1 & 2

Illegal Phases: L, C, P

Notes:

1. Total exclude/include stations must not exceed 8.
2. There must be at least one excluded or included station.

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6. S05

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S05 Task: BTLSDC
 Purpose: Modify uncertainty level of a maneuver - D. C. EP: BMSMED
 Load Module: BMDQCMED QNAME: NA
 QUEID: 5

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle		Repeat sta. batch no.	Maneuver number	Attitude uncertainty	Accelerometer uncertainty	Magnitude uncertainty
Input Format	FXP	FXP	FXP	FXP	FLP	FLP	FLP
Input Units							
Program Units	FXP	FXP	FXP	FXP	FLP	FLP	FLP
Scale Factor							
Checking Option	>0		0 ≤ B. N. ≤ 999	0 ≤ M. N.	0.0 ≤ Att. un.	0.0 ≤ Acc. un.	0.0 ≤ Mag. un.
Missing Item Option	Error	Error	Error	Error	Error	Error	Error
Item Destination	SP1	SP1	SP1	SP1	SP1	SP1	SP1

Initial Logic: None
 Final Logic: None
 Illegal Phases: L, C, P
 Notes: None

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6. S06

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S06 Task: BTLSDC
 Purpose: Specify editing multiplier - DC EP: BMSMED
 Load Module: BMQDCMED QNAME: NA
 QUEID: 6

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	Repeat sta. batch no.	Range multiplier	Range rate multiplier	Azimuth multiplier	Elevation multiplier
Input Format		FXP	FXP	FLP	FLP	FLP	FLP
Input Units							
Program Units		FXP	FXP	FLP	FLP	FLP	FLP
Scale Factor							
Checking Option		>0	0 ≤ B.N. ≤ 999	0.0 ≤ RRM ≤ 50.0	0.0 ≤ AM ≤ 50.0	0.0 ≤ EM ≤ 50.0	
Missing Item Option		Error	Error	Error	Error	Error	Error
Item Destination		SP1	SP1	SP1	SP1	SP1	SP1

Initial Logic: None
 Final Logic: None
 Illegal Phases: L, C, P
 Notes:

1. Fixed point multipliers within the same range will be accepted.



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6. S07

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S07
 Purpose: Request D. C. internal recycle
 Load Module: BMQDCMED

Task: BTLSDC
 EP: BMSMED
 QNAME: NA
 QUEID: 7

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	Repeat sta. batch no.				
Input Format		FXP	FXP				
Input Units							
Program Units		FXP	FXP				
Scale Factor							
Checking Option		>0	0≤B. N. ≤999				
Missing Item Option		Error	Error				
Item Destination		SPI	SPI				

Initial Logic: None
 Final Logic: None
 Illegal Phases: L, C, P
 Notes: None

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6. S08

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S08 Task: BTLSDC
 Purpose: Pre-edit weight modification - D. C. EP: BMSMED
 Load Module: BMQDCMED QNAME: NA
 QUEID: 8

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle	Repeat sta. batch no.	Range criterion	Range rate criterion	Azimuth criterion	Elevation criterion	
Input Format	FXP	FXP	FLP	FLP	FLP	FLP	
Input Units							
Program Units	FXP	FXP	FLP	FLP	FLP	FLP	
Scale Factor							
Checking Option	>0	0 ≤ B. N. ≤ 999	0.0 ≤ R. C. ≤ 100,000.	0.0 ≤ R. R. C. ≤ 100,000.	0.0 ≤ A. C. ≤ 1000.0	0.0 ≤ E. C. ≤ 1000.	
Missing Item Option	Error	Error	Error	Error	Error	Error	
Item Destination	SP1	SP1	SP1	SP1	SP1	SP1	SP1

Initial Logic: None

Final Logic: None

Illegal Phases: L, C, P

Notes:

1. Fixed point criterion within the same range will be accepted.

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6. S09

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S09
 Purpose: Request elliptic edit - D. C.
 Load Module: BMQDCMED
 Task: BTLSDC
 EP: BMSMED
 QNAME: NA
 QUEID: 9

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	Repeat sta. batch no.				
Input Format		FXP	FXP				
Input Units							
Program Units		FXP	FXP				
Scale Factor							
Checking Option		>0	0 ≤ B. N. ≤ 999				
Missing Item Option		Error	Error				
Item Destination		SPI	SPI				

Initial Logic: None
 Final Logic: None
 Illegal Phases: L, C, P
 Notes: None

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6. S10

DATE 6/27/67 (206)

REV

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MED Format. Table

MED. Code: S10

Purpose: Set Reentry NI and Table Times

Task: BTLSDC

EP: BMSMED

QNAME: NA

QUEID: 10

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	GMTRNI	GMTRCNS			
Input Format		FXP	DD:HR:MIN: SS	DD:HR:MIN: SS			
Input Units			Days, hrs, min, sec	Days, hrs min, sec			
Program Units		FXP	FLP hours	FLP hours			
Scale Factor							
Checking Option		> 0					
Missing Item Option		ERROR	IGNORE Note 1	IGNORE Note 1			
Item Destination							

Initial Logic: None

Final Logic: Note 1 Both items 2 and 3 cannot be missing

Illegal Phases: None

Notes: None

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6. S11

DATE 11/27/67 (EORP)

REV

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MED Format Table

MED Code: S11

Purpose: N1/N2 edit

Task: BTLSDC

EP: BMSMED

QNAME: None

QUEID: 11

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle ID		Batch no.	Time left	Time right	Observation type	
Input Format	FXP		FXP	FLP	FLP	EBCDIC	
Input Units							
Program Units	FXP		FXP	FLP	FLP	FXP	
Scale Factor						Note 2	
Checking Option	1, 2, or 3	0 ≤ B.N. ≤ 999	0.0 ≤ TL ≤ 1.0	0.0 < TR ≤ 1.0	Note 1	R, D, A, or E	
Missing Item Option	Error	Error	Error	Error	Error	Error	
Item Destination	SP1	SP1	SP1	SP1	SP1	SP1	

Programmer:

Initial Logic: None

Final Logic: None

Illegal Phases: L, C, P, High-speed phases.

Notes: 1. Parameter 4 must be greater than parameter 3.

2. Convert: R → 1

D → 2

A → 3

E → 4

Programmer: J. PalmerManager: George Papadakis

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6. S19

DATE 11/27/67 (EORP)

REV

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MED Format Table

Task: BTLSDC
 EP: BMSMED
 QNAME: None
 QUEID: 19

MED Code: S19
 Purpose: Use Nth range

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle ID	N					
Input Format	FXP	FLP					
Input Units							
Program Units	FXP	FLP					
Scale Factor							
Checking Option	1, 2, or 3	> 0					
Missing Item Option	Error	Error					
Item Destination	SP1	SP1					

Programmer:

Initial Logic: None

Final Logic: None

Illegal Phases: L, C, P, High-speed phases

Notes:

Programmer: J. PalisoulManager: George Papadellis



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6. S22

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S22
 Purpose: Force end-of-transmission
 Load Module: BMQDCMED
 Task: BTLSDC
 EP: BMQLSNIP
 QNAME: NA
 QUEID: 2

Desc.	Item	1	2	3	4	5	6
Item Name		Section Name	Vehicle no.				
Input Format		BBB ^C _S	FXP				
Input Units		EBCDIC					
Program Units							
Scale Factor							
Checking Option		Last char. must be C or S	0 ≤ V ≤ 255				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None

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6. S24

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S24

Purpose: Add GMTLO to data time tags

Load Module: BMQDCMED

Task: BTLSDC
 EP: BMQLSMED
 QNAME: NA
 QUEID: 4

Desc.	Item	1	2	3	4	5	6
Item Name	GMTLO	Vehicle no.					
Input Format	DD:HH:MM:SS	Integer					
Input Units	Days, hrs., mins., secs.						
Program Units	FXP seconds						
Scale Factor							
Checking Option		1-255					
Missing Item Option	Error	Error					
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None

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6.S25
DATE 3/30/67 (206)
REV
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MED Format Table

MED Code: S25
Purpose: Add range correction for C-band beacon
Load Module: BMQDCMED
Task: BTLSDC
EP: BMQLSMED
QNAME: NA
QUEID: 5

Desc.	Item	1	2	3	4	5	6
Item Name		Range correction	Beacon number				
Input Format		+ -XXXX.XXX	FXP				
Input Units		yards					
Program Units		D CUL					
Scale Factor							
Checking Option			1-255				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: None
Final Logic: None
Illegal Phases: None
Notes: None



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6.S26

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S26

Task: BTLSDC

Purpose: Change vehicle-beacon ID for LS radar data

EP: BMQLSMED

Load Module: BMQDCMED

QNAME: NA

QUEID: 6

Desc.	Item	1	2	3	4	5	6
Item Name		Input ID	Vehicle number	Beacon number	Band type		
Input Format		FXP	FXP	FXP	C or S		
Input Units							
Program Units							
Scale Factor					C = 0 S = 1		
Checking Option		0-15	0-255	0-255	Only C or S		
Missing Item Option		Error	Error	Error	Error		
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None

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6.S27

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S27
 Purpose: Specify limits on batch size for LS radar
 Load Module: BMQDCMED
 Task: BTLSDC
 EP: BMQLSMED
 QNAME: NA
 QUEID: 7

Desc.	Item	1	2	3	4	5	6
Item Name		Minimum	Maximum	Vehicle number			
Input Format		FXP	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Min $\geq$ 6	Max $\leq$ 80				
Missing Item Option		Insert 6	Insert 80	Error			
Item Destination							

Initial Logic: None
 Final Logic: Min < Max
 Illegal Phases: None
 Notes: None

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6. S28

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S28
 Purpose: Minimum elevation for acceptable
 LS radar data
 Load Module: BMQDCMED

Task: BTLSDC
 EP: BMQLSMED
 QNAME: NA
 QUEID: 8

Desc.	Item	1	2	3	4	5	6
Item Name		Minimum elevation	Vehicle number				
Input Format		FLP	FXP				
Input Units		Deg.					
Program Units		D Radians					
Scale Factor							
Checking Option		$1^{\circ} \leq M < 90^{\circ}$	1-255				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None

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6. S29

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S29
 Purpose: Specify time between LS radar observations
 Load Module: BMQDCMED
 Task: BTLSDC
 EP: BMQLSMED
 QNAME: NA
 QUEID: 9

Desc.	Item	1	2	3	4	5	6
Item Name		Time between observations	Vehicle number				
Input Format		FXP	FXP				
Input Units		seconds					
Program Units		FXP seconds					
Scale Factor							
Checking Option		T=6N N=1, 2, 3...	1-255				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None



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6.S30
 DATE 3/30/67 (206)
 REV
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MED Format Table

MED Code: S30
 Purpose: Duplicate a LS radar batch
 Load Module: BMQDCMED
 Task: BTLSDC
 EP: BMQLSMED
 QNAME: NA
 QUEID: 10

Desc.	Item	1	2	3	4	5	6
Item Name		Station name	Vehicle no.				
Input Format		BBB ^C _S	FXP				
Input Units		EBCDIC					
Program Units							
Scale Factor							
Checking Option		Last char. must be C or S	1-255				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: None
 Notes: None

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6.S36
DATE 3/30/67 (206)
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MED Format Table

MED Code: S36
Purpose: Make duplicate batches for another vehicle
Load Module: BMQDCMED
Task: BTLSDC
EP: BMGCHANE
QNAME: NA
QUEID: 36

Desc.	Item	1	2	3	4	5	6
Item Name		Present vehicle no.	Vehicle no. of duplicate	batch nos.			
Input Format		FXP	FXP	FXP			
Input Units		None	None	None			
Program Units		None	None	None			
Scale Factor							
Checking Option		1 or 2	1 of 2	0 ≤, ≤999*			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: None
Final Logic: None
Illegal Phases: *Not more than 5 numbers
Notes: None



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6.S40

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S40 Task: BTSPDR
 Purpose: Delete or restore a device EP: BMSPDR
 Load Module: BMQDCMED QNAME: NA
 QUEID: 40

Desc.	Item	1	2	3	4	5	6
Item Name	Description	Device	Action	Device No.			
Input Format	EBCDIC	EBCDIC	EBCDIC	FXP			
Input Units							
Program Units			Fixed Note 3				
Scale Factor							
Checking Option	Exact Note 1	Exact Note 2	Exact Note 3	01-05 MINMAX			
Missing Item Option	Error	Error	Error	Error			
Item Destination							

Initial Logic: None

Final Logic: Converted device number stored in item 4 address

Illegal Phases: L

Notes: 1. RECOV
 10 X 20
 10 X 10
 SSRXY

2. SCRIBE
 SPOT
 BACKGD
 PEN

3. DELETE-1
 RESTOR-0

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6.S41
DATE 3/30/67 (206)
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PAGE 1 of 1

MED Format Table

MED Code: S41
Purpose: Exchange two devices
Load Module: BMQDCMED
Task: BTSPDR
EP: BMSPDR
QNAME: NA
QUEID: 41

Desc.	Item	1	2	3	4	5	6
Item Name	Description	Device	First device number	Second device number			
Input Format	EBCDIC	EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option	Exact Note 1	Exact Note 2	MINMAX 01-05	MINMAX 01-05			
Missing Item Option	Error	Error	Error	Error			
Item Destination							

Initial Logic: None
Final Logic: Converted device no. 1 stored in item 3 address. Converted device no. 2 stored in item 4 address
Illegal Phases: L
Notes: 1. 10 X 10 2. SCRIBE
10 X 20 SPOT
SSRXY PEN



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6. S42

DATE 3/30/67 (206)

REV

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MED Format Table

MED. Code: S42 Task: BTSPDR
Purpose: Regenerate Abort/Reentry Nominals on EP: BMSPDR
 SSRXY Plotboards QNAME: None
Load Module: BMQDCMED QUEID: 42

Desc.	Item	1	2	3	4	5	6
Item Name		Confirmation Item					
Input Format		EBCDIC					
Input Units							
Program Units		FXP NOTE 1					
Scale Factor							
Checking Option		EXACT NOTE 1					
Missing Item Option		ERROR					
Item Destination							

Initial Logic: None
Final Logic: None
Illegal Phases: L, M

Notes:

1. PVSL → 21
TVSR → 19
HVSL → 19
HVSV → 18

EX: S42,

{ PVSL
TVSR }
{ HVSL
HVSV } \$



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6. S43

DATE 7/3/67 (206)

REV

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MED Format Table

MED Code: S43
 Purpose: Re-initialize plotboard supervisor
 Load Module: BMQDCMED
 Task: BTSPDR
 EP: BMSPDR
 QNAME:
 QUEUEID: 43

Desc.	Item	1	2	3	4	5	6
Item Name							
Input Format							
Input Units							
Program Units							
Scale Factor							
Checking Option							
Missing Item Option							
Item Destination							

Initial Logic:

Final Logic:

Illegal Phases: None

Notes: No items.

S43 \$



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6.S50

DATE 8/2/67 (206)

REV

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MED Format Table

MED Code: S50
 Purpose: Initiate World Map Display
 Load Module: BMQDCMED

Task: BTSPDR
 EP: BMSPDR
 QNAME: None
 QUEID: 50

Desc.	Item	1	2	3	4	5	6
Item Name	Confirmation Item	Starting Rev (NN)	Ending Rev (MM)	Scale			
Input Format	EBCDIC	FXP	FXP	FXP			
Input Units							
Program Units	FXP NOTE 1			FXP			
Scale Factor							
Checking Option	EXACT NOTE 1			1 or 2			
Missing Item Option	ERROR	IGNORE NOTE 2	IGNORE NOTE 2	INSERT 1			
Item Destination							

Initial Logic: None

Final Logic: Note 2 and 3

Illegal Phases: R, N, A, L, C, P

Notes:

1. S4BSPL → 0
 LEMSPL → 1
 S4BSTD → 2
 LEMSTD → 3
2. MM and NN must be present for S4BSPL or LEMSPL
 MM and NN ignored for S4BSTD or LEMSTD.
3. $0 \leq (MM - NN) \leq 5$



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6. S50

DATE 11/27/67 (EORP)

REV

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MED Format Table

MED Code: S50

Purpose: Initiate World Map display

Load Module: BMQDCMED

 Task: BTSPDR
 EP: BMSPDR
 QNAME: None
 QUEID: 50

Desc.	Item	1	2	3	4	5	6
Item Name		Confirmation Item	Starting Rev (NN)	Ending Rev (MM)			
Input Format		EB CDIC	FXP	FXP			
Input Units							
Program Units		FXP See Note 1	FXP	FXP			
Scale Factor							
Checking Option		Exact See Note 1					
Missing Item Option		Error	Ignore See Note 2	Ignore See Note 2			
Item Destination							

Programmer:

Initial Logic: None

Final Logic: See Notes 2 and 3

Illegal Phases: R, N, A, L, C, P

Notes: 1. LEMSPL → 0

CSMSPL → 1

LEMSTD → 2

CSMSTD → 3

2. MM and NN must be present for LEMSPL or CSMSPL.

MM and NN ignored for LEMSTD or CSMSTD

3. $0 \leq (MM-NN) \leq 5$ Programmer: J. PalisoulManager: George M. M. M.



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6. S51

DATE 11/27/67 (EORP)

REV

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MED Format Table

MED Code: S51

Task: BTSPDR

Purpose: Set scale for V_T on SSRXY

EP: BMSPDR

Load Module: BMQDCMED

QNAME: None

QUEID: 51

Desc.	Item	1	2	3	4	5	6
Item Name		Format	Scale				
Input Format		FXP	FXP				
Input Units							
Program Units		FXP	FXP				
Scale Factor							
Checking Option		Exact See Note 1	Exact See Note 2				
Missing Item Option		Error	Ignore See Note 3				
Item Destination							

Programmer:

Initial Logic:

Final Logic:

Illegal Phases: R, N, A, L, C, P

Notes: 1. 65 through 68
 2. 1 through 3
 3. Ignore for 65 and 66
 1 or 2 for 67
 1 through 3 for 68

Programmer: J. PalisandManager: George P. P. P.

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6. S52

DATE 3/30/67 (206)

REV

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MED Format Table

MED Code: S52 Task: BTSPDR
 Purpose: Generate Orbit Nominals on SSRXY Plotboards EP: BMSPDR
 Load Module: BMQDCMED QNAME: None
 QUEID: 52

Desc.	Item	1	2	3	4	5	6
Item Name		Confirma- tion	number of Revs				
Input Format		EBCDIC	FXP				
Input Units							
Program Units		FXP NOTE 1					
Scale Factor							
Checking Option		EXACT NOTE 1	$1 \leq NN \leq 3$				
Missing Item Option		Error	Ignore				
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: R, N, A, L, C, P
 Notes: 1. GVSV → 18
 HVSL → 19
 PVSL → 21
 VVSE → 20
 AVSP → 22
 EVSE → 23

EX: S52, { GVSV
 HVSL
 PVSL
 VVSE
 AVSP
 EVSE }, NN \$



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6. S52

DATE 11/27/67 (EORP)

REV

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MED Format Table

MED Code: S52

Purpose: Generate orbit nominals on SSRX-Y
plotboards

Load Module: BMQDCMED

Task: BTSPDR
EP: BMSPDR
QNAME: None
QUEID: 52

Desc.	Item	1	2	3	4	5	6
Item Name		Confirmation	Number of revs.				
Input Format		EBCDIC	FXP				
Input Units							
Program Units		FXP See Note 1	FXP				
Scale Factor							
Checking Option		Exact See Note 1	$1 \leq NN \leq 3$				
Missing Item Option		Error	Ignore				
Item Destination							

Programmer:

Initial Logic: None

Final Logic: None

Illegal Phases: R, N, A, L, C, P

Notes: 1. GVSU → 18

HVSL → 19

PVSL → 21

VVSE → 20

AVSP → 22

Programmer: J. PalisardManager: George W. Puffer



MED Format Table

MED Code: S53 Task: BTSPDR
 Purpose: Set Input Data Source for Maneuver Monitor EP: BMSPDR
 Load Module: BMQDCMED QNAME: None
 QUEID: 53

Desc.	Item	1	2	3	4	5	6
Item Name		Source					
Input Format		EBCDIC					
Input Units							
Program Units		FXP NOTE 1					
Scale Factor							
Checking Option		EXACT NOTE 1					
Missing Item Option		Error					
Item Destination							

Initial Logic: None
 Final Logic: None
 Illegal Phases: R, N, A, L, C, P
 Notes:
 1. RADAR → 0
 SCTL → 1
 GVS → 2
 AVSP → 3



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MED Format Table

MED Code: S53
Purpose: Set input data source for maneuver monitor
Load Module: BMQDCMED
Task: BTSPDR
EP: BMSPDR
QNAME: None
QUEID: 53

Desc.	Item	1	2	3	4	5	6
Item Name		Source					
Input Format		EBCDIC					
Input Units							
Program Units		FXP See Note 1					
Scale Factor							
Checking Option		Exact See Note 1					
Missing Item Option		Error					
Item Destination							

Programmer:
Initial Logic: None
Final Logic: None
Illegal Phases: R, N, A, L, C, P
Notes: 1. RADAR -0
SCTLM -1

Programmer: J. Palisond
Manager: George Poppe

MED Format Table

MED. Code:	S54	Task:	BTSPDR
Purpose:	Set Scale for V_T on maneuver monitor	EP:	BMSFDR
Load Module:	BMQDCMED	QNAME:	NA
		QUEID:	54

Desc.	Item	1	2	3	4	5	6
Item Name	Scale number						
Input Format	FXP						
Input Units							
Program Units	FXP						
Scale Factor							
Checking Option	$1 \leq N \leq 3$						
Missing Item Option	Error						
Item Destination							

Initial Logic:	None
Final Logic:	None
Illegal Phases:	R, N, A, L, C, P
Notes:	None

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MED Format Table

MED Code: S54

Task: BTSPDR
 EP: BMSPDR
 QNAME:
 QUEID: 54

Purpose: Set scale for $\tilde{V}_T$ on 10×10

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		AMSK Number	Scale Number				
Input Format		FXP	FXP				
Input Units							
Program Units		FXP	FXP				
Scale Factor							
Checking Option		$140 \leq AN \leq 143$	$1 \leq SN \leq 3$				
Missing Item Option		Error	Ignore See Note 1				
Item Destination							

Programmer:

Initial Logic:

Final Logic:

Illegal Phases: R, N, A, L, C, P

Notes: 1. Scale = 1, 2, 3, if AMSK = 143
 Scale = 1 or 2 if AMSK = 142
 Ignore if 140 or 141

Programmer: J. PolsonManager: George R. Mueller



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MED Format Table

MED: Code: S55
 Purpose: Set conditions for Recovery Room (6x12)
 Projection Plotboard
 Load Module: BMQDCMED

Task: BTSPDR
 EP: BMSPDR
 QNAME: None
 QUEID: 54

Desc.	Item	1	2	3	4	5	6
Item Name		Starting Rev (NN)	Ending Rev (MM)	Change			
Input Format		FXP	FXP	FXP			
Input Units							
Program Units		FXP	FXP	FXP			
Scale Factor							
Checking Option				0 or 1			
Missing Item Option		Error	Error	Ignore			
Item Destination							

Initial Logic: None

Final Logic: $0 \leq (MM - NN) \leq 5$

Illegal Phases: R, N, A, L, C, P

Notes: None



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MED Format Table

MED Code: S56
 Purpose: Set YV scale on XY plotboard
 Task: BTSPDR
 EP: BMSPDR
 QNAME:
 QUEID: 56

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		Scale					
Input Format		FXP					
Input Units							
Program Units		FXP					
Scale Factor							
Checking Option		1 or 2					
Missing Item Option		INSERT 1					
Item Destination							

Initial Logic:

Final Logic:

Illegal Phases: R, N, A, L, C, P

Notes:



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MED Format Table

Task: BTSPDR
 EP: BMSPDR
 QNAME:
 QUEID: 56

MED Code: S56
 Purpose: Set yV scale on XY plotboard
 Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		Scale					
Input Format		FXP					
Input Units							
Program Units		FXP					
Scale Factor							
Checking Option		1, 2, or 3					
Missing Item Option		Insert 1					
Item Destination							

Programmer:
 Initial Logic:
 Final Logic:
 Illegal Phases: R, N, A, L, C, P
 Notes:

Programmer: J. Palson
 Manager: George R. Palson



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MED Format Table

MED Code: S61
Purpose: Display nominal maneuver quantities
Load Module: BMQDCMED
Task: BTHIGH
EP: BMSHSDS
QNAME: NA
QUEID: 2

Desc.	Item	1	2	3	4	5	6
Item Name	Display type	1st Maneuver No.	Last Maneuver No.				
Input Format	EBCDIC	FXP	FXP	FXP			
Input Units		FXP	FXP	FXP			
Program Units	FXP	FXP	FXP	FXP			
Scale Factor							
Checking Option	A, D, P or L Note 1	≥0	≥0	Insert item 2 value			
Missing Item Option	Error	Error	SP1				
Item Destination	SP1						

Initial Logic: None
Final Logic: None
Illegal Phases: R, N, A, L, C, P
Notes: Note 1 A-1
D-2
P-3
L-4

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MED Format Table

MED Code: S61

Task: BTHIGH

Purpose: Display nominal maneuver quantities

EP: BMSHSDS

QNAME:

Load Module: BMQDCMED

QUEID: 2

Desc.	Item	1	2	3	4	5	6
Item Name		Display Type	First maneuver number	Last maneuver no.	Vehicle name		
Input Format		EBCDIC	FXP	FXP	EBCDIC		
Input Units							
Program Units		FXP See Note 1	FXP	FXP	FXP See Note 2		
Scale Factor							
Checking Option		Exact See Note 1	≥ 0	≥ 0	Exact See Note 2		
Missing Item Option		Error	Error	Insert item 2 value	Error		
Item Destination							

Programmer:

Initial Logic:

Final Logic:

Illegal Phases: R, N, A, L, C, P

Notes: 1. A → 1

D → 2

P → 2

L → 4

2. CSM → 1

S4B → 2

LEM → 3

Programmer: J. PulsonManager: George W. Puckett



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6. S80

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MED Format Table

MED Code: S80

Task: GTMSCTRL
EP: GMSCTRL
QNAME: GQ2CTL
QUEID: 10

Purpose: Specify vector comparison parameters

Load Module: BMQDCMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle	GMT	Vector ID 1	Vector ID 2	Vector ID 3	Vector ID 4
Input Format		FXP	HH:MM:SS	EBCDIC	EBCDIC	EBCDIC	EBCDIC
Input Units			hours, min., sec.				
Program Units		FXP	Double prec. hours				
Scale Factor							
Checking Option		1 or 3		1 - 6 characters	1 - 6 characters	1 - 6 characters	1 - 6 characters
Missing Item Option		Error	Error	Error	Ignore See Note 1	Ignore See Note 1	Ignore See Note 1
Item Destination							

Initial Logic:

Final Logic:

Illegal Phases: High-speed phases

Notes: 1. If item 6 is entered, item 4 and 5 are required. If item 5 is entered, item 4 is required.

Programmer: J. Pulicini

Manager: George M. Pulicini

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MED Format Table

MED Code: U00 Task: NA
Purpose: Initialize target table header EP: NA
Load Module: EMGTVMED QNAME: NA
QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev. no.				
Input Format		EBCDIC	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	None				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: NA
Final Logic: Store X'FF' in first byte of subpool, link to RMMUDAT, set update for target table display
Illegal Phases: R, N, A, L, C

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MED Format Table

MED Code: U00

Purpose: Initialize target table header

Load Module EMGTVMED

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		VEH ID	REV. NO.				
Input Format		EBCDIC	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	NONE				
Missing Item Option		ERROR	ERROR				
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store X'FF' in first byte of subpool, link to RMMUDAT, set update for target table display.

Illegal Phases: R, N, A, L, C

Notes: NA

Initiator: S. K. Wright Subsystem Approval: S. K. Wright Requirements Control: J. L. D. Small

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6. U01

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MED Format Table

MED Code: U01
 Purpose: Update target table
 Load Module: EMGTVMED
 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle ID		Area type	Rev. no.	Landing area code	Latitude	Longitude
Input Format	EBCDIC		EBCDIC	FXP	EBCDIC	LAT	LONG
Input Units						D:M:S	D:M:S
Program Units			Note 1			radians	radians
Scale Factor							
Checking Option	Special		Exact	MINMAX Note 2	None	None	None
Missing Item Option	Error		Error	Error	Error	Error	Error
Item Destination							

Initial Logic: NA

Final Logic: Link to EMMUDAT then set update for target table display

Illegal Phases: R, N, A, L, C

Notes: 1. Input Convert to

PRIM 0

CONT 3

66-2656-1 2. Current rev -1 ≤ rev no. input ≤ current rev +22



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6. U01

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MED Format Table

MED Code: U01
Purpose: Update target table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name	VEH. ID	Area type	Rev. No.	Landing Area Code	Latitude	Longitude	
Input Format	EBCDIC	EBCDIC	FXP	EBCDIC	LAT	LONG	
Input Units					D:M:S	D:M:S	
Program Units		See note (1)			radians	radians	
Scale Factor							
Checking Option	Special	EXACT	MINMAX See note (2)	NONE	NONE	NONE	
Missing Item Option	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Link to RMMUDAT then set update for target table display.

Illegal Phases: R, N, A, L, C

Notes: (1) INPUT CONVERT TO

PRIM 0

CONT 3

(2) Current Rev - 1 $\leq$ Rev No. Input $\leq$ Current Rev. + 22.Initiator: S. Wright

Subsystem

Approval: S. Wright

Requirements

Control: J. Donald

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6. U02

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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U02
Purpose: Initiate checkout monitor

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle ID		Rev. no.	Mnv. no.	Time		
Input Format	EBCDIC		FXP	FXP	GET		
Input Units					H:M:S.F		
Program Units					Hours		
Scale Factor							
Checking Option	Special		MINMAX Note 1	None	None		
Missing Item Option	Error		Note 2	Note 2	Note 2 & 3		
Item Destination							

Initial Logic: NA

Final Logic: Store in block 3 of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes:

1. Current rev -1 ≤ Rev ≤ Current rev +22
2. Set to zero if missing
3. Error if items 2, 3, 4 all zero

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6. U02

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MED Format Table

MED Code: U02 Task: NA
 Purpose: Initiate checkout monitor EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh ID	Rev no.	Mnv. no.	Time		
Input Format		EBCDIC	FXP	FXP	GET		
Input Units					HHH:MM:SS,TH		
Program Units					hours		
Scale Factor							
Checking Option		Special	MINMAX See note (1)	None	None		
Missing Item Option		ERROR	EXECUTE See note (2)	EXECUTE See note (2)	EXECUTE See notes (2), (3)		
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 3 of EZETVMED.

Illegal Phases: R, N, A, L, C.

Notes: (1) Current rev - 1 $\leq$ Rev $\leq$ Current rev + 22

(2) Set to zero if missing

(3) Error if items 2, 3, 4 all zero.

Requirements
Control:Subsystem
Approval:

Initiator:

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6. U03

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MED Format Table

MED Code: U03

Purpose: Relative motion digitals

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name	Chaser Veh. ID	Target Veh. ID	Time	Delta Time	REFSMMAT Code	AXIS	
Input Format	EBCDIC 8	EBCDIC 8	hours	FXP	EBCDIC	EBCDIC	
Input Units			H:M:S				
Program Units			deciseconds	minutes	Note (2)		
Scale Factor							
Checking Option	Special	Special	None	EXACT Note (1)	Special	Special Note (3)	
Missing Item Option	ERROR	ERROR	ERROR	ERROR	Note (4)	ERROR	
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 17 of EZETVMED.

Illegal Phases: R, N, A, L, C.

Notes: (1) $\Delta t = 3, 6, 9, 12$, or 15.

(2) CUR = 1 MED = 5 LCV = 8

PCR = 2 DMT = 6 AGS = 9

TLM = 3 DOD = 7 DES = 10.

OST = 4 DOK = 7

(3) If chaser Veh. is CSM, item 6 must be CX.
Otherwise, LX or LZ must be input.

(4) Assume CUR (=1).

Initiator: *S. Wright*

Subsystem

Approval: *S. Wright*

Requirements

Control: *J. L. Donald*

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6. U04

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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U04
Purpose: Groundtrack digitals
Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev no.	Longitude			
Input Format		EBCDIC	FXP	LONG			
Input Units				D:M:SW ^E			
Program Units				radians			
Scale Factor							
Checking Option		Special	MINMAX Note 1	None			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA
Final Logic: Store in block 2 of EZETVMED
Illegal Phases: R, N, A, L, C, P
Notes: 1. Present rev ≤ requested rev ≤ present rev +22



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6. U04

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MED Format Table

MED Code: U04

Purpose: Ground track digitals

Load Module: EMGTVMED

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Time	Longitude			
Input Format		EBCDIC	Hours	LONG			
Input Units			H:M:S	D:M:S W ^E			
Program Units			deciseconds	radians			
Scale Factor							
Checking Option		Special	Special	None			
Missing Item Option		ERROR	ERROR	ERROR			
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 2 of EZE TVMED.

Illegal Phases: R, N, A, L, C, P.

Notes: NA

Requirements
Control:Subsystem
Approval:

Initiator:

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MED Format Table

MED Code: U05

Purpose: Sunrise/sunset or moonrise/moonset

Load Module: EMGTVMED

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev. no.	Sun/moon			
Input Format		EBCDIC	FXP	EBCDIC			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX Note 1	EBCDIC			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA

Final Logic: Store in block 5 (for sun) or block 6 (for moon) of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes: 1. 1 ≤ Rev ≤ 8

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MED Format Table

MED Code: U06 Task: NA
Purpose: Generate rendezvous evaluation display EP: NA
Load Module: EMGTVMED QNAME: NA
QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Plan Number					
Input Format		FXP					
Input Units							
Program Units							
Scale Factor		None					
Checking Option		MINMAX Note (1)					
Missing Item Option		ERROR					
Item Destination							

Programmer: S. Wright
Initial Logic: NA
Final Logic: Store in block 6 or EZETVMED.
Illegal Phases: R, N, A, L, C.
Notes: (1) N ≤ 7

Initiator: S. Wright Subsystem Approval: CH. ... Requirements Control: J. L. ...

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MED Format Table

MED Code: U08

Purpose: Recovery target selection

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Rev. No.	Mission No.	Longitude		
Input Format		EBCDIC	FXP	FXP	LONG		
Input Units					DDD:MM:SS	E	W
Program Units					radians		
Scale Factor							
Checking Option		Special	MINMAX Note (1)	Nohe	None		
Missing Item Option		ERROR	ERROR	ERROR	ERROR		
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 18 of EZETVMED.

Illegal Phases: R, N, A, L, C, P

Notes: (1) Current rev $\leq$ Rev $\leq$ Current rev + 22.Initiator: S. Wright

Subsystem

Approval: 2/2/68

Requirements

Control: J. Donald

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MED Format Table

MED Code: U09 Task: NA
Purpose: Recovery zone digitals EP: NA
Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Beginning rev.	Ending rev.			
Input Format		EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX Note 1	MINMAX Note 1			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA
Final Logic: Store in block 13 of EZETVMED
Illegal Phases: R, N, A, L, C, P
Notes: 1. Current rev -1 ≤ rev ≤ current rev +22

MED Format Table

MED Code: U09

Purpose: Recovery zone digitals

Load Module: EMGTVMED

Task: NA

EP: NA

QNAME: NA

QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Beginning Rev.	Ending Rev.			
Input Format		EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX See note (1)	MINMAX See note (1)			
Missing Item Option		ERROR	ERROR	ERROR			
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 13 of EZETVMED.

Illegal Phases: R, N, A, L, C, P.

Notes: (1) $\text{Current rev} - 1 \leq \text{Rev} \leq \text{Current rev} + 22$.

Requirements

Control:

Subsystem

Approval:

Initiator:

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MED Format Table

MED Code: U10
 Purpose: AGS navigation update

Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Get AGS clock zero	Matrix ID				
Input Format		Hours	AAA				
Input Units		HHH:MM:SS. T	EBCDIC				
Program Units		CENTISEC	Note (1)				
Scale Factor							
Checking Option			Special				
Missing Item Option		ERROR	ASSUME CUR				
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 1 of EZETVMED.

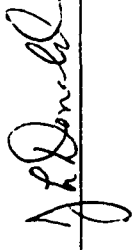
Illegal Phases: R, N, A, L, C, P.

Notes: (1) CUR = 1 OST = 4 DOD = 7 AGS = 9.
 PCR = 2 MED = 5 DOK = 7
 TLM = 3 DMT = 6 LCV = 8

Requirements
Control:Subsystem
Approval:

Initiator:

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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U12
Purpose: Predict apogee/perigee

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev. no.	Time	Mnv. no.		
Input Format		EBCDIC	FXP	GET	FXP		
Input Units				H:M:S			
Program Units				Hours			
Scale Factor							
Checking Option		Special	MINMAX Note 1	None	None		
Missing Item Option		Error	Insert Note 2	Insert Note 2	Insert Note 2 & 3		
Item Destination							

Initial Logic: NA

Final Logic: Set up SP2 for special queue to GTISPLAY

Illegal Phases: R, N, A, L, C, P

- Notes:
1. Current rev $\leq$ rev $\leq$ current rev +22
 2. Set to zero if missing
 - 3 Error if items 2, 3, 4 all zero

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MED Format Table

MED Code: U12 Task: NA
 Purpose: Predict apogee/perigee EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Rev no.	Time	Mnv. no.		
Input Format		EBCDIC	FXP	GET	FXP		
Input Units				H:M:S			
Program Units				Hours			
Scale Factor							
Checking Option		Special	MINMAX See note (1) INSERT	NONE INSERT See note (2)	NONE INSERT See notes (2), (3)		
Missing Item Option		ERROR	See note (2)				
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Set up SP2 for special queue to GTISPLAY.

Illegal Phases: R, N, A, L, C.

Notes: (1) Current rev $\leq$ Rev $\leq$ Current rev + 22.
 (2) Set to zero if missing.
 (3) Error if items 2, 3, 4 all zero.

Requirements
Control:Subsystem
Approval:

Initiator:

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RTCC APOLLO PROGRAMMING SYSTEMS

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6.U13

DATE 3/30/67(206)

REV

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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U13
Purpose: Longitude crossing times
Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev. no.	Longitude			
Input Format		EBCDIC	FXP	Long.			
Input Units				D:M:SW ^E			
Program Units				radians			
Scale Factor							
Checking Option		Special	MINMAX Note 1	None			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA
Final Logic: Set up SP2 for special queue to GTISPLAY
Illegal Phases: R, N, A, L, C, P
Notes: 1. Current rev -1 ≤ rev ≤ current rev +22



MED Format Table

MED Code: U13
Purpose: Longitude crossing times
Load Module: MGTVMED
Task: NA
EP: NA
QNAME: NA
QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Rev. No.	Longitude			
Input Format		EBCDIC	FXP	LONG			
Input Units				D:M:S			
Program Units				radians			
Scale Factor							
Checking Option		Special	MINMAX See note (1)	NONE			
Missing Item Option		ERROR	ERROR	ERROR			
Item Destination							

Programmer: S. Wright
Initial Logic: NA
Final Logic: Set up SP2 for special queue to GTISPLAY.
Illegal Phases: R, N, A, L, C.
Notes: (1) Current rev - 1 $\leq$ Rev $\leq$ Current rev + 22.

Initiator: S. Wright Subsystem Approval: S. Wright Requirements Control: J. P. Donald
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6. U14

DATE 3/30/67 (206)

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MED Format Table

MED Code: U14
 Purpose: Compute longitude at given time
 Load Module: EMGTVMED
 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Time				
Input Format		EBCDIC	GET				
Input Units			H:M:S.F				
Program Units			Hours				
Scale Factor							
Checking Option		Special	None				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: NA
 Final Logic: Set up SP2 for special queue to GTISPLAY
 Illegal Phases: R, N, A, L, C, P
 Notes: None



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6. U14

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MED Format Table

MED Code: U14
 Purpose: Compute longitude at given time
 Load Module: EMGTVMED
 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Time				
Input Format		EBCDIC	GET				
Input Units			H:M:S.F				
Program Units			hours				
Scale Factor							
Checking Option		Special	NONE				
Missing Item Option		ERROR	ERROR				
Item Destination							

Programmer: S. Wright
 Initial Logic: NA

Final Logic: Set up SP2 for special queue to GTISPLAY.

Illegal Phases: R, N, A, L, C.

Notes: NA

Initiator: S. Wright Subsystem 01.2.3.4.5.6.7.8.9.0 Requirements Control: J. D. Smith
 Approval: 01.2.3.4.5.6.7.8.9.0

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6. U15

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MED Format Table

MED Code: U15
 Purpose: Predicted site acquisition
 Load Module: EMGTVMED
 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Beginning rev.	Ending rev.			
Input Format		EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX Note 1	MINMAX Note 1			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA

Final Logic: Store in block 14 (CSM) or block is (S4B) of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes: 1. Current rev. -1 ≤ rev ≤ current rev +22

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6. U15

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MED Format Table

MED Code: U15 Task: NA
 Purpose: Predicted site acquisition EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Beginning Rev.	Ending Rev.			
Input Format		EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX See note (1)	MINMAX See note (1)			
Missing Item Option		ERROR	ERROR	ERROR			
Item Destination							

Programmer: S. Wright
 Initial Logic: NA

Final Logic: Store in block 14 (CSM) or block 15 (LEM) of EZETVMED.
 Illegal Phases: R, N, A, L, C.

Notes: (1) Current rev - 1 $\leq$ Rev $\leq$ Current rev + 22.

Initiator: A. K. Wright Subsystem Approval: S. Wright Requirements Control: J. Donald

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6. U16

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MED Format Table

MED Code: U16 Task: NA
 Purpose: Experimental site acquisition EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name	Vehicle ID	Beginning rev.	Ending rev.				
Input Format	EBCDIC	FXP	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option	Special	MINMAX Note 1	MINMAX Note 1				
Missing Item Option	Error	Error	Error				
Item Destination							

Initial Logic: NA

Final Logic: Store in block 16 of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes: 1. Current rev -1 ≤ rev ≤ current +22

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6. U16

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MED Format Table

MED Code: U16
 Purpose: Experimental site acquisition
 Load Module: EMGTVMED

Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Time	DELTA TIME			
Input Format		EBCDIC	GET	GET			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special (2)	NONE	MINMAX See note (1)			
Missing Item Option		ERROR	ERROR	ERROR			
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 16 of EZETVMED.

Illegal Phases: R, N, A, L, C, P.

Notes: (1) $0 \leq \Delta T \leq 10$ hours.

(2) CSM only.

Initiator: S. K. Wright Subsystem Approval: S. K. Wright Requirements Control: J. L. D. D. D.

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6.U17

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MED Format Table

MED Code: U17 Task: NA
 Purpose: Recovery world map EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Beginning rev.	Ending rev.			
Input Format		EBCDIC	FXP	FXP			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX Note 1	MINMAX Note 2			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA

Final Logic: Store in block 8 (CSM) or block 9 (S4B) of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes: 1. Current rev $\leq$ rev $\leq$ current rev +222. End rev - begin rev $\leq$ 5

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MED Format Table

 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

 MED Code: U18
 Purpose: DC Residuals Plot

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Veh ID	Batch Number				
Input Format		EBCDIC	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	None				
Missing Item Option		ERROR	ERROR				
Item Destination							

 Initial Logic: None
 Final Logic: Store in block 10 (CSM) or 11 (S4B) of EZETVMED
 Illegal Phases: None
 Notes: None



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MED Format Table

MED Code: U18
 Purpose: DC residuals plot
 Load Module: EMGTVMED
 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	BATCH NUMBER				
Input Format		EBCDIC	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	NONE				
Missing Item Option		ERROR	ERROR				
Item Destination							

Programmer: S. Wright
 Initial Logic: NA
 Final Logic: Store in block 10 (CSM) or 11 (LEM) of EZETVMED.
 Illegal Phases: R, N, A, L, C, P.
 Notes: NA

Initiator: A. H. Wright Subsystem Approval: P. J. Wright Requirements Control: J. R. Donald



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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U20
Purpose: Detailed maneuver table

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Mnv. no.	Refsmat code			
Input Format		EBCDIC	FXP	EBCDIC			
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	None	EBCDIC Note 1			
Missing Item Option		Error	Error	Error			
Item Destination							

Initial Logic: NA
Final Logic: Store in block 4 of EZETVMED
Illegal Phases: R, A, L, C
Notes: 1. Input Convert to

CUR-----1
PCR-----2
AGC-----3
OST-----4
MED-----5
DMT-----6
MOD-----7
DES-----8

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6. U20

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MED Format Table

MED Code: U20 Task: NA
 Purpose: Generate detailed maneuver table display EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		MPT ID	Maneuver Number	REFSMAT Code	Heads up/ Heads down		
Input Format		AAA	NN	AAA	A		
Input Units		EBCDIC	FXP	EBCDIC	D, U		
Program Units		Note (1)		Note (2)	Note (3)		
Scale Factor							
Checking Option		Special	$1 \leq NN \leq 15$	Special	Note (4)		
Missing Item Option		ERROR	ERROR	ASSUME CUR	Note (5)		
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 4 of EZETVMED.

Illegal Phases: R, A, L, C.

Notes: (1) CSM = 1

LEM = 3.

(2) CUR = 1 MED = 5 LCV = 8

PCR = 2 DMT = 6 AGS = 9

TLM = 3 DOD = 7 DES = 10.

OST = 4 DOK subsystem

Approval: S. WrightInitiator: S. Wright

Requirements

Control: J. L. Donnell

missing.

(3) D = 0

U = 1.

(4) If item 3 $\neq$ DES, item 4 must not be input.

(5) Assume u if item 3 = DES, and item 4 is

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6. U22

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MED Format Table

Task: NA
EP: NA
QNAME: NA
QUEID: NA

MED Code: U22

Purpose: Revolution ascending node

Load Module: EMGTVMED

Desc.	Item	1	2	3	4	5	6
Item Name		Vehicle ID	Rev. no.				
Input Format		EBCDIC	FXP				
Input Units							
Program Units							
Scale Factor							
Checking Option		Special	MINMAX Note 1				
Missing Item Option		Error	Error				
Item Destination							

Initial Logic: NA

Final Logic: Store in block 7 of EZETVMED

Illegal Phases: R, N, A, L, C, P

Notes: 1. Current rev -1 ≤ rev ≤ current rev +22

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6. U22

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MED Format Table

MED Code: U22 Task: NA
 Purpose: Revolution ascending node EP: NA
 Load Module: EMGTVMED QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		Veh. ID	Time				
Input Format		EBCDIC	HHH:MM:SS.TH				
Input Units							
Program Units			CENTISEC				
Scale Factor							
Checking Option		Special	NONE				
Missing Item Option		ERROR	ERROR				
Item Destination							

Programmer: S. Wright

Initial Logic: NA

Final Logic: Store in block 7 of EZETVMED.

Illegal Phases: R, N, A, L, C, P.

Notes: NA

Initiator: A. K. Wright Subsystem Approval: S. F. Wright Requirements Control: J. H. Donald

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 6. V10
 DATE 7/3/67 (206)
 REV
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MED Format Table

MED Code: V10 V10, VEH, TYPE, /N, H, L/;
 Purpose: TM Limit Tables Task: TTDSPREQ
 Load Module: TMQTMED (501) EP: TMDSPREQ
 QNAME:
 QUEID: 2

Desc.	Item	1	2	3	4	5	6
Item Name		Veh Code Note #1	Lmt Type Note #2	Lmt Index Note #3	Hi LMT	Lo LMT	
Input Format		EBCDIC	EBCDIC	FLP	FLP	FLP	
Input Units		NA	NA	FLP	FLP	FLP	
Program Units		NA	NA	NA	FLP	FLP	
Scale Factor		NA	NA	None	None	None	
Checking Option		Special	Special	Special	Special	Special	
Missing Item Option		PRIM	Error	Error	Special	Special	
Item Destination		NA	NA	NA	A TLM LMT Table	A TLM LMT Table	

Programmer: D. Boyd

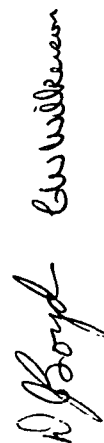
Initial Logic: ILIMIT

Final Logic: FLIMIT

Illegal Phases: None

Notes:

- Note #1 (Veh code) CSM, SIU, SIC, SII
 Note #2 (LMT Type) Prim = P, Secondary = S, if left blank prim is assumed.
 Note #3 The LMT index is the rank in the LMT table of the word that contains the control data for the parm for which the LMTs are being inserted.





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6. V10
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MED Format Table

MED Code: V10 V10, veh, type/N,H,L/;
Purpose:

Task: TTDSPREQ
EP: TMDSPREQ
QNAME:
QUEID: 2

Load Module: TMQTMED (EORP)

Desc.	Item	1	2	3	4	5	6
Item Name		VEH CODE Note #1	LMT TYPE Note #2	LMT INDEX Note #3	HI LMT	LO LMT	
Input Format		EBCDIC	EBCDIC	FLP	FLP	FLP	
Input Units		NA	NA	FLP	FLP	FLP	
Program Units		NA	NA	NA	FLP	FLP	
Scale Factor		NA	NA	None	None	None	
Checking Option		SPECIAL	SPECIAL	SPECIAL	SPECIAL	SPECIAL	
Missing Item Option		PRIM	ERROR	ERROR	SPECIAL	SPECIAL	
Item Destination		NA	NA	NA	A TLM LMT TABLE	A TLM LMT TABLE	

Programmer: D Flippen
Initial Logic: ILIMIT
Final Logic: FLIMIT
Illegal Phases: None

Notes: #1 veh: CSM, SIU, SIB, LEM, AMD

#2 type: Ø or P = PRIM LMTS; S - Secondary LMTS

#3 The LMT INDEX is the rank in the LMT Table of the word that contains the control data for the parameter for which the LMTS are being inserted.

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Programmer Doug Flippen

Manager Charles W. Williams

MED Format Table

MED Code: V20

V20, name, /Px, X.X/;

Task: TTDSPREQ

Purpose: Update CSM Computation Constants

EP: TMDSPREQ

QNAME:

Load Module: TMQTMED (501)

QUEID: 3

Desc.	Item	1	2	Item 1 to N Subitem 1	4	5	6
Item Name		Constant Name Note#1	Remote Format	Computation Constant			
Input Format		EBCDIC	Px	FLP			
Input Units		NA	Note #2	FLP			
Program Units		NA		FLP			
Scale Factor		NA		None			
Checking Option		Special		None			
Missing Item Option		Error		Error			
Item Destination		NA		Const Table TZMEDCSM			

Programmer: D. Boyd

Initial Logic: **ICONST**

Final Logic: FCONST

Illegal Phases: LAUNCH

Notes: See Attached Sheet (1)

D. Kroyl ... C. Williams



Supplement # 1

Note # 1

Name	Code	Name	Code
Gimbal Angle	Gimbal	CSM FC Ampere Hr.	FCAMP
Resolver Angle	SCS	CSM Btry Ampere Hr.	BATAMP
Cryogenic Mass	Cyro		
Helium Mass	H _E Mass		
Propellant Mass	P _R Mass		

Note # 2

Gimbal Angle	Propellant Mass	Cryogenic Mass	CSM FC Ampere Hr.
Px Constant	Px Constant	Px Constant	Px Constant
P1 A ₁	P1 SMRCS - A T ₁	P1 CSM H2 Tank 1	P1 A' Battery A
P2 A ₂	P2 SMRCS - B T ₁	P2 CSM H2 Tank 2	P2 A' Battery B
P3 A ₃	P3 SMRCS - C T ₁	P3 CSM O2 Tank 1	P3 A' Battery C
P4 A ₄	P4 SMRCS - D T ₁	P4 CSM O2 Tank 2	P4 C Battery A
P5 A ₅	P5 SMRCS - A WOT	P5 TB CSM H2 Tank 1	P5 C Battery B
P6 A ₆	P6 SMRCS - B WOT	P6 TB CSM H2 Tank 2	P6 C Battery C
P7 K ₇	P7 SMRCS - C WOT	P7 TB CSM O2 Tank 1	P7 FCA-H Battery A
	P8 SMRCS - D WOT	P8 TB CSM O2 Tank 2	P8 FCA-H Battery B
	P9 SMRCS - A WFT		P9 FCA-H Battery C
	P10 SMRCS - B WFT	Helium Mass	
	P11 SMRCS - C WFT	Px Constant	CSM Battery Ampere Hr.
Resolver Angle	P12 SMRCS - D WFT	P1 SMSPST _{HA}	Px Constant
Px Constant	P13 SMRCS - A WHT	P2 SMRCS - AT _{HA}	P1 Total Amps Battery A
P1 G ₁	P14 SMRCS - B WHT	P3 SMRCS - BT _{HB}	P2 Total Amps Battery B
P2 G ₂	P15 SMRCS - C WHT	P4 SMRCS - CT _{HC}	P3 Total Amps Battery C
P3 G ₃	P16 SMRCS - D WHT	P5 SMRCS - DT _{HD}	P4 Total Amps Charger
P4 G ₄			
P5 G ₅			
P6 G ₆			



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MED Format Table

 MED Code: V20 V20, name, /Px, X.X/;
 Purpose: Update CSM Computation Constants

 Task: TTDSPREQ
 EP: TMDSPREQ

QNAME:

Load Module: TMQTMED (EORP)

QUEID: 3

Remote FMT1

Desc.	Item	1	2	Item 1 to N Subitem 1	4	5	6
Item Name		Constant Name Note #1	Remote Format	Computation Constant			
Input Format		EBCDIC8	Px	FLP			
Input Units		NA	Note #2	FLP			
Program Units		NA		FLP			
Scale Factor		NA		None			
Checking Option		SPECIAL		None			
Missing Item Option		ERROR		ERROR			
Item Destination		NA		Const.Table FZMEDCSM			

Programmer: D. Flippen

Initial Logic: ICON

Final Logic: FCON

Illegal Phases: LAUNCH

Notes: See Attached Sheet (1)

 Programmer Doug Flippen
 Manager Charles W. Williams

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CSM COMPUTATIONS

Note #1

<u>CODE</u>	<u>NAME</u>	<u>CODE</u>	<u>NAME</u>
GIMBAL	Gimbal Angle	FCFLO	Est. Fuel Cell Flow
SCS	Resolver Angle	FCTEN	F.C. Total Energy Remaining
CRYO	Cryogenic Mass	EECOM	EECOM Rate Calculations
VEHWTS	Vehicle Weights	FCAMP	Fuel Cell Ampere Hours
PRMASS	Propellant Mass	BATAMP	Battery Ampere Hours

Note #2

<u>GIMBAL ANGLE</u>			<u>RESOLVER ANGLE</u>			<u>CRYOGENIC MASS</u>			
Px	Constant		Px	Constant		Px	Constant		
P1	G1 — SINMED	—	P1	A1		P1	CSM	O2	1
P2	G2 — COSMED	—	P2	A2		P2	CSM	O2	2
P3	G3 — SINMED	—	P3	A3		P3	CSM	H2	1
P4	G4 — COSMED	—	P4	A4		P4	CSM	H2	2
P5	G5 — SINMED	—	P5	A5		P5	TBCSM	O2	1
P6	G6 — COSMED	—	P6	A6		P6	TBCSM	O2	2
P7	K7 — TBIASG					P7	TBCSM	H2	1
						P8	TBCSM	H2	2

RH

TE

VEHICLE WEIGHTSSMRCS
PROPELLANT MASS

Px	Constant	Px	Constant	P18	AOAB
P1	SMD	P1	MR1A	P19	POAC
P2	CMD	P2	MR1B	P20	POAD
P3	CMMISC	P3	MR1C	P21	PFAA
P4	SMMISC	P4	MR1D	P22	PFAB
P5	CMDELTA	P5	MR2A	P23	PFAC
P6	SPSFU	P6	MR2B	P24	PFAD
P7	SPSOX	P7	MR2C	P25	WFA
P8	WPAMED	P8	MR2D	P26	WFB
P9	WPBMED	P9	PSAA	P27	WFC
P10	WPCMED	P10	PSAB	P28	WFD
P11	WPD MED	P11	PSAC	P29	WOA
P12	H2TIMED	P12	PSAD	P30	WOB
P13	H2T2MED	P13	TSAA	P31	WOC
P14	O2TIMED	P14	TSAB	P32	WOD
P15	O2T2MED	P15	TSAC	P33	ETA O A
P16	MWWP	P16	TSAD	P34	ETA O B
P17	MWWW	P17	AOAA	P35	ETA O C

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P36	ETA	O	D
P37	ETA	F	A
P38	ETA	F	B
P39	ETA	F	C
P40	ETA	F	D

(FCAHMED)
FUEL CELL AMPERE HOURS

<u>Px</u>	<u>Constant</u>
P1	FCA-H Battery A
P2	FCA-H Battery B
P3	FCA-H Battery C

ESTIMATED FUEL CELL FLOW

<u>Px</u>	<u>Constant</u>
P1	RTMED
P2	RMED1
P3	RMED2
P4	RMED3

(BATTSV)
BATTERY AMPERE HOURS

<u>Px</u>	<u>Constant</u>
P1	Total Amps Batt A
P2	Total Amps Batt B
P3	Total Amps Batt C
P4	Total Amps Charger

FUEL CELL TOTAL ENERGY REMAINING

<u>Px</u>	<u>Constant</u>
P1	HCMED

(QMED)

EECOM RATE CALCULATIONS

<u>Px</u>	<u>Constant</u>
P1	H2 1 Flow
P2	H2 2 Flow
P3	O2 1 Flow
P4	O2 2 Flow
P5	H2 1 $\Delta P/\Delta T$
P6	H2 2 $\Delta P/\Delta T$
P7	O2 1 $\Delta P/\Delta T$
P8	O2 2 $\Delta P/\Delta T$
P9	F/C 1 Skin Rate
P10	F/C 2 Skin Rate
P11	F/C 3 Skin Rate
P12	F/C 1 Rad Rate
P13	F/C 2 Rad Rate
P14	F/C 3 Rad Rate
P15	F/C 1 Cond Rate
P16	F/C 2 Cond Rate
P17	F/C 3 Cond Rate
P18	Potable H2O Qty Rate
P19	Waste H2O Qty Rate
P20	F/C 1 N2 Press
P21	F/C 2 N2 Press
P22	F/C 3 N2 Press

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6. V24

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MED Format Table

MED Code: V24 V24, name, /Px, X.X. /;
 Purpose: Update S4B Computation Constant
 Load Module: TMQTMED
 Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Constant Name Note 1	Remote Format	Computation Constant			
Input Format		EBCDIC	Px	FLP			
Input Units		NA	Note 2	FLP			
Program Units		NA		FLP			
Scale Factor		NA		None			
Checking Option		Special		None			
Missing Item Option		Error		Error			
Item Destination		NA		TZMEDSIU			

Programmer: D. Boyd

Initial Logic: ICONST

Final Logic: FCONST

Illegal Phases: LAUNCH

Notes: See Attached Sheet #2

D. Boyd
C. Williams

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Supplement #2

Note 1

<u>Name</u>	<u>Code</u>
Cryogenic Mass	Cryo
Helium Mass	HEMASS
Mass Remaining	MASS R _E

Note 2

<u>Cryogenic Mass</u>			<u>Mass Remaining</u>	
Px	Constant		Px	Constant
P1	HE	RHO	P1	M1P
P2	HE	J2	P2	M1T
P3	H ₂		P3	M1Px
P4	HE	TB	P4	M1Tx
P5	HE	J2	P5	M1MO
P6	H ₂		P6	M1MF
P7	PE	WT	P7	M2P
P8	HE	J2	P8	M2T
P9	H ₂		P9	M2Px
P10	I _h		P10	M2Tx
P11	I _o		P11	M2MO
			P12	M2MF
			P13	MODM

Helium Mass

Px	Constant
P1	LH2 Wt
P2	LO2 Wt
P3	APS1 Wt
P4	APS2 Wt



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MED Format Table

MED Code: V26 V26, name, /Px, X.X./;
 Purpose: Update LEM Computation Constants
 Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Load Module: TMQTMED (EORP)

Remote FMT 1

Desc.	Item	1	2	Item 1 to N Sub-item 1	4	5	6
Item Name		Constant Name Note #1	Remote Format	Computation Constant			
Input Format		EBCDIC8	Px	FLP			
Input Units		NA	Note #2	FLP			
Program Units		NA		FLP			
Scale Factor		NA		None			
Checking Option		SPECIAL		None			
Missing Item Option		ERROR		ERROR			
Item Destination		NA		Const. Table TZMEDLEM			

Programmer: D. Flippen

Initial Logic: ILCON

Final Logic: FCON

Illegal Phases: LAUNCH

Notes: See attached sheet

66-2656-1

Programmer

Manager

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LM COMPUTATIONS

Exept LMBAHGET

Note #1

CODENAMECODENAME

LMRESATT

Resolver Attitudes

LMBAH

Battery Amp. Hrs.

LMRCSFO

RCS Fuel & Oxygen Left

LMOHQUAN

Des, ASC O2/H2O Qu

LMAFSFO

APS Fuel & Oxygen Left

LMOHFLO

O2 & H2O Flowrates

LMDPSFO

DPS Fuel & Oxygen Left

LMRADAR

Rendezvous Radar An

LMVEHWT

Vehicle Weights

Note #2

LMRESATTLMRCSFOLMAFSFO

Px	Constant
P1	H1 (2)
P2	H2 (2)
P3	H3 (2)
P4	H4 (2)
P5	H5 (2)
P6	H6 (2)
P7	C (2.5)

Px	Constant
P1	AL (300 lb)
P2	BL (300 lb)
P3	RCS A "Q" (3 lbs.)
P4	RCS B "Q" (3 lbs.)

Px	Constant
P1	Kf (.0864)
P2	KO (.109)
P3	FU REM; (2000 lb)
P4	OX REM; (3200 lb)
P5	FU USED (0 lbs)
P6	OX USED (0 lbs)

LMOPSFOLMBAHLMOHQUAN

Px	Constant
P1	DPO (11, 100 lbs)
P2	DPF (6, 900 lbs)

Px	Constant
P1	BAT 1 AH
P2	BAT 2 AH
P3	BAT 3 AH
P4	BAT 4 AH
P5	BAT 5 AH
P6	BAT 6 AH
P7	DAHT (2000 AH)
P8	AAHT (800 AH)
P9	A' (0)

Px	Constant
P1	Z (1)
P2	DO (48 lb)
P3	AO1 (2.4 lb)
P4	AO2 (2.4 lb)
P5	ALW (40 lb)
P6	A2W (40 lb)
P7	DW (300 lb)

LMOHFLOLMRADARLMVEHWT

Px	Constant
P1	H2O QD (1%)
P2	H2O QA1 (1%)
P3	H2O QA2 (1%)
P4	O2 QD (1%)
P5	O2 QA1 (1%)
P6	O2 QA2 (1%)

Px	Constant
P1	K (2.5)
P2	A (3.26)

Px	Constant
P1	DW ASC
P2	MISC ASC
P3	DW DES



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MED Format Table

MED Code: V27 V27, LMBAHGET, HH:MM:SS; Task: TTDSPREQ
Purpose: Update LM Battery Ampere Hour EP: TMDSPREQ
Ground Elapsed Time Computation Constant QNAME:
Load Module: TMQTMED (EORP) QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code LMBAHGET	Time				
Input Format		EBCDIC8	Hours				
Input Units		NA	HH:MM:SS				
Program Units		NA	STU				
Scale Factor		NA	NA				
Checking Option		SPECIAL	None				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	Const. Table TZMEDLEM				

Programmer: D. Flippen
Initial Logic:
Final Logic: FCONG
Illegal Phases: LAUNCH
Notes:

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Programmer Doug Flippen Manager Garth E. Flippen

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 6. V30
 DATE 7/3/67 (206)
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MED Format Table

MED Code: V30 V30, AGMTLO,±XX:XX:XX:XX;
 Purpose: Update GMTLO
 Load Module: TMQTMED
 Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code AGMTLO	Time				
Input Format		EBCDIC	Hours				
Input Units		NA	DD:HH:MM:SS				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		Exact	Min				
Missing Item Option		Error	Special TLM				
Item Destination		NA	STATUS Tab				

Programmer: D. Boyd
 Initial Logic: IGMTLO
 Final Logic: FTIME
 Illegal Phases: None
 Notes:

D. Boyd
EWILLMAN

MED Format Table

MED\Code:	V30	Task:	TTDSPREQ
Purpose:	Update GMTLO	EP:	TMDSPREQ
Load Module:	TMQTMED (EQRP)	QNAME:	
		QUEID:	5

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code Note #1	Time Note #2				
Input Format		EBCDIC8	Days				
Input Units		NA	DD:HH: MM:SS				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		SPECIAL	Min.				
Missing Item Option		ERROR	SPECIAL				
Item Destination		NA	TLM Status Tab				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIM

Illegal Phases:

Notes: #1, Veh: CSM, LEM

#2, If time is missing enter system time

Programmer Doug Flipse

Manager Charles W. Wilmer

MED Format Table

Task: TT DSPREQ
EP: TMDSPREQ
QNAME:
QID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code LSTIME	L/S Time				
Input Format		EBCDIC	Hours				
Input Units		NA	Hours				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		Exact	Min				
Missing Item Option		Error	Error				
Item Destination		NA	TLM Status Tab				

Programmer: D. Boyd
Initial Logic: ILS DELTA
Final Logic: FTIME
Illegal Phases: LAUNCH
Notes:

W. Lloyd Garrison

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6. V31

DATE 11/8/67 (EORP)

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MED Format Table

MED Code: V31 V31, LSTIME, + XX:XX:XX;
Purpose: Update LS MSG Acceptance Time (CSM)
Task: TTDSPREQ
EP: TMDSPREQ
QNAME:
QUEID: 3

Load Module: TMQTMED (EORP)

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code LSTIME	LS Time				
Input Format		EBCDIC8	Hours				
Input Units		NA	+ -HH:MM:SS				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		Exact	Min.				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	TLM Status Tab				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIME

Illegal Phases: LAUNCH

Notes:

Programmer Doug Flippen

Manager Charles Williamson



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6. V32

DATE 11/8/67 (EORP)

REV 12/13/67

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MED Format Table

MED Code: V32 V32, timename, ±XXXX;
 Purpose: Update Delta LGC & AGC Time, CMC
 Ground Elapsed Time, and DELTA AMD Time
 Load Module: TMQTMED (EORP)

Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code See Note 1	Time				
Input Format		EBCDIC8	FLP				
Input Units		NA	seconds				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		SPECIAL	None				
Missing Item Option		Error	Error				
Item Destination		NA	TLM status tab				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIME

Illegal Phases: LAUNCH

Notes: 1 timename = LGCTIM, AGCTIM, CMCGET, AMDTIM

Programmer

Manager



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MED Format Table

MED.Code: V32 V32, timename, tXXXX;
 Purpose: Update Delta LGC & AGC Time, CMC
 Ground Elapsed Time, and DELTA AMD Time
 Load Module: TMQTMED (EORP)

Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Time Code Note #1	Time				
Input Format		EBCDIC8	FLP				
Input Units		NA	Hours				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		SPECIAL	None				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	TLM Status Tab				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIME

Illegal Phases: LAUNCH

Notes: #1: timename = LGCTIM, AGCTIM, CMCGET, AMDTIM

Programmer Doug Flippen

Manager Charles Williams



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 6. V33
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MED Format Table

MED Code: V33 V33, vehTIM, + XXX:XX:XX;
 Purpose: Update L/S MSG Time Correction
 Load Module: TMQTMED Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 3

Desc.	Item	1	2	3	4	5	6
Item Name		Veh TIM Note #1	L/S Time				
Input Format		EBCDIC	Hours				
Input Units		NA	+HHH:MM: -SS				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		Exact	Min.				
Missing Item Option		Error	Error				
Item Destination		NA	TLM				
			Status Tab				

Programmer: D. Boyd

Initial Logic:

Final Logic: FTIME

Illegal Phases: None

Notes:

1 SLV

CSM



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MED Format Table

MED Code: V33 V33, vehTIM, + XXX:XX:XX;
Purpose: Update LS MSG Time Correction
Task: TTDSPREQ
EP: TMDSPREQ
QNAME:
QUEID: 3

Load Module: TMQTMED (EORP)

Desc.	Item	1	2	3	4	5	6
Item Name		Veh TIM Note #1	LS Time				
Input Format		EBCDIC8	Hours				
Input Units		NA	+ HHH:MM: SS				
Program Units		NA	STU				
Scale Factor		NA	None				
Checking Option		SPECIAL	None				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	TLM Status Tab				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIME

Illegal Phases: None

Notes: #1: SLV, LEM, CSM

Programmer

Manager Charles W. Williams



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6. V40
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MED Format Table

MED Code: V40
Purpose: INHIBIT OR V40, veh, INH;
RESTORE V40, veh;
Load Module: Character count on High Speed Data Frame
TMQTMED

Task:
EP:
QNAME:
QUEID:

Desc.	Item	1	2	3	4	5	6
Item Name		Veh Code Note #1	INH				
Input Format		EBCDIC	EBCDIC				
Input Units		NA	NA				
Program Units		NA	NA				
Scale Factor		NA	NA				
Checking Option		None	NA				
Missing Item Option		ERROR	RESTORES				
Item Destination			TLM				
			STATUS TAB				

Programmer: D. Boyd
Initial Logic: None
Final Logic: FCHARCNT
Illegal Phases:None
Notes: 1 CSM
SIU
SIC
AGC
SII

D. Boyd *E. Williams*



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6. V40
DATE 11/8/67 (EORP)
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MED Format Table

MED Code: V40 V40, veh, INH;
Purpose: INHIBIT OR RESTORE V40, veh;
Character count on high-speed data frame
Load Module: TMQTMED (EORP)

Task:
EP:
QNAME:
QUEID:

Desc.	Item	1	2	3	4	5	6
Item Name		Veh Code Note #1	INH				
Input Format		EBCDIC	EBCDIC				
Input Units		NA	NA				
Program Units		NA	NA				
Scale Factor		NA	NA				
Checking Option		None	NA				
Missing Item Option		ERROR	RESTORES				
Item Destination		NA	TLM Status Tab				

Programmer: D. Flippen
Initial Logic: FCHARCNT
Final Logic: FCHARCNT
Illegal Phases: None
Notes: #1: CSM, SIU, SIB, AGC, LEM, LGS, AGS, AMD

Programmer Doug Flippen Manager Charles W. Williams



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6. V41

DATE 10/31/67 (EORP)

REV 3/8/68

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MED Format Table

MED.Code: V41 V41, LAUNCHx;
Purpose: Set launch flags,
Clear TZUSSDSP, and Update GMTLS with correct GMTLO
Load Module: TMQTMED (EORP)

Task: TTDSREQ
EP: TMDSPREQ
QNAME: NA
QUEID: 8

Desc.	Item	1	2	3	4	5	6
Item Name		Flag name Note #1					
Input Format		EBCDIC8					
Input Units		NA					
Program Units		NA					
Scale Factor		NA					
Checking Option		SPECIAL					
Missing Item Option		ERROR					
Item Destination		TLM Status Table					

Programmer: D. Flippen

Initial Logic:

Final Logic: CLRTABLE

Illegal Phases:

Notes: #1 x: A for CSM, B for LEM

66-2656-1

Programmer

Doug Flippen

Manager

Garth E Bagley



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6. V50

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REV

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MED Format Table

MED Code: V50, HH:MM:SS;
Purpose: Shift Data On Trends

Task: TTDSPREQ
EP: TMDSPREQ
QNAME:
QUEID: 6

Load Module: TMQTMED

Desc.	Item	1	2	3	4	5	6
Item Name		MIN TREND TIME					
Input Format		HOURS					
Input Units		+HH:MM:SS -HH:MM:SS	NOTE 1				
Program Units		STU					
Scale Factor		None					
Checking Option		MIN					
Missing Item Option		ERROR					
Item Destination		TM STATUS TABLE					

Programmer: D. Boyd

Initial Logic: None

Final Logic: FTIM

Illegal Phases:

Notes: 1 MINIMUM TIME ISA -9 HOURS

D. Boyd
W. Willerson



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MED Format Table

MED Code: V50, HH:MM:SS;
 Purpose: Shift Data On Trends
 Load Module: TMQTMED (EORP)

Task: TTDSPPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID: 6

Desc.	Item	1	2	3	4	5	6
Item Name		MIN TREND TIME					
Input Format		Hours					
Input Units		+HH:MM:SS	Note 1				
Program Units		STU					
Scale Factor		None					
Checking Option		Min.					
Missing Item Option		ERROR					
Item Destination		TM Status Tab					

Programmer: D. Flippen

Initial Logic: None

Final Logic: FTIM

Illegal Phases:

Notes: #1: MINIMUM TIME IS (A-9) HOURS

THIS MED IS PRESENT BUT DISABLED FOR EORP

Programmer

Manager

IBM**RTCC APOLLO PROGRAMMING SYSTEMS**

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6. V55

DATE 3/8/68 (EORP)

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MED Format Table

MED Code: V55, TSPAP Task: TTLSSMEK
 Purpose: Simulate PBI that tells TMXPAPER the EP: TMXPAPER
 TSPAP Tape has been unloaded. QNAME:
 Load Module: TMQTMED QUEID: 350

Desc.	Item	1	2	3	4	5	6
Item Name	TSPAP						
Input Format	EBCDIC8						
Input Units	NA						
Program Units	NA						
Scale Factor	NA						
Checking Option	SPECIAL						
Missing Item Option	ERROR						
Item Destination	NA						

Programmer: D. Flippen

Initial Logic: NA

Final Logic: NA

Illegal Phases: None

Notes:

66-2656-1

Programmer Doug Flippen

Manager Barth E Bagley

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6. V60

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MED Format Table

MED Code: V60 V60, veh, msg;
Purpose: Manual LFI
Load Module: TMQTMED (EORP)

Task: TTHSveh Note #1
EP: TMSHSveh Note #1
QNAME:
QUEID: Note 3

Desc.	Item	1	2	3	4	5	6
Item Name		Veh Name Note #1	Message Note #2				
Input Format		EBCDIC	EBCDIC				
Input Units		NA	NA				
Program Units		NA	NA				
Scale Factor		NA	NA				
Checking Option		None	None				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	TTHSveh	Note #1			

Programmer: D. Flippen

Initial Logic:

Final Logic:

Illegal Phases:

Notes: #1 veh: AGS, LGC, AGC, AMD, SIU, SIB, LEM, CSM

#2 Msg: PB, L

#3 If msg = L then ID = 7, but if msg = PB then ID = 8

66-2656-1

 Programmer Doug Flippen

 Manager Garth E. Bagley



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MED Format Table

MED Code: V61
Purpose: Display
 Input Data Stream
Load Module: TMQTMED (EORP)

Task: TTRFPRXG
EP: TMCENTRF
QNAME:
QUEID: (6) Note #2

Desc.	Item	1	2	3	4	5	6
Item Name		CENTRF	Number Note #1				
Input Format		EBCDIC8	FLP				
Input Units		NA	+ XXXX				
Program Units		NA	FLP				
Scale Factor		NA	NA				
Checking Option		SPECIAL	MINMAX				
Missing Item Option		ERROR	ERROR				
Item Destination		NA	Task TTRFPRXG				

Programmer: D. Flippen

Initial Logic:

Final Logic:

Illegal Phases:

Notes: #1 (-3000 ≤ XXXX ≤ -2000) v (2000 ≤ XXXX ≤ 3000)

#2 GPR 6 contains 11 if xxxx is negative and therefore
 Playback and contains 10 if xxxx is positive and
 therefore Live data

66-2656-1

 Programmer Doug Flippen

 Manager Garth E. Bagley

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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6. V70
 DATE 10/31/67 (EORP)
 REV 11/8/67
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MED Format Table

MED Code: V70 **V70, veh GMT, SLVCOMP;** **Task:**
Purpose: Set effective lift-off time for SLV computations **EP:**
Load Module: TMQTMED (EORP) **QNAME:** **QUEID:**

Desc.	Item	1	2	3	4	5	6
Item Name		VELGMT Note #1	SLVCOMP				
Input Format		EBCDIC8	EBCDIC8				
Input Units		NA	NA				
Program Units		NA	NA				
Scale Factor		NA	NA				
Checking Option		SPECIAL	SPECIAL				
Missing Item Option		ERROR	ERROR				
Item Destination		Note #2	NA				

Programmer: D. Flippen

Initial Logic:

Final Logic: FTIMSLV

Illegal Phases:

Notes: #1, veh: CSM, LEM

#2 If veh = CSM then GMTLS is set to GMTLA in the Status Table, but
 if veh = LEM then GMTLS is set to GMTLB

66-2656-1

Programmer Doug Flippen

Manager Garth E. Engley

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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6. V75

DATE: 7/3/67 (206)

REV

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MED Format Table

MED Code: V75

Purpose: Vehicle Shutdown
or Restore

Load Module: TMQTMED

V75, veh, INH;

V75, veh;

Task:

EP:

QNAME:

QUEID:

Desc.	Item	1	2	3	4	5	6
Item Name	VEH Code Note 1		INH				
Input Format	EBCDIC		EBCDIC				
Input Units	NA		NA				
Program Units	NA		NA				
Scale Factor	NA		NA				
Checking Option	EXACT		SPECIAL				
Missing Item Option	ERROR		RESTORES				
Item Destination	NA		NA				

Programmer: D. Boyd

Initial Logic: None

Final Logic: None

Illegal Phases: None

Notes:

1. SIC, SII, SIU, CSM, AGC, LSM (L/S Module), GID (GUIDANCE)

D Boyd *EW Williamson*



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6. V90
DATE 10/31/67 (EORP)
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MED Format Table

MED Code: V90
Purpose: Simulate DDDS
Load Module: TMQTMED (EORP)

Task: TTTTTTTT
EP: TMSWITCH
QNAME:
QUEID: (5)

Desc.	Item	1	2	3	4	5	6
Item Name		Number Note #1					
Input Format		EXP					
Input Units		XXX					
Program Units		NA					
Scale Factor		NA					
Checking Option		MINMAX					
Missing Item Option		ERROR					
Item Destination		TTTTTTT					

Programmer: D. Flippen
Initial Logic:
Final Logic:
Illegal Phases:
Notes: #1 0 ≤ XXX ≤ 32000

66-2656-1

Programmer Doug Flippen
Manager South E. Eggle



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6. V95

DATE 10/31/67 (EORP)

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MED Format Table

MED Code: V95 V95, veh IDx, XXXXX;
 Purpose: LGC and AGC
 Downlink ID's
 Load Module: TMQTMED (EORP)

Task: TTDSPREQ
 EP: TMDSPREQ
 QNAME:
 QUEID:3

Desc.	Item	1	2	3	4	5	6
Item Name		Name See Note 1	Number See Note 2				
Input Format		EBCDIC8	EBCDIC				
Input Units		NA	decimal See Note 3				
Program Units		NA	octal				
Scale Factor		NA	NA				
Checking Option		Special	Special				
Missing Item Option		Error	Error				
Item Destination		NA	TLM status table				

Programmer: D. Flippen

Initial Logic:

Final Logic: FLNKID

Illegal Phases: LAUNCH

Notes: 1. veh: AGC, LGC

x: P = powered, R = rendezvous/pre-thrust, C = Coast/ Align, U = Entry Update (AGC),
 and AGS initial update (LGC)

2. Five and only five octal digits must be typed in.

3. Decimal number - no digit of which can be greater than seven.

66-2656-1

Programmer

Manager



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 6. XXX
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MED Format Table

MED Code: XXX

Purpose: To initiate a restart

Task: GTRESTRT

EP: GMLRESRT

QNAME: NA

QUEID: 1, 2, 3, 4, 5 or 6

Load Module: GMSREMED

Desc.	Item	1	2	3	4	5	6
Item Name		Restart	A, B or End	MOC or DSC			
Input Format		EBCDIC	EBCDIC	EBCDIC			
Input Units		EBCDIC	EBCDIC	EBCDIC			
Program Units		EBCDIC8	EBCDIC8	EBCDIC 8			
Scale Factor							
Checking Option		EXACT	EXACT	EXACT			
Missing Item Option		ERROR	ERROR	IGNORE			
Item Destination							

Initial Logic:

Final Logic: EPF = FINAL

Illegal Phases: None

Notes: MED formats:

 XXX, RESTART, A, Moc \$ — QUEID = 1
 XXX, RESTART, B, Moc \$ — QUEID = 2
 XXX, RESTART, A, DSC \$ — QUEID = 3
 XXX, RESTART, B, DSC \$ — QUEID = 5
 XXX, RESTART, END \$ — QUEID = 6

66-2656-1



MED Format Table

MED Code: Z00

Purpose: Start or Stop ZSHEIL Logging

Load Module: LMGMED

 Task: NA
 EP: NA
 QNAME: NA
 QUEID: NA

Desc.	Item	1	2	3	4	5	6
Item Name		ZSHEIL Log Indicator					
Input Format		EBCDIC8					
Input Units		NONE					
Program Units		NONE					
Scale Factor		NONE					
Checking Option		EXACT					
Missing Item Option		ERROR					
Item Destination		NONE					

Initial Logic: NA

Final Logic: Update (RTCHNGE MKLIMP)

Illegal Phases: None

 Notes: Z00 START will allow ZSHEIL logging
 Z00 STOP will keep ZSHEIL from logging

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6. Z01

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MED Format Table

MED Code: Z01
 Purpose: Specify DELOG OPTIONS to ZSHEIL DELOG
 Program
 Load Module: LMGMED

Task: LTXZSHEL
 EP: LMXZSHEL
 QNAME: NA
 QUEID: 1

Desc.	Item	1	2	3	4	5	6
Item Name	Time		A t	Delog Indicator			
Input Format	DAYS		F X P	EBCDIC			
Input Units	dd:hhmm:ss		SSS	NONE			
Program Units	D. P. Hours		fixed point seconds	NONE			
Scale Factor	NONE		NONE	NONE			
Checking Option	NONE		NONE	NONE			
Missing Item Option	NONE		NONE	ERROR			
Item Destination	LMXZHSEL		LMXZSHEL	LMXZSHEL			

Initial Logic: NA

Final Logic: Error if RTDD0013 DD card is missing

Illegal Phases: RNMALCP

Notes: This MED is to be used for subsystem checkout. It is illegal except in NOPHASE. An additional check is made for the RTDD0013 card in LMGMED and LMXSHEL load modules to prevent any accidental entries.



Data Table Format

Symbolic Name — BZCHAIN

Programmer — C. Dupree

Table Name — Chaining Table

Initialization of any Element Required — The table must be initialized with all logical blocks in the empty chain. The number of vehicles must also be initialized.

Dimensions

Blocks —	1
Bytes/Blocks —	1176
Total Bytes	1176

General Description and Usage

BZCHAIN is used by BMGCHAIN to keep track of the data stored in BZLSINPT. BZCHAIN contains 35 "blocks" of 32 bytes each. In each of these is kept information about the corresponding block in BZLSINPT. These blocks are chained together in several logical chains: one empty chain and a pre-DC and a post-DC chain for each vehicle.

There is one sixteen byte header for each vehicle, containing the time of last DC, the largest batch number used, and pointers to the pre-DC and post-DC chains for that vehicle. In addition there is one full word containing pointers to the empty chain and the number of vehicles, and a full word which indicates whether high-speed radar data is being processed.

Approval	Approval
<i>C. Dupree</i>	<i>D. Schiller</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		0		D	hours	Time of first observation
		8		D	hours	Time of last observation
		16		H		Batch number (1-999)
		18		X		Mother block number (1-35)
		19		X		Number of observations
		20	5			1 = batch split for post-maneuver
			6			1 = station transmitting
			7			1 = this batch is excluded
			8			1 = this batch is split
		21		X		Station characteristics block number
		22		X		Previous block in chain
		23		X		Next block in chain
		24		EBCDIC		Station name - 4 characters
		28		F		BZLSPERM displacement

The above constitutes one logical "block". There are 35 of these. Following them are the vehicle headers, one for each vehicle.

Header for a vehicle:

		0		D	hours	Time of last DC
		8		H		Largest batch no. (0-999)
		10		X		First block in pre-DC (0-35)
		11		X		Last block in pre-DC (0-35)
		12		X		Number in pre-DC (0-35)
		13		X		First block in post-DC (0-35)

Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
		14		X		Last block in post-DC (0-35)
		15		X		Number in post-DC (0-20)
Following the vehicle headers are 8 bytes of other information:						
		0		X		First block in empty chain (0-35)
		1		X		Last block in empty chain (0-35)
		2		X		Number in empty chain (0-35)
		3		X		Number of vehicles
		4		F		High-speed indicator: 0 - not processing high-speed data ≠0 - processing high-speed data

* Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. BZDPHS

DATE 6/22/67 (206)

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Data Table Formats

Symbolic Name — BZDPHS

Programmer — L. Westberry

Table Name — Display Parameters for High Speed

Initialization of any Element Required — No initialization required.

Dimensions

Blocks — 3

Words/Blocks — 56 words, i. e. 28 double words

Total Words — 168 words

General Description and Usage

This data table will contain the present position vectors and display parameters computed from these vectors for high-speed radar and telemetry in orbit phase. The table will also contain the nominal end of maneuver vector and display parameters. Block one will contain the radar quantities, while blocks two and three will contain the telemetry and nominals, respectively.

Approval	Approval
<i>L. Westberry</i>	<i>W. E. McFadden</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0		D	hrs.	Vector time tag (radar)
	3	8		D	Er	X-component of vector
	5	16		D	Er	Y-component of vector
	7	24		D	Er	Z-component of vector
	9	32		D	Er/hrs	X-component of vector
	11	40		D	Er/hrs	Y-component of vector
	13	48		D	Er/hrs	Z-component of vector
	15	56		D	Er/hrs	Velocity at entry interface
	17	64		D	hrs.	Elapsed time since mnvr. initiate
	19	72		D	hrs.	Time of free fall to entry interface
	21	80		D	Er/hrs	Present velocity
	23	88		D	rad.	Flight-path angle
	25	96		D	Er	Height above oblate Earth
	27	104		D	Er	Semimajor axis
	29	112		D		Eccentricity
	31	120		D	hrs.	GET of perigee
	33	128		D	rad.	Inclination
	35	136		D	Er	Height at perigee
	37	144		D	rad.	Longitude at perigee
	39	152		D	Er	Height at apogee
	41	160		D	Er/hrs	Velocity normal to target plane
	43	168		D	rad.	Flight-path angle at E.I.
	45	176		D	rad.	Latitude at entry interface

Type

H - Fixed point half word
F - Fixed point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	47	184		XL4		Station ID
	48	188		F		Thrust Indicator =1 for thrusting, =0 for non-thrusting
	49	192		D	rad.	Longitude at entry interface
	51	200		D	hrs.	Time until cutoff
	53	208		D	hrs.	Ignition time (GMT)
	55	216		D	hrs.	Cut-off time (GMT)
2	1	0				} Same as block one (1) except all quantities are from telemetry vectors
	:	:				
	55	216				
3	1	0				} Same as block one (1) except all quantities are for nominal cutoff vector
	:	:				
	:	:				
	51	200				
	53	208		CL8		Station ID - source of last valid trajectory update
	55	216		4H		Indicators for maneuver code

* Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Data Table Formats

Symbolic Name — BZEVLVECProgrammer — A. KircherTable Name — Evaluation Vector TableInitialization of any Element Required — NoneDimensions

Blocks — 12

Words/Blocks — 20

Total Words — 240

General Description and Usage

BZEVLVEC contains the last telemetry vector (by source and vehicle) that was selected via Vector Control Panel PBI action for inclusion in the table. Vectors are in RTCC inertial coordinates. The table is available in all phases. A description of the vector ID can be found in TR-165A, Section 2 under the Vector Panel Summary Writeup.

Abbreviations:

CMC — Command Module Computer

LGC — LM Guidance Computer

AGS — Abort Guidance Computer

IU — Instrument Unit (S-1VB)

Approval	Approval
<i>A. Kircher</i>	<i>George W. Fuller</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1	0-3	X		Vector code (EBCDIC)
	2	4-7	F		ID Nr (= -1 with no vector in block)
	3-4	8-15	D		TIME
	5-6	16-23	D		X
	7-8	24-31	D		Y
	9-10	32-39	D		Z
	11-12	40-47	D		X̄
	13-14	48-55	D		Ȳ
	15-16	56-63	D		Z̄
	17-18	64-71	X		REFSMAT ID from GOST or BES if Besilian system was used.
	19	72-75	X		Station ID (EBCDIC)
	20	76-79			Open
2	}	Same as block 1		{	CSM, LGG vector
3					CSM, AGS vector
4					CSM, IU vector
5-6	}	Same as block 1		{	Open
7					LM, CMC vector
8					LM, LGC vector
9					LM, AGS vector
10				{	LM, IU vector
11					Open
12					Vector ID Nr accumulators for corresponding blocks of BZEVLVEC and BZUSEVEC
	13-20				Open

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. BZLSDISP
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Data Table Formats

Symbolic Name — BZLSDISPProgrammer — C. DupreeTable Name — Low-Speed Radar Display ListInitialization of any Element Required — All "blocks" must be designated as empty to start.DimensionsBlocks — 1
Bytes/Blocks — 972
Total Bytes — 972General Description and Usage

BZLSDISP contains information about low-speed radar data which has been received. It contains twenty "blocks", each of which contains information about one batch of data. Part of the information is in the form of a list, which can be referred to directly in an RTCNV statement, of information to be displayed on the low-speed radar display. These "blocks" may be designated as empty or full, and the full blocks are chained together. The batch with the latest time of first observation comes first in the chain. There are also three words of pointers to the full and empty blocks at the end of the data table.

Approval	Approval
<i>C. J. Dupree</i>	<i>D. C. Schiller</i>



Detailed Contents

Block for a C-band Station

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		0		D	hours	Time of first valid observation or time of receipt of first transmitted observation
		8		H		Block before
		10		H		Block after
		14		H		Y-coordinate on display
		16		C		Asterisk if station is transmitting, blank if not.
		17		3C		Station name
		20		C		Bank type - C
		21		3C		Batch number if valid data has been received, blanks if not.
		24		3C		Vehicle name, or blanks if vehicle ID is not valid.
		28		H		Number of observations saved
		30		H		Number of observations transmitted
		32		H		Vehicle-beacon ID number
		33 . . 45				
		46		X		Station number
		47				Vehicle number

Type
 H - Fixed point half word
 F - Fixed point full word
 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

C - EBCDIC Characters

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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 7. BZLSDISP
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Detailed Contents

Block for S-band Station

Block	Word	Byte	Bit	Type*	Units	Description and Range
		0		D		Time of first valid observation or time of receipt of first transmitted observation
		8		H		Block before
		10		H		Block after
		14		H		Y-coordinate on display
		16		C		Asterisk if station is transmitting, blank if not.
		17		3C		Station name
		20		C		Band type - S
		21		3C		Batch number if valid data has been received, blanks if not.
		24		3C		Vehicle name, or blanks if vehicle ID is not valid.
		28		H		No. of valid doppler observations
		30		H		No. of valid angle observations
		32		H		No. of min. or sec. } Data rate
		34		3C		'MIN' or 'SEC' }
		37		3C		'DST' or 'NON'
		40		H		Mode - 1, 2, or 3 (way doppler)
		42		4C		Frequency standard - 'CRYS' or 'RBD'
		46		X		Station number
		47		X		Vehicle number

* Type
 H = Fixed point half word
 F = Fixed point full word
 E = Single-precision (floating-point)
 D = Double-precision (floating-point)
 X = Hexadecimal

C - EBCDIC characters



Detailed Contents

Pointer Words

Block	Word	Byte	Bit	Type*	Units	Description and Range
		0		H		Number of first block in full chain
		2		H		Number of last block in full chain
		4		H		Number of blocks in full chain
		6		H		Number of first empty block
		8		H		Number of last empty block
		10		H		Number of empty blocks
						These words follow the twenty logical station blocks in the table.

* Type

H — Fixed point half word
F — Fixed point full wordE — Single-precision (floating-point)
D — Double precision (floating-point)
X — Hexadecimal

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7. BZLSDISP
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Data Table Formats

Symbolic Name — BZLSDISPProgrammer — L. FowlerTable Name — Low-speed Radar Display ListInitialization of any Element Required — All "blocks" must be designated as empty to start.Dimensions

Blocks — 1
Bytes/Blocks — 972
Total Bytes — 972

General Description and Usage

BZLSDISP contains information about low-speed radar data that has been received. It contains twenty "blocks", each of which contains information about one batch of data. Part of the information is in the form of a list, which can be referred to directly in an RTCNV statement, of information to be displayed on the low-speed radar display. These "blocks" may be designated as empty or full, and the full blocks are chained together. The batch with the latest time of first observation comes first in the chain. There are also three words of pointers to the full and empty blocks at the end of the data table.

Approval	Approval
<i>Louise Fowler</i>	<i>George W. Fuller</i>



Detailed Contents

Block for a C-band Station

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		0		D	hours	Time of first valid observation or time of receipt of first transmitted observation
		8		H		Block before
		10		H		Block after
		14		H		Y-coordinate on display
		16		C		Asterisk if station is transmitting, blank if not.
		17		3C		Station name
		20		C		Band type - C
		21		3C		Batch number if valid data has been received, blanks if not.
		24		3C		Vehicle name, or blanks if vehicle ID is not valid.
		28		H		Number of observations saved
		30		H		Number of observations transmitted
		32		H		Vehicle-beacon ID number
		33				
		45				
		46		X		Station number
		47				Vehicle number

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Detailed Contents

Block for a S-band Station

Block	Word	Byte	Bit	Type*	Units	Description and Range
		0		D		Time of first valid observation or time of receipt of first trans- mitted observation
		8		H		Block before
		10		H		Block after
		14		H		Y-coordinate on display
		16		C		Asterisk if station is transmitting, blank if not
		17		3C		Station name
		20		C		Band type
		21		3C		Batch number if valid data has been received, blanks if not
		24		3C		Vehicle name, or blank if vehicle ID is not valid
		28		H		Number of valid doppler observations
		30		H		Number of observations transmitted
		32		H		Vehicle-beacon ID number
		34		H		Number of valid angle observations
		36		H		Mode - 1, 2 or 3 (way doppler)
		38		H		Rate - Number of sec. between messages
		46		X		Station number
		47		X		Vehicle number

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Detailed Contents

Pointer Words

Block	Word	Byte	Bit	Type*	Units	Description and Range
		0		H		Number of first block in full chain
		2		H		Number of last block in full chain
		4		H		Number of blocks in full chain
		6		H		Number of first empty block
		8		H		Number of last empty block
		10		H		Number of empty blocks
						These words follow the twenty logical station blocks in the table.

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Format

Symbolic Name — BZLSINPTProgrammer — C. WaundTable Name — Low-Speed Radar Data TableInitialization of any Element Required — NoDimensions

Blocks — 35
Words/Blocks — 402 double words, 3,216 bytes/blk
Total Words — 14,070 double words

General Description and Usage

Each block of BZLSINPT will contain a batch of low-speed radar observations. The batch will consist of a header and 80 observation blocks. Each complete observation block will contain a positional observation (time, range, angles) and a doppler observation (time, doppler frequency shift).

If any component of an observation (range, angles, frequency) is missing, it will be set negative. If the frequency is missing, the doppler time will be zero. The positional time will always be valid.

Approval	Approval
C. Waund	D.C. Schaller



Detailed Contents

Block Format

Block	Double Word	Byte	Bit	Type*	Units	Description and Range	
1-35	1	1-2		H		Transmitting station number	
		3-4		H		Receiving station number	
		5-6		H		Count of positional observation	
		7-8		H		Count of doppler observation	
	2	1-2		H		Number of observation blocks	
		3-4		H		Doppler mode indicator	
							-1 = destruct N1
							-2 = destruct N2
					0 = no doppler		
					1 = non-destruct		

Additions Attached

The header is followed by 80 observation blocks, each in the following format

1	1-8	D	hours	Time	} Positional Observation
2	1-8	D	CUL	Range	
3	1-4	E	radians	Angle 1	
	5-8	E	radians	Angle 2	
4	1-8	D	hours	Time	} Doppler Observation
5	1-8	D	mc/sec	Frequency	

Type
 H = Fixed point half word
 F = Fixed point full word

E = Single-precision (floating-point)
 D = Double precision (floating-point)
 X = Hexadecimal

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7. BZLSPERM
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Data Table Formats

Symbolic Name — BZLSPERMProgrammer — C. WaundTable Name — Low-Speed Radar Collection Control TableInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 300 words/blk. DDD bytes/blk.

Total Words — 300 DDD bytes

General Description and Usage

BZLSPERM contains information necessary for low-speed radar input data collection and display.

The first 240 words are organized into 15 transmitting station blocks. While data is being received from a station, a block will be used to keep information about that station. Transmitting station blocks not being used will be zero.

The remainder of the table contains information used to control data collection in general.

Approval	Approval
C. Waund	D. C. Schiller

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7. BZLSPERM
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-240					Transmitting Station Blocks 16 words/block
	241-246			3D	CUL	Range Corrections for C-band beacons (1, 2, 3)
	247-252			3D	rad.	Minimum elevations for vehicles (1, 2, 3)
	253-255			3F	sec.	GMT of lift-off for vehicles (1, 2, 3). Used for data with elapsed time tags.
	256-258			3F	sec.	Time between observations for vehicles (1, 2, 3)
	259-260			3H	—	Minimum batch size for vehicles 1, 2, 3
	260-261			3H	—	Maximum batch size for vehicles 1, 2, 3
	262-263			3H	—	Responsibility counts for DDD lights, vehicles 1, 2, 3
	263-271			16H	—	C-band vehicle-beacon ID table (used to interpret the input ID)
	271-279			16H	—	USB vehicle-beacon ID table
	279-300			37H	—	Station-Radar table (one half word for each radar station in the network)

Type
H — Fixed-point half word
F — Fixed-point full word
E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

Table BZLSPERM-1. Format of a Transmitting Station Block

Block	Word	Byte	Bit	Type*	Units	Description and Range
	1	0		X	—	Station Number
		1		X	—	Vehicle Number
		2		X	—	Beacon Number
		3		X	—	BZLSINPT Block Number
	2	0-2		EBCDIC	—	Station Name
		3		EBCDIC	—	Band Type (C or s)
	3	0-1		H	—	No. of Observations Received
		2-3		H	—	No. of OBS. Blocks Filled
	4	0-3		F	—	ADDR. of Data Block
	5	0-3		F	—	ADDR. of Next OBS. Block
	6	0-1		H	—	No. of Positional OBS.
		2-3		H	—	No. of Doppler OBS.
	7	0-3		F	Seconds	Time of Previous OBS.
	8	0-3		F	—	Not Used
	9-10	0-7		D	Hours	Time of Non-Destruct Doppler Count
	11-12	0-7		D	Cycles	Non-Destruct Doppler Count
	13	0		X	—	Input Data ID
		1	5	—	—	Doppler Type 1 = Destruct
						0 = Non-Destruct
		2		X	—	Data Rate Indicator
		3	5-6	—	—	Doppler Mode Indicator
		3	7	—	—	Frequency Standard 1 = Rubidium
						0 = Crystal
	14	0-1		H	—	Batch Number
		2-3		H	—	Not Used
	15-16	0-7		D	CUL	Range Refraction Correction

*Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. BZNMFM
DATE 4/17/67 (206)
REV
PAGE 1 of 2

Data Table Format

Symbolic Name — BZNMFMProgrammer — J. DavisTable Name — Maneuver Nominals for Mission Operation Control RoomInitialization of any Element Required — Not applicableDimensions

Blocks — 9
Bytes/Blocks — 800
Total Bytes — 7200

General Description and Usage

BMMNFM calculates BZNMFM, which contains the nominals (H_a , H_p , γ , V_o , $\tilde{V}_T$, ET_{MI}) for a particular maneuver.

Blocks 1 - 3 correspond to the first maneuver requested. Blocks 4 - 6 follow the same format as blocks 1 - 3 and the values are those for the second maneuver requested. Blocks 7 - 9 follow the same pattern as blocks 1 - 3 and the values are those for the third maneuver.

Approval	Approval
<i>James H. Davis</i>	<i>D.C. Schiller</i>

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7. BZNMFM
DATE 4/17/67 (206)
REV
PAGE 2 of 2Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Number of sets
	2	1 - 2		H		Number of maneuvers requested
		3 - 4		H		MPT maneuver number
	3-101			E		Apogees
	102-200			E		Perigees
2	1			F		Number of sets
	2	1 - 2		H		Number of maneuvers requested
		3 - 4		H		MPT maneuver number
	3-101			E		GAMMA
	102-200			E		V_o
3	1			F		Number of sets
	2	1 - 2		H		Number of maneuvers requested
		3 - 4		H		MPT maneuver number
	3-101			E		$\tilde{V}_T$
	102-200			E		ET_{MI}

Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Data Table Format

Symbolic Name — BZRAXYProgrammer — A. KircherTable Name — Raster History Table for X-Y Analog PlotboardsInitialization of any Element Required — NoDimensions

Blocks — 1
Word/Blocks — 25
Total Words — 25

General Description and Usage

BZRAXY contains the rasters computed by BMSPPP and used as positioning controls for the X-Y analog plotboards. Flags to indicate validity of data stored are also included.

Approval	Approval
<i>A. Kircher</i>	<i>D.C. Schiller</i>

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7. BZRAXY
DATE 3/30/67 (205)
REV
PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				Mission phase
		2-4				Open
	2	1		H		X-axis raster XY board #1
		3		H		Y-axis raster XY board #1
	3	1				Internal MSK flag
		2				Scale flag
		3				Entry code flag
		4				Validity flag
	4					Same as words 2 and 3 but for XY boards #2 - #5
	...					
	...					
	11					Same as words 2-11 but for telemetry data source
	12					
	...					
	...					
	21					
	22-25					Open

Type
H — Fixed-point half word
F — Fixed-point full word
E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS7. BZUNVT
DATE 6/30/67 (206)
REV
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BOOK: MISSION SYSTEMS - AS-200 Systems Integration

Data Table Formats

Symbolic Name - BZUNVTProgrammer - L. WestberryTable Name - Maneuver Unit Vector TableInitialization of any Element Required - NoDimensions

Blocks - 3

Words/Blocks - 24 words or 12 double words

Total Words - 72 words or 36 double words

General Description and Usage

This data table contains the unit vectors for calculating velocity normal to a (the) target plane during a high-speed pass.

Approval	Approval
<i>L. Westberry</i>	<i>George W. Mueller</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0		D	Er	X Component of Unit Vector
	3	8		D	Er	Y Component of Unit Vector
	5	16		D	Er	Z Component of Unit Vector
	7	24		D	Er	Delta Time of Burn
	9	32		D		OPEN
	11	40		D		OPEN
2	1	0				Not Used at Present Time
	11	40				
3	1	0				Not Used at Present Time
	11	40				

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. BZUSEVEC

DATE 4/12/68 (EORP)

REV

PAGE 1 of 2

Data Table Formats

Symbolic Name — BZUSEVECProgrammer — A. KircherTable Name — Useable Vector TableInitialization of any Element Required — NoDimensions

Blocks — 12

Words/Blocks — 20

Total Words — 240

General Description and Usage

BZUSEVEC contains vectors that have been transferred from the Evaluation Vector Table as a result of Vector Control Panel PBI action. Vectors are in RTCC inertial coordinates. The table is available in all phases. The vectors are passed to appropriate control programs for ephemeris update as a result of PBI action. A description of the vector ID can be found in TR-165A, section 2 under the Vector Panel Summary writeup.

Abbreviations: CMC - Command Module Computer
LGC - LM Guidance Computer
AGS - Abort Guidance Computer
IU - Instrument Unit (S-IVB)
HSR - High-Speed Radar Cutoff Vector
DC - Differential Correction

Approval	Approval
<i>A. Kircher</i>	<i>George W. Mueller</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. BZUSEVEC

DATE 4/12/68 (EO

REV

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1	0-3	X		Vector code (EBCDIC)
	2	4-7	F		ID Nr (= -1 with no vector in block)
	3-4	8-15	D	hours	Time
	5-6	16-23	D	Er	X
	7-8	24-31	D	Er	Y
	9-10	32-39	D	Er	Z
	11-12	40-47	D	Er/hr	Ẋ
	13-14	48-55	D	Er/hr	Ẏ
	15-16	56-63	D	Er/hr	Ż
	17-18	64-71	X		CSM, CMC vector
2					REFSMAT ID from GOST or 'BES' if Besilian system was used.
	19	72-75	X		Station ID (EBCDIC)
	20	76	X		TLM ave vector indicator (=1 for TLM cutoff, =0 otherwise)
		77-79	X		Open
	3	Same as block 1			CSM, LGC vector
	4				CSM, AGS vector
	5				CSM, IU vector
	1	0-3	X		Vector code (= 'HSRC')
	2	4-7	F		ID Nr (number of last executed CSM maneuver, = -1 if no vector is in block)
	3-16	8-63	D		CSM, HSR vector as in block 1
6	17-18	64-71			Open
	19	72-75	X		Station ID (EBCDIC)
	20	76-79			Open
	1	0-3	X		Vector code (DC Station ID)
	2	4-7	F		ID Nr (DC batch number, = -1 with no vector in block)
	3-16	8-63	D		CSM, DC vector as in block 1
	17-18	64-71			Open
	19	72-75	X		Station ID (EBCDIC)
	20	76-79			Open
	7-12	Same as blocks 1-6 above except			data presented represents the LM.

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. BZVALU
DATE 9/1/67 (206)
REV
PAGE 1 of 4

Data Table Formats

Symbolic Name — BZVALUProgrammer — J. H. Davis, S. L. StanleyTable Name — Differential Correction (DC) History TableInitialization of any Element Required — NoneDimensions

Blocks — 20
Words/Blocks — 1096 bytes
Total Words — 21920 bytes

General Description and Usage

BZVALU, BZVALV AND BZVALW are identical tables containing differential correction history information for the CSM, S-IVB and LM, respectively. This table is initialized by BMSINT each time the program receives an insertion vector. At the completion of each DC BZVALU, BZVALV or BZVALW is updated with the results of the current batch. A manual decision and a mode change are the only other items that cause a table update.

Approval	Approval
<i>Stanley</i>	<i>George W. Mueller</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. BZVALU
DATE 9/1/67 (206)
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Detailed Contents

Block	Symbol	Byte	Bit	Type*	Units	Description and Range
1	ST AID	0		X		Station name
	BATCH	4		F		Station batch
	PREREJ	8		H		Ranges rejected by pre-edit
		10		H		A/X angles rejected by pre-edit
		12		H		E/Y angles rejected by pre-edit
		14		H		Doppler rejected by pre-edit
	PRERMS	16		E		Range RMS from pre-edit
		20		E		A/X angle RMS from pre-edit
		24		E		E/Y angle RMS from pre-edit
		28		E		Doppler RMS from pre-edit
	EEREJ	32		H		Elliptic edit range rejected
		34		H		Elliptic edit A/X angle rejected
		36		H		Elliptic edit E/Y angle rejected
		38		H		Open for display
	EERMS	40		E		Elliptic edit range RMS
		44		E		Elliptic edit A/X angle RMS
		48		E		Elliptic edit E/Y angle RMS
		52		E		Open for display
	DCREJ	56		H		Range rejections
		58		H		A/X angle rejections
		60		H		E/Y angle rejections
		62		H		Doppler rejections
	DCRMS	64		E		Range RMS
		68		E		A/X angle RMS
		72		E		E/Y angle RMS
		76		E		Doppler RMS
	DCAVG	80		E		Range average
		84		E		A/X angle average
		88		E		E/Y angle average
		92		E		Doppler average
	SIGMUL	96		E		Range apriori weight
		100		E		A/X angle apriori weight

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexidecimal

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 2. BZVALU
 DATE 9/1/67 (206)
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Detailed Contents

Block	Symbol	Byte	Bit	Type*	Units	Description and Range
		104		E		E/Y angle apriori weight
		108		E		Doppler apriori weight
	WTS	112		E		Range station weight
		116		E		A/X angle station weight
		120		E		E/Y angle station weight
		124		E		Doppler station weight
	QFORM	128		E		Quadratic form
	QRBEL	132		E		Address of SP 0
		136				Open
	GLAMDA	144		D		Longitude of Greenwich
		152				Open
	RFACTR	160		D		Density multiplier
	NV	168		D		Time of last observation
	MAXEL	176		F		Maximum elevation
	FOM	180		E		Figure of merit
	TRACE	184		E		Output trace
	PTRACE	188		E		Trace of uncorrected covariance
	AREA	192		E		Area
	WT	196		E		Weight
	VEC	200		D		Output anchor vector
						time, position, velocity
	COVAR	256		D		Output anchor covariance
	CORREC	544		D		Vector corrections
						position, velocity
	AGVEC	592		D		Propagated vector
						time, position, velocity
	PGCOVR	648		D		Propagated covariance
	LSHEAD	936		X		Low-speed header
	IPREED	952		H		Pre-edit indicator, 1 for no
	EL	954		H		Elliptic edit indicator
	NUM	956		H		Mishap number
	NBZL	958		H		Low-speed data index

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



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2. BZVALU

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Detailed Contents

Block	Symbol	Byte	Bit	Type*	Units	Description and Range
	NED	960		H		Number edit loops
	NIT	962		H		Number iteration loops
	KRHO	964		H		KRHO Indicator
	KALPHA	966		H		KALPHA Indicator
	KGAMMA	968		H		KGAMMA Indicator
	NSG	970		H		Single station/multistation
	NAR	972		H		Program accept/reject
	MANUL	974		H		Manual decision
	NUN	976		H		Update/no update
	NAM	978		H		Auto/manual
		980				Open
	NMAN	982		H		Maneuver Indicator
	IWAIT	984		H		1 for waiting, 0 for idle
	FORCE	986		H		Force indicator
	REPEAT	988		H		Repeat batch number
	PHASE	990		H		1=orbit, 2=reentry, 3=abort no burn, 4=abort with burn
		992				Open
	LASTMAN-					
		1008		D		Time of insertion or burnout of last maneuver
	SONMAN	1016		D		GMT of next maneuver
	ELVEC	1024		D		Elliptic edit vector
						time, position, velocity
	COND	1080		E		Inversion conditioning
	ACCHBN	1084		H		History block number of last accepted batch
	SAMETIME-					
		1086		H		Number of stations back which have same time tag
		1088		D		Open

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

Data Table Formats

Symbolic Name — CZAPSBN2Programmer — F. HeathTable Name — Lunar Module (LM) — APS₂ Burn Update Makeup TableInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 30
Total Words — 30

General Description and Usage

CZAPSBNA contains the digital command quantities necessary for display and transmission of a APS2 Burn Update to the LM Guidance Computer.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>John J. Bidman</i>

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7. CZAPSBN2
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		HL1		Update number
	1	2		HL1		Sequence number (0-63)
	1	3-4				Not used
	2	1-3		X		Primary command site
	2	4				Not used
	3	1-3		X		Backup command site
	3	4				Not used
	4					Not used
	5-6			D	STU	GET of load generation
	7-8			D	ft.	$R_{CSM} (T_A)_0$
	9-10			D	ft.	$R_{CSM} (T_A)_1$
	11-12			D	ft.	$R_{CSM} (T_A)_2$
	13-14			D	STU	T_A
	15-16			D	ft.	R_D
	17			DSKY		$R_{CSM} (T_A)_0$
	18			DSKY		$R_{CSM} (T_A)_1$
	19			DSKY		$R_{CSM} (T_A)_2$
	20			DSKY		T_A
	21			DSKY		R_D
	22-30					Not used

Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. CZAXTRDV
DATE 8/3/67 (EORP)
REV
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Data Table Formats

Symbolic Name — CZAXTRDV

Programmer — W. R. Surles

Table Name — Command Module Computer (CMC) External Delta V Data Table

Initialization of any Element Required — None

Dimensions

Blocks — 1
Words/Blocks — 40
Total Words — 40

General Description and Usage

This data table is used as a makeup buffer by the CMC External Delta V Update and Display.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>Kobori C. Kaku</i>

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7. CZAXTRDV

DATE 8/3/67 (EORP)

REV

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Load number
	2			F	EBIDIC	Site 1
	3			F	EBIDIC	Site 2
	4					Unused
	5-6			D	hrs.	GET of generation
	7			F		Data word count
	8			F		Verb and verb symbol
	9			F		Index
	10			F		CMC core address
						DSKY output
	11			F		DSKY output time of engine ignition
	12			F		DSKY output Vx
	13			F		DSKY output Vy
	14			F		DSKY output Vz
	15			F		DSKY output weight of CSM
	16			F		Veh. I. D.
	17-18			D	hrs.	Time
	19-20			D	F/S	Vx
	21-22			D	F/S	Vy
	23-24			D	F/S	Vz
	25-26			D	lbs.	Weight
	27-28			D	EBIDIC	Maneuver code
	29-30			D	hrs.	GMT I. D.
	31-32			D	EBIDIC	Station I. D.
	33-40					Unused

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. CZDCSSST

DATE 4/6/67 (206)

REV

PAGE 1 of 2

Data Table Formats

Symbolic Name — CZDCSSSTProgrammer — G. K. LutherTable Name — SLV Switch Selectro Command TableInitialization of any Element Required — AllDimensions

Blocks — 1
Words/Blocks — 450
Total Words — 450

General Description and Usage

This table is used to generate SLV Switch Selector Updates and is displayed by CMDSWSLT. It is the table of all possible switch selector commands.

Approval	Approval
<i>G. K. Luther</i>	<i>J. H. G. [Signature]</i>

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7. CZDCSSST

DATE 4/6/67 (206)

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		1-2		H	—	Command number 0
		3-14		X	—	Command name
		15-16		H	—	Command function
		17-18		H	—	Command function
		⋮				
		⋮				
		⋮				
		(N*18)+1		H	—	Command number N
		-(N*18)+2				
		(N*18)+3		X	—	Command name
		-(N*18)+14				
		(N*18)+15		H	—	Command function
		-(N*18)+16				
		(N*18)+17		H	—	Command function
		-(N*18)+18				

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Data Table Format

Symbolic Name — CZDCSXMTProgrammer — R. A. WellsTable Name — Command Transfer TableInitialization of any Element Required — NoneDimensions

Blocks — 3
Words/Blocks — 50 full words
Total Words — 150 full words

General Description and Usage

CZDCSXMT serves as a table for CCATS¹ - formatted digital command messages prior to transmission of the messages from the RTCC. The table block used is dependent upon the type of digital command update, as follows:

- BLOCK 1 — used for Command/Service Module (CSM) Updates²
BLOCK 2 — used for Saturn IV-B (SLV) Updates
BLOCK 3 — used for Lunar Excursion Module (LEM) Updates³

A more detailed description of the table's function may be found in task writeup CTDCSTSK, load module CMSDCSXT.

¹ Communications, Command, and Telemetry System — a Univac 494 computer.

² To the Apollo Guidance Computer - (AGC)

³ To the Lunar Guidance Computer - (LGC)

Approval	Approval
W. R. Sines	John J. Berkey

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

 7. CZDCSXMT
 DATE 3/30/67 (206)
 REV
 PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	bytes	RTCC/CCATS message length
	2	1-3		EBCDIC	—	Primary command site
	3	1-3		EBCDIC	—	Back-up command site
	4	1-4		F	—	Primary site DDD pointer
	5	1-4		F	—	Backup site DDD pointer
	6, 7	1-5		—	—	CP label/RTCC time word
	7	2-4				Packed digital command
	8-50					Message, with parity ¹
2						Same format as Block 1
3						

* Type
 H — Fixed-point half word
 F — Fixed-point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

¹ A detailed description of digital command transmission formats may be found in Volume 4 of PHO TR165 or TR170, and in section I of the NASA Apollo Command Data Format Control Book.

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BOOK: MISSION SYSTEMS - AS-200 Systems Integration7. CZDPSBN1
DATE 3/31/67 (206)
REV
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Data Table Format

Symbolic Name — CZDPSBN1Programmer — R. WellsTable Name — Launch Guidance Computer DPS1 Burn Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 20 full-words
Total Words — 20 full-words

General Description and Usage

CZDPSBN1 serves as the Descent Propulsion System (DPS) Burn 1 Update portion of the Lunar Module Makeup buffer.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>John J. Redmon</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				Update number (=21)
		2				Serial number (0 to 63)
		3-4				Not used
		1-3		C		Primary command site
	2	1-3		C		Backup command site
	3	1-3		C		Not used
	4					Not used
	5-6			D	STU	GET of load generation
	7-8			D	feet	R(P)
	9			DSKY	meters	R(P)
	10-20					Not used

Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

C — EBCDIC

DSKY — LM guidance computer format



Data Table Format

Symbolic Name — CZDPSBN2Programmer — R. WellsTable Name — LGC DPS2 Burn Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 20 full words
Total Words — 20 full words

General Description and Usage

CZDPSBN2 serves as the Descent Propulsion System (DPS) Burn 2 Update portion of the Lunar Module Makeup Buffer.

Approval	Approval
W. R. Wells	John J. Bednarek

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				Update number (=22)
		2				Serial number (0 to 63)
		3-4				Not used
	2	1-3		C		Primary command site
	3	1-3		C		Backup command site
	4					Not used
	5-6			D	STU	GET of generation
	7-8			D	feet	CPT (6)
	9-10			D	feet	CPT (7)
	11-12			D	feet	CPT (8)
	13			DSKY	meters	CPT (6)
	14					Not used
	15			DSKY	meters	CPT (7)
	16					Not used
	17			DSKY	meters	CPT (8)
	18-20					Not used

* Type
H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal* C — EBCDIC
DSKY — LM guidance computer format

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7. CZDSWSEL
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Data Table Formats

Symbolic Name — CZDSWSELProgrammer — G. K. LutherTable Name — SLV Switch Selector Update Makeup BufferInitialization of any Element Required — NoneDimensionsBlocks — 4
Words/Blocks — 64
Total Words — 256General Description and Usage

This table is used for display and transmission of SLV Switch Selector Update loads. It is updated by CMMSWSEL.

Approval	Approval
<i>Gary K. Luther</i>	<i>John S. West</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X	—	Update type
		2		X	—	Serial number
	2	2-4		X	—	Site (Primary)
	3	2-4		X	—	Site (Secondary)
	4					Not Used
	5-6			D	STU	Get of generation
	7	4	2-8	X	—	Command number
	8	3-4		X	—	Command function
	:					:
	21	4	2-8	X	—	Command number
	22	3-4		X	—	Command function
	23			F	—	Number of commands
	24	1				Commands for display
	25-59	4				From CZDCSSST
	60-64					SPARE

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. CZERAMEM
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Data Table Formats

Symbolic Name — CZERAMEMProgrammer — G. K. LutherTable Name — Command Module Computer/LM Guidance Computer
(CMC/LGC) Erasable Memory Update Makeup BufferInitialization of any Element Required — NoDimensionsBlocks — 4
Words/Block — 532
Total Bytes — 2128General Description and Usage

This table is the makeup buffer for CMC/LGC Erasable Memory Updates A and B. It contains all the information necessary for transmission and display of an Erasable Memory Update.

Approval	Approval
<i>G. K. Luther</i>	<i>Robert C. Koby</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update number
		2		X		Serial no.
		3-4				Not used
	2	1-3		X		Primary site
		4				Not used
	3	1-3		X		Backup site
		4				Not used
	4	1-2		H		Smallest valid line ID
		3-4		H		Largest valid line ID
	5-6	1-8		D		GET of generation
	7	1-4		F		Verb no.
	8	1-4		F		Data word count
	9	1-4		F		Vehicle ID
	10	1-4		F		Verb symbol
	11	1-4		F		Index
	12	1		X		00=verb 71, 01=verb 72
		2-4		F		Number of valid lines
	13	1-2		H		X-coordinate for display
		3-4		X		Octal data (8000 ₁₆ if missing)
	14	1-2		H		Y-coordinate for display
		3		X		End of data flag (FF if end)

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Detailed Contents (Cont'd.)

Block	Word	Byte	Bit	Type*	Units	Description and Range
2-4		4		X		Data type (00=addr, 01=single prec, 02=double prec., 03, 2nd of double., 04=triple prec., 05=2nd of triple prec., 06=3rd of triple prec.)
	15-16			D		Engineering Units
	17-18			D		Value of least significant bit
	10-114					Same format as 13-18
	115-116					Spares
	117-121					CCATS information
						Same format as Block 1

*Type

H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Data Table Formats

Symbolic Name — CZGETTMRProgrammer — F. HeathTable Name — LM GET Timer Updates Makeup TableInitialization of any Element Required — NoneDimensions

Blocks — 4
Words/Blocks — 20
Total Words — 80

General Description and Usage

CZGETTMR contains the digital command quantities necessary for display and transmission of a GET timer update to the LM Guidance Computer.

Approval	Approval
<i>F. R. Heath</i>	<i>J. R. Kennedy</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		HL1		Update number
	1	2		HL1		Sequence number (0 - 63)
	1	3-4				Not used
	2	1-3		X		Primary command site
	2	4				Not used
	3	1-3		X		Backup command site
	3	4				Not used
	4					Not used
	5-6			D	STU	GET of Load Generation
	7-8			D	STU	GETDE
	9				DSKY	GETDE
	10			F		GETDE - hours
	11			F		GETDE - minutes
	12			F		GETDE - seconds
	13			F		GETDE - centiseconds
2-4	14-20					Spares
						Same as above

 Type
 H - Fixed point half word
 F - Fixed point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

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7. CZGNGMTL
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Data Table Formats

Symbolic Name — CZGNGMTLProgrammer — W. SurlesTable Name — Ground Network GMTLO Data TableInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 40 full words
Total Words — 40 full words

General Description and Usage

CZGNGMTL is used to pass data from in Ground Network GMTLO Update Program to the associated display program, and serves as a buffer for GMTLO loads prior to transmission from the RTCC.

Approval	Approval
W. R. Surles	<i>[Signature]</i>

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7. CZGNGMTL
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Status byte
		2		X		Serial byte
		3-4				Unused
	2			F		Site 1
	3			F		Site 2
	4					Unused
	5-6			D		GET of generation
	7			F		Year of Lo
	8			F		Month of Lo
	9			F		Day of Lo
	10			F		Minute of Lo
	11			F		Second of Lo
	12			F		Centiseconds of Lo
	13-40					Unused

Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. CZGNGMTL
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Data Table Formats

Symbolic Name — CZGNGMTLProgrammer — W. SurlesTable Name — Ground Network GMTLO Data TableInitialization of any Element Required — NoneDimensionsBlocks — 1
Words/Blocks — 25
Total Words — 25General Description and Usage

CZGNGMTL is used to pass data from in Ground Network GMTLO Update Program to the associated display program, and serves as a buffer for GMTLO loads prior to transmission from the RTCC.

Approval	Approval
<i>P. Aker</i>	<i>E. A. Franz</i>

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Detailed Contents

Elock	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update Number
		2		X		Sequence Number
		3-4				Unused
				EBCDIC		Site 1
	2					
	3			EBCDIC		Site 2
	4					Unused
	5-6			D	hrs.	GET of Generation
	7			F		Year of Lo
	8			F		Month of Lo
	9			F		Day of Lo
	10			F		Hour of Lo
	11			F		Minute of Lo
	12			F		Second of Lo
	13			D		Centiseconds of Lo
	14			F		Vehicle I. D.
	15			F		Date Word Count
	16-25					Unused

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Data Table Format

Symbolic Name — CZINTSEQProgrammer — E. J. ZatopekTable Name — SLV Sequence Initiate Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 6
Words/Blocks — 40
Total Words — 240

General Description and Usage

This table contains the data necessary for displaying and transmitting the SLV Sequence Initiate Updates. The table is updated by the SLV Sequence Initiate Update (CMMSEQIN).

Approval	Approval
W. R. Sules	

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update Type
		2		X		Serial Number
	2			X		EBCDIC Site #1
	3			X		EBCDIC Site #2
	4			—		SPARE
	5-6			D		GET of Generation
	7			F		Mode
	8			↓		Time
	9			↓		Sign
	10			↓		Sequence
	11			↓		Hours
	12			↓		Minutes
	13			↓		Manuever Code
	14			↓		DTIME
	15			↓		DSIGN
	16			—		SPARE
	↓					↓
	20					
2	SAME	AS	BLOCK	1		
3		↓	↓			
4						
5		↓	↓			
6						

Type
 H — Fixed point half word
 F — Fixed point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

Display

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7. CZINTSEQ

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Data Table Formats

Symbolic Name — CZINTSEQProgrammer — E. J. ZatopekTable Name — Saturn Launch Vehicle (SLV) Sequence Initiate Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 9

Words/Blocks — 40

Total Words — 360

General Description and Usage

This table contains the data necessary for displaying and transmitting the SLV Sequence Initiate Updates. It is updated by the SLV Sequence Initiate Update CMMSEQIN.

Approval	Approval
<i>G. Sher</i>	<i>E. J. Zatopek</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update Type
		2		X		Serial Number
	2			EBCDIC		EBCDIC Site #1
	3			EBCDIC		EBCDIC Site #2
	4					Spare
	5-6			D	hrs.	GET of Generation
	7			F		Mode
	8					Time
	9					Sign
	10					Sequence
	11					Hours
	12					Minutes
	13					Manuever Code
	14					DTIME Display
	15					DSIGN Display
	16					Spare
	...					Spare
	...					
	...					
	20					
2	Same as block 1					
3	↓					
4						
5						

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
6	Same as block 1					
7	Same as block 1					
8	V					
9						

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Data Table Formats

Symbolic Name — CZLIFTFF

Programmer — G. K. Luther

Table Name — Command Module Computer/LM Guidance Computer (CMC/LGC)
Lift-off Time Makeup buffer

Initialization of any Element Required — No

Dimensions

Blocks — 2
Bytes/Blocks — 88
Total Bytes — 176

General Description and Usage

This table contains all data necessary to display and transmit CMC or LGC Lift-off Time Update.

Approval	Approval
<i>G. K. Luther</i>	<i>Robert C. Kiley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1			X	Update no.
		2			X	Serial no.
		3-4				Not used
	2	1-3			X	Primary site
		4				Not used
	3	1-3			X	Backup site
		4				Not used
	4					Not used
	5-6	1-8			D	GET of generation
	7	1-4			X	DTEPOCH
	8	1-4			F	CCATS (days)
	9	1-4			F	CCATS (hours)
	10	1-4			F	CCATS (min)
	11	1-4			F	CCATS (sec)
	12	1-4			F	CCATS (c sec)
	13-14	1-8			D	Input time for display
	15	1-4			F	Verb symbol
	16	1-4			F	Data word count
	17	1-4			F	Vehicle ID
	18	1-4			F	Verb
	19	1-4			F	Index
	20	1-4			F	Address
	21-22					Not used

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. CZLMPCD
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Data Table Formats

Symbolic Name — CZLMPCDProgrammer — G. K. LutherTable Name — LGC LMP Command Makeup BufferInitialization of any Element Required — NoneDimensionsBlocks — 3
Bytes/Blocks — 40
Total Bytes — 120General Description and Usage

This table is used to store LGC LMP command loads when generated.

Approval	Approval
<i>G. K. Luther</i>	<i>John J. Burdmore</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2	1-16	X		Update type and sequence no.
	2	1-3	1-24	X		Site 1
	3	1-3	1-24	X		Site 2
	4					Not used
	5-6	1-8	1-64	D	hrs.	GET of generation
	7	3-4	8-16	X		LMP command no.
	8					Spare
	9					Spare
	10					Spare
	2-3					Same format as above

* Type

H — Fixed point half word

F — Fixed point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Data Table Formats

Symbolic Name — CZLTMEINProgrammer — W. SurlesTable Name — LGC Time Increment Data TableInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 20 full words
Total Words — 20 full words

General Description and Usage

CZLTMEIN is used to pass data from the LGC Time Increment Update Program to the associated display program, and serves as a buffer for time increment loads prior to transmission from the RTCC.

Approval	Approval
W. R. Surles	<i>[Signature]</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Status byte
		2		X		Serial byte
		3-4				Unused
	2			F		Site 1
	3			F		Site 2
	4					Unused
	5-6			D		GET of generation
	7			F		Total centiseconds
	8			F		Minutes
	9			F		Seconds
	10			F		Centiseconds
	11					Unused
	12			F		Total centiseconds in BCD
	13			F		Minutes in BCD
	14			F		Seconds in BCD
	15			F		Centiseconds in BCD
	16-20					Unused

Type
 F — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Formats

Symbolic Name — CZLXTRDV

Programmer — W. R. Surles

Table Name — LM Guidance Computer (LGC) External Delta V Data Table

Initialization of any Element Required — None

Dimensions

Blocks — 1

Words/Blocks — 40

Total Words — 40

General Description and Usage

This data table is used by the LGC External Delta V update and display as a makeup buffer.

Approval	Approval
W R Surles	Robert C. King



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Load number
	2			F	EBIDIC	Site 1
	3			F	EBIDIC	Site 2
	4					Unused
	5-6			D	hrs.	GET of generation
	7			F		Data word count
	8			F		Verb and verb symbol
	9			F		Index
	10			F		LGC core address
	11			F		Time of E. I. DSKY Data
	12			F		Vx DSKY Data
	13			F		Vy DSKY Data
	14			F		Vz DSKY Data
	15			F		Weight of LM DSKY Data
	16			F		Weight of CSM DSKY Data
	17			F		Vehicle ID
	18			F		Unused
	19-20			D	hrs.	Time Display Data
	21-22			D	F/S	Vx Display Data
	23-24			D	F/S	Vy Display Data
	25-26			D	F/S	Vz Display Data
	27-28			D	lbs.	Weight of LM Display Data

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	29-30			D	lbs.	Weight of CSM Display Data
	31-32			D	EBIDIC	Maneuver code Display Data
	33-34			D	hrs.	GMT ID Display Data
	35-36			D	EBIDIC	Station ID Display Data
	37-40					Unused

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



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7. CZNAVGEN
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Data Table Format

Symbolic Name — Command Module Computer/LM Guidance Computer (CMC/LGC)
Navigation Update Makeup Buffer

Programmer — G. K. Luther

Table Name — CZNAVGEN

Initialization of any Element Required — No

Dimensions

Blocks — 4
Words/Blocks — 43
Total Words — 172

General Description and Usage

This table is used to display and transmit CMC and/or LGC Navigation Update loads. It is used by the following programs CMSDCSXT, CMMCMNAV, CMMLMNAV, and CMDCMNAV.

Approval	Approval
<i>G. K. Luther</i>	<i>E. A. Jones</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Load type
		2		X		Sequence number
		3-4				Not used
	2	1-3		EBCDIC		Primary command site
	3	1-3		EBCDIC		Backup command site
	4					Not used
	5-6	1-8		D	hrs.	GET of generation
	7-9	1-4		X		X, Y, Z positional vectors
	10-12	1-4		X		X, Y, Z velocity vectors
	13	1-4		X		GETSV
	14-17	1-4		F		Hrs., min., sec., c-sec. GMTLO for CCATS
	18					SPARE
	19-24	1-8		D	kilo.	X, Y, Z pos. vector for display
	25-30	1-8		D	M/cs.	X, Y, Z vel. vector for display
	31-32	1-8		D		GETSV for display
	33-34	1-8		D		DC code
	35-36	1-8				DC anchor vector time
	37	1-4		F		Core address
	38	1-4		F		Verb no.
	39	1-4		F		Index
	40	1-4		F		Verb symbol

*Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
2-4	41	1-4		F		Vehicle ID
	42	1-4		F		Word count
	43	1-4		F		State vector ID
	1-43					Same as above

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Formats

Symbolic Name — CZMPTMERProgrammer — G. LutherTable Name — LGC Mission Phase and Timer Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 4
Bytes/Blocks — 56
Total Bytes — 224

General Description and Usage

This table is used to store LGC Mission Phase and Timer loads when generated.

Approval	Approval
<i>Gary K. Luther</i>	<i>John G. Bannock</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2	1-16	X		Update type and sequence number
	2	1-3	1-24	X		Site 1
	3	1-3	1-24	X		Site 2
	4					Not used
	5-6	1-8	1-64	D	hrs.	GET of generation
	7	4	4-8	X		Mission phase
	8	3-4	2-16	X	sec.	Timer increment
	9	4	6-8	X	hrs.	Hrs. - Timer increment (CCATS)
	10	4	3-8	X	min.	Min. - Timer increment (CCATS)
	11	4	3-8	X	sec.	Sec. - Timer increment (CCATS)
	12					Spare
	13	1-4	1-32	E	hrs.	Timer increment for display
	14					Spare
2-4						Same format as above

Type
 P — Fixed point half word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 F — Fixed point full word
 X — Hexadecimal

Data Table Formats

Symbolic Name — CZNAVLEM

Programmer — G. K. Luther

Table Name — LGC LM Navigation Makeup Buffer

Initialization of any Element Required — None

Dimensions

Blocks — 1
Bytes / Block — 132
Total Bytes — 132

General Description and Usage

This table is used to store LGC LM Navigation loads when generated.

Approval	Approval
<i>Gary K. Luther</i>	<i>John J. Redman</i>

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7. CZNAVLEM
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		X	-	Update type & Serial no.
	2	1-3		X		Site 1
	3	1-3		X		Site 2
	4					Not used
	5-6	1-8		D	Hrs.	Get of generation
	7	1-4	2-32	X	Meters	X positional vector
	8	1-4	2-32	X	Meters	Y positional vector
	9	1-4	2-32	X	Meters	Z positional vector
	10	1-4	2-32	X	M/Cs	X Velocity vector
	11	1-4	2-32	X	M/Cs	Y Velocity vector
	12	1-4	2-32	X	M/Cs	Z Velocity vector
	13	1-4	2-32	X	Cs.	Time of State Vector (Get)
	14	3-4	7-16	X	Hrs.	Hrs CCATS time
	15	4	2-8	X	Min.	Min CCATS time
	16	4	2-8	X	Sec.	Sec CCATS time
	17					SPARE
	18					SPARE
	19					SPARE
	20-22	1-4		E	Meters	X, Y, Z positional vectors for display
	23-25	1-4		E	M/Cs	X, Y, Z velocity vectors for display
	26					SPARE
	27-28	1-8		D	Hrs.	Time of State Vector for display
	29-30	1-8		D	Hrs.	Get of State Vector for display
	31					SPARE
	32					SPARE
	33					SPARE

Type
H ~ Fixed point half word
F ~ Fixed point full word

E ~ Single-precision (floating-point)
D ~ Double-precision (floating-point)
X ~ Hexadecimal

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7. CZNAVSLV
DATE 10/10/67 (EORP)
REV
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Data Table Formats

Symbolic Name — CZNAVSLVProgrammer — G. LutherTable Name — SLV Navigation Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 80

Total Words — 80

General Description and Usage

This table contains the data necessary to display and transmit an SLV Navigation Update. It is updated by the SLV Navigation Update CMMSVNAV.

Approval <i>G. Luther</i>	Approval <i>E. A. Suarez</i>
------------------------------	---------------------------------

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update type
		2		X		Serial Number
	2	1-3		EBCDIC		Site (Primary)
	3	1-3		EBCDIC		Site (Secondary)
	4					Not used
	5-6	1-3		D	fl. pt. hrs.	GET of gen.
	7	4				Word 1
	8	4				2
	9	4				3
	10	4				4
	11	4				5
						XDOT
	12	4				Word 1
	13	4				2
	14	4				3
	15	4				4
	16	4				5
						YDOT
	17	4				Word 1
	18	4				2
	19	4				3
	20	4				4
	21	4				5
						ZDOT
	22	4				Word 1
	23	4				2
	24	4				3
	25	4				4
	26	4				5
						XPOS
	27	4				Word 1
	28	4				2
	29	4				3
	30	4				4
	31	4				5
						YPOS

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. CZNAVSLV

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Detailed Contents (Cont'd.)

Block	Word	Byte	Bit	Type*	Units	Description and Range
	32	4				Word 1
	33	4				2
	34	4				3
	35	4				4
	36	4				5
						ZPOS
	37	4				Word 1
	38	4				2
	39	4				3
	40	4				4
	41	4				5
						TIME
	42					Spare
	43					Spare
	44					Spare
	45-46	1-8		D	fl. pt. hrs.	Get of state vector
	47-48	1-8		D	ft./sec.	XDOT
	49-50	1-8		D	meters	XDOT
					centisec.	
	51-52	1-8		D	ft./sec.	YDOT
	53-54	1-8		D	meters	YDOT
					centisec.	
	55-56	1-8		D	ft./sec.	ZDOT
	57-58	1-8		D	meters	ZDOT
					centisec.	
	59-60	1-8		D	feet	XPOS
	61-62	1-8		D	meters	XPOS
	63-64	1-8		D	feet	YPOS
	65-66	1-8		D	meters	YPOS
	67-68	1-8		D	feet	ZPOS
	69-70	1-8		D	meters	ZPOS
	71-72	1-8		D	sec.	TIME
	73-74	1-8		D	sec.	TIME
	75	1-4		F		Data word count
	76	1-4		F		Vehicle ID

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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 7. CZNAVSLV
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Detailed Contents (Cont'd.)

Block	Word	Byte	Bit	Type*	Units	Description and Range
	77 78-80	1-4		F		Mode Spare

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. CZPTBACK

DATE 8/3/67 (EORP)

REV

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Data Table Formats

Symbolic Name — CZPTBACKProgrammer — W. R. SurlesTable Name — Prelaunch Targeting Backup Data TableInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 100

Total Words — 100

General Description and Usage

This data table is used as a makeup buffer by the Prelaunch Targeting Backup Update and Display.

Approval	Approval
F. L. Heath, Jr.	Robert C. Kallu

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7. CZPTBACK

DATE 8/3/67 (EORP)

REV

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Load number
	2			F	EBIDIC	Site 1
	3			F	EBIDIC	Site 2
	4					Unused
	5-6				hrs.	GET of generation
						Words 7-51 contain bits formatted for transfer. The bits are the last six bits in the fourth byte of each word. All other bit are unused
	7-11					Inertial insertion velocity
	12-16					S-IVB tailoff
	17-21					Insertion radius vector magnitude
	22-26					Insertion flight-path angle
	27-31					Instantaneous inclination angle
	32-36					Nodal parameter
	37-41					Reg. rate of target orbit plane
	42-46					P. T. of guidance release
	47-51					Flight AZIMUTH
	52					Unused
						Metric display data
	53-54			D	M/S	I. I. velocity
	55-56			D	M/S	S-IVB tailoff
	57-58			D	mtrs.	Insert R. V. magnitude
	59-60			D	degs.	I. flight-path angle
	61-62			D	degs.	I. I. angle
	63-64			D	degs.	Nodal parameter
	65-66			D	DG/S	R. R. of target orbit plane
	67-68			D	sec.	P. T. of guidance release
	69-70			D	degs.	Flight AZIMUTH
						English display data
	71-72			D	M/S	I. I. velocity
	73-74			D	M/S	S-IVB tailoff

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	75-76			D	mtrs.	Insert. R.V. magnitude
	77-78			D	deg.	I. flight-path angle
	79-80			D	deg.	I. I. angle
	81-82			D	deg.	Nodal parameter
	83-84			D	D/S	R. R. of target orbit plane
	85-86			D	hrs.	P. T. of guidance release
	87-88			D	deg.	Flight AZIMUTH
	89			F		Veh. I. D.
	90-100					Unused

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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DATE 8/3/67 (EORP)
REV
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Data Table Formats

Symbolic Name — CZPTPRIMProgrammer — W. R. SurlesTable Name — Prelaunch Targeting Primary Data TableInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 100

Total Words — 100

General Description and Usage

This data table is used as a makeup buffer for the Prelaunch Targeting Primary Update and the Prelaunch Targeting Primary Display.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>Robert C. Raby</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Load Number
	2			F	EBIDIC	Site 1
	3			F	EBIDIC	Site 2
	4					Unused
	5-6			D	hrs.	GET of generation
						words 7-51 contain bits formatted for transfer. The bits are in byte 4. Bytes 1-3 of each word are unused.
	7-11					Inertial insertion velocity
	12-16					S-IVB tailoff
	17-21					Insertion radius vector magnitude
	22-26					Insertion flight-path angle
	27-31					Instantaneous inclination angle
	32-36					Nodal parameter
	37-41					Reg. rate of target orbit plane
	42-46					P. T. of guidance release
	47-51					Flight AZIMUTH
	52					Unused
						Metric display data
	53-54			D	M/S	I. I. velocity
	55-56			D	M/S	S-IVB tailoff
	57-58			D	meters	Insert. R. V. magnitude
	59-60			D	degs.	I. flight-path angle
	61-62			D	degs.	I. I. angle
	63-64			D	degs.	Nodal parameter
	65-66			D	D/S	R. R. of target orbit plane
1	67-68			D	sec.	P. T. of guidance release
	69-70			D	deg.	Flight AZIMUTH
	71-72			D	M/S	I. I. velocity
	73-74			D	M/S	S-IVB tailoff
	75-76			D	mrs.	Insert. R. V. magnitude

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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 7. CZPTPRIM
 DATE 8/3/67 (EORP)
 REV
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	77-78			D	deg.	I. flight-path angle
	79-80			D	deg.	I. I. angle
	81-82			D	deg.	Nodal parameter
	83-84			D	D/S	R. R. of target orbit plane
	85-86			D	float hrs.	P. T. of guidance release
	87-88			D	deg.	Flight AZIMUTH
	89			F		Data word count
	90			F		Mode word
	91			F		Vehicle I. D.
	92-100					Unused

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. CZREFMAT

DATE 8/23/67 (EORP)

REV

PAGE 1 of 2

Data Table Formats

Symbolic Name — CZREFMATProgrammer — F. HeathTable Name — CMC/LGC REFSMMAT Updates Makeup TableInitialization of any Element Required — NoneDimensions

Blocks 2
Words/Blocks — 60
Total Words — 120

General Description and Usage

CZREFMAT contains the quantities necessary for display and transmission of a CMC/LGC REFSMMAT update.

Approval	Approval
<i>F.R. Heath</i>	<i>E.A. Young</i>



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 7. CZREFMAT
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 PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				UPDATE NO
	1	2				SEQUENCE NO.
	2	1-3		EBCDIC		Primary Command Site
	3	1-3		EBCDIC		Backup Command Site
	4					NOT USED
	5-6			D	STU	GET OF LOAD GENERATION
	7			F		DATA WORD COUNT
	8			F		VERB
	9			F		INDEX
	10			F		CORE ADDRESS
	11			F		VEHICLE ID
	12-20				DSKY	THE 9 MATRIX ELEMENTS IN DSKY FORMAT
	21-38			D		MATRIX ELEMENTS
	39-40					MATRIX ID
	41-50					SPARE
	51					SERIAL NUMBER
	52					MATRIX TYPE
	53-60					SPARE
2	1-60					SAME AS BLOCK 1

 *Type
 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal



Symbolic Name — CZREXTDV

Programmer — F. Heath

Table Name — CMS Retrofire External Delta-V Update Makeup Buffer

Initialization of any Element Required — None

Dimensions

Blocks — 1
Words/Blocks — 90
Total Words — 90

General Description and Usage

CZREXTDV contains the quantities necessary for display and transmission of a CMC Retrofire External Delta-V Update.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>Ed Jones</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				Update no.
	1	2				Sequence no.
	2	1-3		EBCDIC		Primary Command Site
	3	1-3		EBCDIC		Backup Command Site
	4					Not used
	5-6			D	STU	Get of Load Generation
	7			F		Data-word count
	8			F		Verb
	9			F		Index
	10			F		Address
	11			F		Vehicle ID
	12				DSKY	Latitude
	13				DSKY	Longitude
	14				DSKY	Ignition time
	15				DSKY	VX
	16				DSKY	VY
	17				DSKY	VZ
	18				DSKY	Mass
	19-20			D	deg	Latitude
	21-22			D	deg	Longitude
	23-24			D	STU	Ignition time - GET

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	25-26			D	FPS	VX
	27-28			D	FPS	VY
	29-30			D	FPS	VZ
	31-32			D	lbs	Weight
	33-34			D	STU	TTI
	35-36			D	STU	CT (Coincident time) - GMT
	37-38			D	STU	Ignition time - GMT
	39-40			D	STU	Ignition time - GET
	41-42			D	STU	BT-SPS burn duration
	43-44			D	FPS	Total velocity less tailoff
	45-46			D	deg	Pitch
	47-48			D	n. mi.	Height of perigee
	49-50			D	STU	RET 400 K
	51-52			D	STU	RET RB
	53-54			EBCDIC		Station ID
	55-56			EBCDIC		Area (rev-zone)
	57-85					These words contain the same items as above, but in a format ready for transfer to CCATS. These items are described in PHO-TR165A, Volume 4, and are known as English Translation (ET) quantities.
	86-90					Spare

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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7. CZSLVGEN
DATE 8/22/67 (EORP)
REV
PAGE 1 of 2

Data Table Format

Symbolic Name — CZSLVGENProgrammer — F. HeathTable Name — SLV General Updates Makeup TableInitialization of any Element Required — NoneDimensions

Blocks — 2
Words/Blocks — 76
Total Words — 152

General Description and Usage

CZSLVGEN contains the quantities necessary for display and transmission of a SLV General Update.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>Ed Jones</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				UPDATE NO.
	1	2				SEQUENCE NO.
	2	1-3		EBCDIC		Primary Command Site
	3	1-3		EBCDIC		Backup Command Site
	4					NOT USED
	5-6			D	STU	GET OF LOAD GENERATION
	7			F		DATA WORD COUNT
	8			F		VEHICLE ID
	9-20	1-4				MODE AND DATA WORDS 1-48
	21	2-4				MODE AND DATA WORDS 49-51
	22-72					LINE ID'S 1-51
	73-76					SPARE
2	1-76					SAME AS BLOCK 1

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. CZTMEBSE
DATE 3/30/67 (205)
REV
PAGE 1 of 2Symbolic Name — CZTMEBSEProgrammer — E. J. ZatopekTable Name — SLV Time Base Update Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 40

Total Words — 40

General Description and Usage

This table contains the data necessary for displaying and transmitting the SLV Time Base Update. The table is updated by the SLV Time Base Update (CMMTMBSE).

Approval	Approval
W. R. Dukes	John J. Beckwith



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		X		Update Type
		2		X		Serial Number
	2			X		EBCDIC Site # 1
	3			X		EBCDIC Site # 2
	4					SPARE
	5-6			D		GET of Load Generation
	7			X		Time Base Correction
	8			F		Sign
	9			F		Sequence
	10			F		Mode
	11			F		Minutes
	12			F		Seconds
	13			F		Total Seconds
	14					} SPARES
	:					
	:					
	40					

Type
H — Fixed point half word
F — Fixed point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. CZTMEINC
DATE 8/22/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — CZTMEINCProgrammer — F. HeathTable Name — CMC/LGC Time Increment Updates Makeup BufferInitialization of any Element Required — NoneDimensions

Blocks — 2
Words/Blocks — 20
Total Words — 40

General Description and Usage

CZTMEINC contains the quantities necessary for display and transmission of the CMC/LGC Time Increment Updates command loads.

Approval	Approval
<i>F. R. Heath, Jr.</i>	<i>E. J. Jones</i>

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7. CZTMEINC
DATE 8/22/67 (EORP)
REV
PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				UPDATE NO.
	1	2				SEQUENCE NO.
	2	1-3		EBCDIC		PRIMARY COMMAND SITE
	3	1-3		EBCDIC		BACKUP COMMAND SITE
	4					NOT USED
	5-6			D	STU	GET OF LOAD GENERATION
	7				DSKY	TIME INCREMENT
	8			F		DATA WORD COUNT
	9			F		VERB SYMBOL AND NO.
	10			F		SIGN (0 is +, 1 is -)
	11			F		DELTA T - CENTISECONDS
	12			F		DELTA T - SECONDS
	13			F		DELTA T - MINUTES
	14			F		DELTA T - HOURS
	15-16			D	STU	TIME INCREMENT
	17			F		VEHICLE ID
	18-20					SPARES
2	1-20					Same as Block 1

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. EZAGSNAV
DATE 8/30/67 (EORP)
REV
PAGE 1 of 2

Data Table Format

Symbolic Name — EZAGSNAVProgrammer — G. GrantTable Name — Abort Guidance System (AGS) Navigation Update Display
Parameter TableInitialization of any Element Required — NoDimensionsBlocks — One
Words/Blocks — 36 double words
Total Words — 36 double wordsGeneral Description and Usage

EZAGSNAV contains last set of parameters formatted by AGS navigation update display.

Approval	Approval
<i>G. Grant</i>	<i>P. F. Dellacqua</i>

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7. EZAGSNAV
DATE 8/30/67 (EOR)
REV
PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F	integer	=0 display data =1 MED error message
				F	integer	Generation number
	2			D	hours	MED entry time
	3			EBCDIC		AGS matrix name
	4			D	hours	AGS clock zeroing time
	5			EBCDIC		CSM station name
	6-11			D	feet	CSM position vector
	12-17			D	ft/sec	CSM velocity vector
	18			EBCDIC		LM station name
	19-24			D	feet	LM position vector
	25-30			D	ft/sec	LM velocity vector
	31			D	minutes	AGS clock time in minutes
	32			D	hours	Vectors' GET
	33			F	integer	=128 no CSM ephemeris =1 trajectory update in process
				F	integer	=1 no CSM interpolation
	34			F	integer	=128 no LM ephemeris =1 LM trajectory update
				F	integer	=1 no LM interpolation
	35			H	integer	CSM trajectory update number
				H	integer	LM trajectory update number
	36					Open

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK MISSION SYSTEMS-AS-200 Systems Integration

7. EZANCHR 1
DATE 9/13/67 (206)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — EZANCHR1, EZANCHR2, EZANCHR3

Programmer — J. Summers

Table Name — History Anchor Vector Table

Initialization of any Element Required —

Dimensions

Blocks — 10
Words/Blocks — 8 double words
Total Words — 160

General Description and Usage

The tables contain the last ten anchor vectors for the applicable vehicle.
The anchor vectors are used for maneuver confirmation.

Approval	Approval
<i>Jones Summers</i>	<i>P. J. Pallaria</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. EZANCHR 1
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			D	hrs	Time of anchor vector
	2-4			D	Er	Position components of anchor vector
	5-7			D	Er/hr	Velocity components of anchor vector
	8			EBCDIC	---	Station ID
	2-10	SAME AS BLOCK 1				

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM**RTCC APOLLO PROGRAMMING SYSTEMS**

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7. EZANCHR 1
DATE 8/11/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — EZANCHR1, EZANCHR2, EZANCHR3Programmer — J. SummersTable Name — History Anchor Vector TableInitialization of any Element Required —Dimensions

Blocks — 10
Words/Blocks — 8 double words
Total Words — 160

General Description and Usage

The tables contain the last ten anchor vectors for the applicable vehicle.
The anchor vectors are used for maneuver confirmation.

Approval	Approval
<i>James Summers</i>	<i>R. J. Pallasio</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. EZANCHR 1
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			D	hrs	Time of anchor vector
	2-4			D	Er	Position components of anchor vector
	5-7			D	Er/hr	Velocity components of anchor vector
	8			EBCDIC	---	Station ID
	2-10	SAME AS BLOCK 1				

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Data Table Formats

Symbolic Name — EZCCSM/EZCS4B (EZCS4B not 501)Programmer — J. BarnardTable Name — Cape Longitude Crossing Times TableInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Bytes — 35

Total Words — 35

General Description and Usage

The table consists of the times a specified vehicle crosses the Cape longitude obtained from the current ephemeris.

Approval	Approval
J. Barnard	Barnard



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Trajectory update number < 32768
		3-4		H		Number of revolutions in table < 31
	2	1-2		H		Number of first revolution in table < 32768
		3-4		H		Number of last revolution in table < 32768
	3	1-4		F	centisec.	Time of first vector in ephemeris
	4	1-4		F	centisec.	Time of last vector in ephemeris
	5	1-4		F	centisec.	Time of last known cape crossing before the time of the update vector (zero if unknown)
	6	1-4		F	centisec.	Begin time of first revolution in the ephemeris. If no crossing occurred before the time of the update vector, this begin time shall be set to time of first vector in ephemeris.
	7	1-4		F	centisec.	Begin time of second revolution. If more than one crossing occurred before the time of the update vector, only the last of these shall be included in this table.
	8 ⋮ ⋮ ⋮ 35	1-4		F	centisec.	Begin time of third revolution.
		1-4		F	centisec.	Begin time of thirtieth revolution.

*Type
 F — Fixed point half word
 F — Fixed point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS-AS-200 Systems Integration

7. EZETVMED
DATE 9/4/67 (206)
REV
PAGE 1 of 6

Data Table Format

Symbolic Name — EZETVMED

Programmer — E. Berry

Table Name — U-code MED Save Table

Initialization of any Element Required — None

Dimensions

Blocks — 20
Words/Blocks — 6 full words (24 bytes)
Total Words — 120 full words (480 bytes)

General Description and Usage

EZETVMED is used to save information about the most recent U-code MED's input. With very few exceptions, the data input on U-code MED's is stored in a block in EZETVMED and is used at a later time by the various display programs.

Approval	Approval
<i>E. Berry</i>	<i>P. J. Pallaccia</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1						U07: Orbiting Object
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Rev Number
	4					Open
	5			EBCDIC		Vehicle Name
2	6			F		Vehicle ID
						U04: Ground Track Digital
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Rev Number
	4					Open
3	5			D	radians	Longitude
	6					Longitude
						U 02: Checkout Monitor
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Rev Number
	4			F		Maneuver Number
	5			D	hours	Time
	6					Time

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
4						U20: Detailed Maneuver Table
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Maneuver Number
	4					Open
	5					Open
5	6					Open
						U05: Sunrise/Sunset
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Revolution Number
	4					Open
6	5			EBCDIC		Sun Indicator
	6					Open
						U05: Moonrise/Moonset
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Revolution Number
	4					Open
	5			EBCDIC		Moon Indicator
	6					Open

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
7						U22: Revolution Ascending Node
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Revolution Number
	4					Open
	5					Open
8	6					Open
						U17: Recovery World Map (VEH1)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
9	5					Open
	6					Open
10						Open
11						U18: DC Residuals Plot (VEH2)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Batch Number
	4					Open

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
12	5					Open
	6					Open
						Open
13						U09: Recovery Zone Digitals
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
	5					Open
	6					Open
14						U15: Predicted Site (VEH 1)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
	5					Open
	6					Open
15						U15: Predicted Site (VEH 2)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
16	5					Open
	6					Open
						U16: Experimental Site
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			D	hours	Beginning Time
	4					Beginning Time
17	5			D	minutes	Delta Time
	6					Delta Time
18						Open
19						Open
20						Open

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS7. EZETVMED
DATE 9/6/67 (EORP)
REV
PAGE 1 of 6

BOOK: MISSION SYSTEMS-AS-200 Systems Integration

Symbolic Name — EZETVMEDProgrammer — S. WrightTable Name — U-code MED Save TableInitialization of any Element Required — NoneDimensions

Blocks — 20
Words/Blocks — 6 full words (24 bytes)
Total Words — 120 full words (480 bytes)

General Description and Usage

EZETVMED is used to save information about the most recent U-code MED's input. With very few exceptions, the data input on U-code MED's is stored in a block in EZETVMED and is used at a later time by the various display programs.

Approval	Approval
<i>A. K. Knight</i>	<i>P. F. Cellacia</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS-AS-200 Systems Integration

 7. EZETVMED
 DATE 9/6/67 (EORP)
 REV
 PAGE 2 of 6

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1						U10 AGS Navigation Update
	1			F	decised	Time
	2			F	decised	Current Time
	3			F		Matrix ID
	4					Open
	5					Open
2	6					Open
						U04: Ground Track Digitals
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F	decised	Time
	4					Open
3	5			D	radians	Longitude
	6					Longitude
						U02: Checkout Monitor
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Rev Number
4	4			F		Maneuver Number
	5			D	hours	Time
	6					Time
						U20: Detailed Maneuver Table
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS-AS-200 Systems Integration

 7. EZETVMED
 DATE 9/6/67 (EORP)
 REV
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
5	3			F		Maneuver Number
	4			F		REFSMAT Code
	5			F		Head Up/Down Indicator
	6					Open
6						Open
7						U06: Rendezvous Evaluation
	1			F		Revolution Number
	2					Open
	3					Open
	4					Open
	5					Open
	6					Open
						U22: Revolution Ascending Node
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
8	3			F	decised	Time
	4					Open
	5					Open
	6					Open
						Open
						Open
9						Open

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
10						U18: DC Residuals Plot (VEH 1)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Batch Number
	4					Open
	5					Open
11	6					Open
						U18: DC Residuals Plot (VEH 2)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Batch Number
	4					Open
12	5					Open
	6					Open
13						U09: Recovery Zone Digitals
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
	5					Open
	6					Open

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. EZETVMED
DATE 9/6/67 (EORP)
REV
PAGE 5 of 6

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
14						U15: Predicted Site (VEH 1)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
	5					Open
15	6					Open
						U15: Predicted Site (VEH 2)
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			F		Beginning Revolution
	4			F		Ending Revolution
16	5					Open
	6					Open
						U16: Experimental Site
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
	3			D	hours	Beginning Time
	4					Beginning Time
	5			D	hours	Delta Time
	6					Delta Time

*Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
17						U03: Relative Motion Digitals
	1			EBCDIC		Vehicle Name
	2	0-1		EBCDIC		Axis Indicator
		2-3		H		Vehicle ID
	3			EBCDIC		Vehicle Name
	4	0-1		H		REFSMAT Code
18		2-3		H		Vehicle ID
	5			F	centisec	Time
	6			F	centisec	Delta Time
						U08: Recovery Target Selection
	1			EBCDIC		Vehicle Name
	2			F		Vehicle ID
19	3			F		Revolution Number
	4			F		Mission Number
	5			D	radians	Longitude
	6					Longitude
	19					Open
	20					Open

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZEXSAVE
DATE 7/31/67 (EORP)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — EZEXSAVEProgrammer — S. WrightTable Name — Experimental Sites Save TableInitialization of any Element Required — NoneDimensions

Blocks — 101

Words/Blocks — 9

Total Words — 909 (3636 Bytes)

General Description and Usage

EZEXSAVE contains information generated by EMMEXSIT to be output by EMDEXSIT to the Experimental Site Acquisition Display, and provides an interface between the two modules.

Approval	Approval
<i>S. L. Wright</i>	<i>B. F. Pollara</i>

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BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZEXSAVE
DATE 7/31/67 (EO)
REV
PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Error Indicator 2 - MED Outdated 4 - Data Not Available
		3-4		H		Trajectory update number
	2	1-2		H		Number of first block output on last request
		3-4		H		Number of last block output
	3	1-4		F		TV Guide Word
	4-5	1-6		1-4 EBCDIC 5-6 H		Station Identification
		7				Spare
		8				Experimental Sites Ground Point Table Update Indicator
	6	1-2		H		Number of last page displayed
		3-4				Number of contacts in table
	7	1-4		F	centisec	MED U16 start time
	8	1-4		F	centisec	MED U16 delta time
	9					Spare
2 : : 101	1	1-2		H		REV Number
	1-2	3-7		EBCDIC		Ground Point Name
		8		X		Validity Indicator
	3	1-4		F	centisec	GETAOS
	4	1-4		E	N. M.	Ground Range
	5	1-4		E	N. M.	Altitude

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

 7. EZEXSAVE
 DATE 7/31/67 (EORP)
 REV
 PAGE 3 of 3

Detailed Contents (Cont'd.)

Block	Word	Byte	Bit	Type*	Units	Description and Range
2 : 101	6	1-4		E	deg.	E - Max
	7	1-4		F	centisec	Time at E-Max
	8	1-4		F	centisec	GETLOS
	9	1		X		GETAOS Validity Indicator
		2		X		GETLOS Validity Indicator
		3		X		Time at E-Max Validity Indicator
		4		X		E-Max Validity Indicator

*Type

 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7.EZEXSITE

DATE 8/4/67 (EORP)

REV

PAGE 1 of 3

Data Table Formats

Symbolic Name — EZEXSITE

Programmer — S. Wright

Table Name — Experimental Site Ground Point Table

Initialization of any Element Required — NA

Dimensions

Blocks — 52

Words/Blocks — 36

Total Words — 1872 (7488 Bytes)

General Description and Usage

Parameters input via MED P32 are processed by GMSMED and stored in EZEXSITE. Each index entry in blocks 1 and 2 contains the station name of the ground point information stored in the corresponding block. If an index entry contains zeros, then the associated block contains no data.

Approval	Approval
<i>S. Wright</i>	<i>R. F. Pallacio</i>



RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZEXSITE
DATE 8/4/67 (EORP)
REV
PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-2	1	1		X		Update Counter
		2		X		Number of Entries in TBL ≤ 50
		3-4				NOT USED
		5-9		EBCDIC		Index to Block 3
		10-14		EBCDIC		Index to Block 4
		⋮				⋮
		250-254		EBCDIC		Index to Block 52
		255		X		End of Index Flag
		256-288				NOT USED

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZEXSITE
DATE 8/4/67 (EORP)
REV
PAGE 3 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
3-52	1-2	1-5		EBCDIC	—	Station Name
		6-8		—	—	SPARE
	3-4			D	radians	Geodetic Longitude (λ)
	5-6			D	radians	Geodetic Latitude (ϕ)
	7-8			D	radians	Geocentric Latitude (ϕ')
	9-10			D		$\text{SIN}(\lambda + \lambda_0)$
	11-12			D		$\text{COS}(\lambda + \lambda_0)$
	13-14			D		$\text{SIN}(\phi)$
	15-16			D		$\text{COS}(\phi)$
	17-18			D		$\text{SIN}(\phi')$
	19-20			D		$\text{COS}(\phi')$
	21-22			D	Er	$R_E \text{SIN}(\phi - \phi')$
	23-24			D	Er	$R_E \text{COS}(\phi - \phi')$
	25-26			D	radians	$\lambda + \lambda_0$
	27-28			D	Er	Altitude Above Ellipsoid (H)
	29-30			D	Er	Station Radius from Earth Center (R_S)
	31-32			D	Er	R_E
	33-34			D	Er	$R_E \text{COS} \phi' + H \text{COS} \phi$
	35-36			D	Er	$R_E \text{SIN} \phi' + H \text{SIN} \phi$

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZJGSTAR
DATE 8/1/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — EZJGSTARProgrammer — S. WilhelmTable Name — Guidance Optics Star TableInitialization of any Element Required — YesDimensions

Blocks — 391
Words/Blocks — 3 Double Words
Total Words — 1173 Double Words

General Description and Usage

After execution initialization, this table contains 391 star unit vectors in RTCC inertial coordinates. The first 37 of these are those stars recognized by the Apollo Guidance Computer and referenced by the astronauts for Inertial Measurement Unit fine alignment checks using the sextant.

This table is initialized once per mission by EMSGSUPP from permanent star right ascensions/declinations in mean inertial coordinates of the nearest Bessilian year.

Approval	Approval
<i>S. Wilhelm</i>	<i>P. F. Polaris</i>

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. EZJGSTAR
DATE 8/1/67 (EORP)
REV
PAGE 2 of 2

Detailed Contents

ALL WORDS DOUBLE WORDS

INITIALIZED

OP RH DATA
B A T A
I S A
T E

Block	Word	Byte	Bit	Type*	Units	Description and Range
D A T A	1	1		D		SEC(HR) STAR 1 - 391 RT. ASCENSION
	to	2		D		SEC(DG) STAR 1 - 391 DECLINATION
	391	3				OPEN
D A T A	1	1		D		X { UNIT VECTOR FOR Y { STAR 1 - 391 IN Z { RTCC INERTIAL COORD.
	to	2		D		
	391	3		D		

Type
H — Fixed-point half word
F — Fixed-point full word
E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. EZJGSTTB
DATE 8/1/67 (EORP)
REV
PAGE 1 of 3

Data Table Format

Symbolic Name — EZJGSTTBProgrammer — S. WilhelmTable Name — Guidance Optics Table - CSMInitialization of any Element Required — NoneDimensions

Blocks — 12

Words/Block — 15 Double words

Total Words — 180 Double words

General Description and Usage

This table containing GOST optical information from telemetry and MED input. Table contains 10 representations of Inertial Measurement Unit alignment (REFSMATS) and associated values which can be accessed via fetch routine EIGMTX.

Approval	Approval
<i>S. Wilhelm</i>	<i>P. J. Pallavicini</i>



Detailed Contents

ALL WORDS DOUBLE WORDS

Block	Word	Byte	Bit	Type*	Units	Description and Range
1						DMT, DOD INFORMATION SAVED AS A RESULT OF MED G03 INPUT
	1	1-7		EBCDIC		MANEUVER ID (DMT)
	2			D	radians	0-2 π IMU PITCH
	3			D	radians	0-2 π IMU YAW
	4			D	radians	0-2 π IMU ROLL
	5			2E	radians	0-2 π HORIZ/VERT. PITCH, YAW
	6			2E	radians	0-2 π HORIZ/VERT ROLL, OPEN
	7			D	hours	GMT OF IGNITION
	8			D		OPEN
	9			EBCDIC		MANEUVER ID (DOD)
	10			D	radians	0-2 π IMU PITCH
	11			D	radians	0-2 π IMU YAW
	12			D	radians	0-2 π IMU ROLL
	13			2E	radians	0-2 π HORIZ/VERT PITCH, YAW
	14			2E	radians	0-2 π HORIZ/VERT ROLL, OPEN
	15			D	hours	GMT OF IGNITION

Type

F² - Fixed point half word

F - Fixed point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. EZJGSTTB

DATE 8/1/67 (EORP)

REV

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Detailed Contents

ALL WORDS DOUBLE WORDS

Block	Word	Byte	Bit	Type*	Units	Description and Range
2, 3						MED, TLM OPTICS RESPECTIVELY (SAME FORMAT BOTH BLOCKS)
	1	1-4		F	integer	STAR 1 ID.
		5-8		F	integer	STAR 2 ID.
	2			D	radians	0→2π STAR 1 SHAFT ANGLE
	3			D	radians	0→2π STAR 1 TRUN. ANGLE
	4			D	radians	0→2π STAR 2 SHAFT ANGLE
	5			D	radians	0→2π STAR 2 TRUN. ANGLE
	6			D	radians	0→2π IMU PITCH
	7			D	radians	0→2π IMU YAW
	8			D	radians	0→2π IMU ROLL
	9			D	hours	GMT OF MED/TLM RECEIPT
	10-15					OPEN

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Data Table Formats

Symbolic Name — EZNITCSM, (EZNITS4B)Programmer — D. QuarlesTable Name — CSM Ephemeris Data Table (S4B, LEM)Initialization of any Element Required — NoneDimensions

Blocks — 806
Bytes/Blocks — 48 bytes
Total Bytes — 38, 688 bytes

General Description and Usage

This data table is a "circular" ephemeris table containing a header block and 805 state vectors.

Approval	Approval
<i>D. R. Quarles</i>	<i>P. J. Bellavia</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F	centisec	Left limit of ephemeris
	2			F	centisec	Current right limit of ephemeris
	3			F	centisec	Time step
	4	1		H		Update number
	4	4	5	—		Update in progress
			6	—		Kickout altitude reached
	5			F	centisec	Final right limit of ephemeris
	6					Spare
	7-8			D	hours	Left limit of ephemeris
	9-10			D	hours	Current right limit of ephemeris
	11-12			D	hours	Time step
2-806	1-6			D	CUL	Position vector
	7-12			D	CUL/hr	Velocity vector

Type

 F — Fixed point half word
 F — Fixed point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Formats

Symbolic Name — GZABITProgrammer — J. HelmTable Name — Orbit Subsatellite Position Data DisplayInitialization of any Element Required — NoneDimensions

Blocks — 4
Words/Blocks — 145 double words 1160 bytes
Total Words — 580 double words 4640 bytes

General Description and Usage

GZABIT supplies geodetic latitude (O) and longitude (λ), the oblate altitude (H_o), and the Earth relative velocity (V_E). The data table may contain 140 minutes of data stored at one-minute intervals, will would involve 141 entries per block.

Approval	Approval
<i>J. Helm 3/22/67</i>	<i>D. C. Schiller</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		D	Fpt. Hrs.	Time associated with first entry in block 2-5
	2	3-4			Fpt. Hrs.	Time associated with last entry in block 2-5
	3	5-6			Fpt. Hrs.	Time step of each entry in blocks 2-5
	4	7-8				Number of entries
	5	9-10			RAD	Geodetic latitude (φ)
				↓		
	145	1159-	1160			
	1	1-2		D	RAD	Geodetic longitude (λ)
	141	1127-	1128	D	RAD	
	142-5	1136-	1160			OPEN
	1	1-2		D		Oblate altitude (H_o)
	141	1127-	1160	D	ER	
	142-145	1136- 1160 }				OPEN
	1	1-2		D		
	141	1127-	1128	D	ER/Hr	Earth relative velocity V_E
	142-5	1136	1160			OPEN

Type
 H — Fixed point half word
 F — Fixed point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. GZABIT
DATE 8/3/67 (EORP)
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Data Table Format

Symbolic Name — GZABIT

Programmer — J. Helm

Table Name — Orbit Subsatellite Position Data Display

Initialization of any Element Required — None

Dimensions

Blocks — 3

Words/Blocks — 145 double words, 1160 bytes

Total Words — 435 double words, 3480 bytes

General Description and Usage

GZABIT supplies geodetic latitude (ϕ), longitude (λ), and the oblate altitude (H_o). The data table may contain 140 minutes of data stored at one minute intervals.

Approval	Approval
<i>J. Helm 6/20</i>	<i>George W. Fulle</i>

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 7. GZABIT
 DATE 8/3/67 (EO)
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Fpt hrs.	Time associated with first entry
	2	9-16		D	Fpt hrs.	Time associated with last entry
	3	17-24		D	Fpt hrs.	Time step of each entry
	4	25-32		D		Number of entries
	5	33-40		D	radians	Subsatellite geodetic latitude (ϕ)
	:	:				
	145	1159-1160		D	radians	Subsatellite geodetic latitude (ϕ)
2	1	1-8		D	radians	Subsatellite geodetic longitude (λ)
	:	:				
	141	1127-1135		D	radians	Subsatellite geodetic longitude (λ)
	142-145	1136-1160		D		Open
3	1	1-8		D	Er	Altitude above oblate Earth H_o
	:	:				
	141	1127-1135		D	Er	Altitude above oblate Earth H_o
	142-145	1136-1160				Open

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. GZACQ1
DATE 8/23/67 (206)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — GZACQ1

Programmer — J. Barnard

Table Name — Acquisition Data Task Data Table

Initialization of any Element Required — None

Dimensions

Blocks — 1

Words/Blocks — 20 full words

Total Words — 20

General Description and Usage

The Acquisition Data Task uses this table to keep the station name and corresponding rev numbers of the last 10 stations to receive acquisition messages. The table is circular, and the displacement of the last entry into the table is kept in the task resource table. Entries are made into the table only as a result of time or update queues (not a MED queue) and only during Orbit phase.

Approval	Approval
<i>Jean Barnard</i>	<i>D. F. Pallacio</i>



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7. GZACQ1
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Detailed Contents

Block	Word	Byte	Bit	Type*	Description and Range
1	1 2 3-20			EBCDIC	Station Name Rev Number Paired as words 1 and 2

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. GZACQ1
DATE 8/11/67(EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — GZACQ1

Programmer — J. Barnard

Table Name — Acquisition Data Task Data Table for CSM

Initialization of any Element Required — None

Dimensions

Blocks — 1
Words/Blocks — 20 full words
Total Words — 20

General Description and Usage

The Acquisition Data Task uses this table to keep the station names and corresponding revolution numbers of the last 10 stations to receive acquisition messages. The table is circular, and the displacement of the last entry into the table is kept in the task resource table. Entries are made into the table only as a result of time or update queues (not an MED queue) and only during orbit phase.

Approval	Approval
Dean Barnard	G. F. Pallavicini



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7. GZACQ1

DATE 8/11/67(EORP)

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1 2 3-20			EBCDIC		Station name Revolution number Paired as words land 2

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. GZACQ2
DATE 8/11/67(EORP)
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Data Table Formats

Symbolic Name — GZACQ2Programmer — J. BarnardTable Name — Acquisition Data Task Data Table for LMInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 20 full words

Total Words — 20

General Description and Usage

The acquisition Data Task uses this table to keep the station names and corresponding revolution number of the last 10 stations to receive acquisition messages. The table is circular, and the displacement of the last entry into the table is kept in the task resource table. Entries are made into the table only as a result of time or update queues (not an MED queue) and only during orbit phase.

Approval	Approval
John Barnard	G. F. Pollara



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7. GZACQ2
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1 2 3-20			EBCDIC		Station name Revolution number Paired as words 1 and 2

*Type

H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



Data Table Formats

Symbolic Name — GZCTPPProgrammer — D. McFarlandTable Name — Control Words for Present Position PlotsInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 60
Total Words — 60

General Description and Usage

BMSPDR generates GZCTPP which is used by BMSPPP. The information contained within the Entry Code enables BMSPPP to determine phase, plotboard and data to be displayed on that plotboard.

Approval	Approval
<i>Dean M. McFarland</i>	<i>A.C. Schiller</i>

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 7. GZCTPP
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		H		Entry Code
		3		H		MSK Code
	2					} Same as word 1
	.					
	.					
	.					
	20					
	21	1		H		Device
		3				Color
		4				Slide
	22					} Same as word 21
	.					
	.					
	.					
	40					
	41	1				Character
		2				Vehicle Code
		3-4				Open
	42					} Same as word 41
	.					
	.					
	.					
	60					

 Type
 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



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7. GZCTPP
DATE 12/12/67 (206)
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Data Table Formats

Symbolic Name — GZCTPPProgrammer — D. McFarlandTable Name — Control Words for Present Position PlotsInitialization of any Element Required — NoDimensions

Blocks — 1

Words/Blocks — 60

Total Words — 60

General Description and Usage

BMSPDR generates GZCTPP which is used by BMSPPP. The information contained within the entry code enables BMSPPP to determine phase, type of plot and data to be displayed on that plotboard.

Approval	Approval
<i>Dan W. McFarland</i>	<i>George R. Puckler</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Entry code
		3-4		H		MSK code
	2					} Same as word 1
	...					
	20					
	21	1-2		H		Device address
		3-4				Spare
	22					} Same as word 21
	...					
	40					
	41	1				Character
		2				Vehicle code
		3-4				Open
	42					} Same as word 41
	...					
	60					

* Type

H - Fixed-point half word

F - Fixed-point full word

.E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. GZDBIT
DATE 8/3/67 (EORP)
REV
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Data Table Formats

Symbolic Name — GZDBIT

Programmer — J. Helm

Table Name — De-orbit Subsatellite Position Data Display

Initialization of any Element Required — None

Dimensions

Blocks — 3

Words/Blocks — 160 double words 1280 bytes

Total Words — 480 double words 3840 bytes

General Description and Usage

The load module, BMMLPH, will generate GZDBIT upon request for de-orbit data. The storage time interval for the data is two seconds. The data will be generated for start time plus five minutes.

Approval	Approval
<i>Jim Helm 6/21</i>	<i>George M. Puller</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Fpt hr.	Time associated with first entry
	2	9-16		D	Fpt hr.	Time associated with last entry
	3	17-24		D	Fpt hr.	Time step of each entry
	4	25-32		D	rad.	Longitude (λ) of subsatellite position at B0I.
	5	33-40		D	Er	Oblate altitude (H_o) of vehicle at B0I.
	6	41-48		D	rad.	Longitude (λ) of subsatellite position at B0E
	7	49-56		D	Er	Oblate altitude (H_o) of Vehicle at B0E
	8	57-64		D		Number of entries
	9	65-72		D	rad.	Subsatellite geodetic latitude (φ)
	.	.		.		Subsatellite geodetic latitude (φ)
2	.	.		.		
	.	.		.		
	160	1273-1280		D	rad.	Subsatellite geodetic latitude (φ)
	1	1-8		D	rad.	Subsatellite geodetic longitude (λ)
	.			.	.	Subsatellite geodetic longitude (λ)
3	.			.	.	Subsatellite geodetic longitude (λ)
	.			.	.	
	160	1273-1280		D	rad.	Subsatellite geodetic longitude (λ)
	1	1-8		D	Er	Altitude above oblate Earth H_o
	.			.	.	Altitude above oblate Earth H_o
	160	1273-1280		D	Er	Altitude above oblate Earth H_o

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Data Table Format

Symbolic Name — GZDISDRKProgrammer — J. SienkowskiTable Name — DRK TableDimensions

Blocks — 512

Bytes/Blocks — 8

Total Bytes — 4096

General Description and Usage

On all Display Request Keyboard requests, a pointer will be used to obtain the correct display request.

Approval	Approval
<i>John Sienkowski</i>	<i>H. Howell</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		0				MSK number
		2				MSK number
		4				MSK number
		6				MSK number
2		0				MSK number
		2				MSK number
		4				MSK number
		6				MSK number
3						
.						
.						
.						
512						

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. GZDISIFN
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Data Table Formats

Symbolic Name — GZDISIFNProgrammer — J. SienkowskiTable Name — IFN TableDimensions

Blocks — Variable

Bytes/Blocks — 8

Total Bytes — Variable

General Description and Usage

The IFN Table contains the task name, entry point name, and QNAME of the program to be queued on specific display requests.

Approval	Approval
<i>John Sienkowski</i>	<i>H. Howell</i>

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 7: GZDISIFN
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1						Independent task name
2						EP name
3						QNAME
4						Independent task name
5						EP name
6						QNAME
.						.
.						.
.						.
.						.
.						.

*Type

H - Fixed-point half word

F - Fixed-point full word

S - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. GZDISMSK

DATE 3/30/67 (205)

REV

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Data Table Formats

Symbolic Name — GZDISMSKProgrammer — J. SienkowskiTable Name — MSK TableDimensions

Blocks — 512

Bytes/Blocks — 8

Total Bytes — 4096

General Description and Usage

On all MSK requests, a pointer will be obtained to point to the correct task name and entry point to be queued.

Approval	Approval
<i>J. Sienkowski</i>	<i>A. Howell</i>

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7. GZDISMSK
DATE 3/30/67 (205)
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Block	Word	Byte	Bit	Type*	Units	Description and Range
1		0				IFN Number
		1				Display Number within the IFN
		2				IFN Number
		3				Display Number within the IFN
		4				IFN Number
		5				Display Number within the IFN
		6				IFN Number
		7				Display Number within the IFN
2						
...						
...						
...						
...						
512						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Data Table Formats

Symbolic Name — GZGENCSNProgrammer — J. SienkowskiTable Name — General Constraints TableInitialization of any Element Required — Yes; Cells 16-24Dimensions

Blocks — 30

Words/Blocks — 1

Total Words — 30

General Description and Usage

Used for storage of general information needed for all phases of the mission. Also targeting information is stored for future use.

Approval	Approval
<i>John Sienkowski</i>	<i>H. Howell</i>



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7. GZGENCSN

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			D		Year
2	1			D		Reference Day of Year
3	1			D		Days in Year
4	1	0		H		Version of Go Tape
	1	2		H		Month of Liftoff
	2	0		H		Day of Liftoff
	2	2		H		Number of Days in Month of Liftoff
5	1			D		Lambda One (λ_1)
6	1			D		GMTGRR (CSM)
7	1			D		GMTGRR (S-IVB)
8	1			D		Actual GMT of Zeroing S/C Registers (GMTZS)
9	1			D		Desired Height Difference for Two-Impulse
10	1			D		Desired Phase Angle for Two- Impulse
11	1			D		Desired Elevation Angle of Target for Two-Impulse
12	1			D		Travel Angle for Terminal Phase -wt. -
13	1			D		Nominal Time of NSR Maneuver
14	1			D		Nominal Height Difference NSR
15	1			D		Nominal Phase Angle at NSR

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
16	1			D		 RTCC/AGC Inertial Conversion Matrix
17	1			D		
18	1			D		
19	1			D		
20	1			D		
21	1			D		
22	1			D		
23	1			D		
24	1			D		Spares
25-30						

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Data Table Formats

Symbolic Name — GZGUNEProgrammer — D. McFarlandTable Name — Plotting Control Words for NominalsInitialization of any Element Required — NoneDimensions

Blocks — 1
Words — 90
Total Bytes — 360

General Description and Usage

BMSPDR generates the data table, that is used by BMMLPH and BMPRAW. The data table contains information that controls the plotting board nominals. The table may consist of up to 45 double words.

Approval	Approval
<i>D. McFarland</i>	<i>D.C. Schiller</i>

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7. GZGUNE

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1		H		Entry code
		3		H		MSK
	2	1		H		Device
		3				Color
		4				Slide
	3					Same as word 1
	4					Same as word 2
	:					
	:					
	31	1		H		Number of revolutions
		3		H		Number of starting revolution
	32	1		H		Data table indicator
		3		H		Vehicle code
	33					Same as word 16
	34					Same as word 17
	:					
	:					
	61	4		D		Cape crossing
	62	4				Table name
	:					
	:					
	89	4		D		Same as word 61
	90	4				

Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



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7. GZGUNE

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Data Table Formats

Symbolic Name — GZGUNE

Programmer — D. McFarland

Table Name — Plotting Control Words for Nominals

Initialization of any Element Required — None

Dimensions

Blocks — 1
Words — 90
Total Bytes — 360

General Description and Usage

BMSPDR generates GZGUNE, which is used by BMSPNM, BMSANM and BMSRNM. The data table contains information used by these modules to draw nominals on the MOCR and xy plotboards.

Approval	Approval
<i>Alan H. McFarland</i>	<i>George W. Fuller</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Entry code
		3-4		H		MSK (scale code)
	2	1-2		H		Device address
		3				Color
		4				Slide
	3					Same as word 1
	4					Same as word 2
	:					
	31	1-2		H		Number of revolutions
		3-4		H		Number of starting revolution
	32	1-2		H		Orbit - Vehicle type indicator
						Other - Data table indicator
		3-4		H		Vehicle code
	33					Same as word 31
	34					Same as word 32
	:					
	61-62	1-8		X		Cape crossing table name
	63-64	1-8				
	:					
	89-90	1-8		X		Same as words 61 and 62

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Data Table Format

Symbolic Name — GZLTRA

Programmer — R. O. McCreless

Table Name — Launch Interface Table

Initialization of any Element Required — None

Dimensions

Blocks — 52
 Bytes/Blocks — 2
 Total Words — 104

Approval	Approval
Q.O. McCreless	MA Young



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-9	1-2			D	NA	APL consine matrix
10	1-2			D	decisecs.	GMTGRR (APL)
11-19	1-2			D	NA	SAT cosine matrix
20	1-2			D	decisecs.	GMTGRR (SAT)
21	1	1		X	NA	Mode Indicator 01 - Abort I 02 - Abort II 03 - Abort III 04 - Orbit
		2-4				Open
	2					Open
22	1	1		X	NA	Data source of maneuver vector 10 - Booster TLM, 20 - USB, 30 - S/C TLM, 41 - IPS, 42 - IPR, 43 - SHP
		2		X	NA	Maneuver vector type Free flight = 00 Powered flight = 01 Nominal canned vector = 01
		3		X	NA	Special data source of maneuver vector, 00 - Booster TLM, 01 - USB, 02 - S/C TLM, 03 - IPS, 04 - IPR, 05 - SHP
		4				Open
	2					Open
23	1-2			D	hours	Time of maneuver vector
24-26	1-2			D	Er	Maneuver position vector (X, Y, and Z)

 * Type
 F - Fixed point half word
 F - Fixed point full word

 E - Single-precision (floating-point)
 D - Double precision (floating-point)
 X - Hexadecimal

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
27-29	1-2			D	Er/hr.	Maneuver velocity vector ($\dot{X}$, $\dot{Y}$, and $\dot{Z}$)
30	1-2			D	sq. ft.	Maneuver area
31	1-2			D	lbs.	Maneuver weight
32	1-2			D	hours	GMTIG
33	1-2			D	hours	ΔT_{INS}
34	1-2			D	Er/hr.	ΔV_{INS}
35	1-2			D	hours	GMTPI
36	1-2			D	hours	ΔT_{IP}
37	1-2			D	Er/hr.	ΔV_{IP}
38	1-2			D	radians	Pitch
39	1-2			D	↓	Yaw
40	1-2			D	↓	Roll
41	1	1		X	NA	Data source of current vector 10 - Booster TLM, 20 - USB, 30 - S/C TLM, 41 - IPS, 42 - IPR, 43 - SHP
		2		X	NA	Post burn vector type Free flight = 00 Powered flight = 01 No vector = FF
		3		X	NA	Special data source of current vector 00 - Booster TLM, 01 - USB, 02 - S/C TLM, 03 - IPS, 04 - IPR, 05 - SHP

 *Type
 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	2	4				Open
	1-2			D	hours	Open
42	1-2			D	hours	Time of current vector = 0 If none
43-45	1-2			D	Er.	Current position vector (X, Y, and Z)
46-48	1-2			D	Er/hr.	Current velocity vector ($\dot{X}$, $\dot{Y}$, and $\dot{Z}$)
49	1-2			D	sq. ft.	Current area
50	1-2			D	lbs.	Current weight
51	1-2			D	hours	Low-speed collection time S-IVB cutoff + 20 Sec LES abort init. + 20 Sec
52	1-2			D	hours	S-IVB/CSM separation time (No Event = 0)

Type
 F — Fixed point half word
 E — Fixed point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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(EORP)

Data Table Format

Symbolic Name — GZLTRAProgrammer — R. O. McCrelessTable Name — Launch Interface TableInitialization of any Element Required — NoneDimensions

Blocks — 72

Bytes/Blocks — 8

Total Words — 576

Approval	Approval
Richard O McCreless	R H Williams



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-9	1-2			D		IU (CSM) cosine matrix
10	1-2			D	decisec	GMTGRR
11-19	1-2			D		IU (LM) cosine matrix
20	1-2			D	decisec	GMTGRR
21	1	1		X		Mode Code 01 - Abort I 02 - Abort II 03 - Abort III 04 - Orbit
		2-4				Open
	2					Open
22	1	1		X		Data source of maneuver vector (Preburn) 10-Booster TLM 20-USB 30-S/C TLM 41-IPS 42-IPR 43-SHP
		2		X		Maneuver vector type free Flight = 00 powered flight = 01 Nominal canned vector = 02
		3		X		Special data source of maneuver Vector 00 - Booster TLM 01 - USB 02 - S/C TLM 03 - IPS 04 - IPR 05 - SHP

*Type

 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
		4				Maneuver vector powered flight type 00 = Post-cutoff FF = Pre-cutoff Open
	2					
23	1-2			D	hours	Time of maneuver vector
24-26	1-2			D	Er	Maneuver position vector (X, Y, & Z)
27-29	1-2			D	Er/hr.	Maneuver velocity vector (X, Y, & Z)
30	1-2			D	sq. ft.	Maneuver vector area
31	1-2			D	lbs.	Maneuver vector weight
32	1-2			D	hours	GMTIG
33	1-2			D	hours	Δ Tins
34	1-2			D	Er/hr.	Δ Vins
35	1-2			D	rad.	Pitch (orbit)
36	1-2			D	rad.	Yaw (orbit)
37	1-2			D	rad.	Roll (orbit)
38	1-2			D	hours	GMTPI (CSM)
39	1-2			D	hours	Δ Tip (CSM)
40	1-2			D	Er/hr.	Δ Vip (CSM)
41	1-2			D	rad.	Pitch (CSM) (Mode III)
42	1-2			D	rad.	Yaw (CSM) (Mode III)
43	1-2			D	rad.	Roll (CSM) (Mode III)
44	1-2	1		X		Data source of current vector (Postburn) 10 - Booster TLM 20 - USB 30 - S/C TLM 41 - IPS 42 - IPR 43 - SHP
		2		X		Current vector type Free flight = 00 Powered flight = 01 No vector = FF

*Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
		3		X		Special data source of current Vector, 00 - Booster TLM 01 - USB 02 - S/C TLM 03 - IPS 04 - IPR 05 - SHP Open
	2	4				Open
45	1-2			D	hours	Time of current vector (no vector=00)
46-48	1-2			D	Er	Current position vector (X, Y, & Z)
49-51	1-2			D	Er/hr.	Current velocity vector (X, Y, & Z)
52	1-2			D	sq. ft.	Current vector area
53	1-2			D	lbs.	Current vector weight
54	1-2			D	hours	Low-speed collection time either S-IVB cutoff+ 20 sec. or LES abort Init. + 20 sec. (CSM)'
55	1-2			D	hours	Separation time (no event = 00) either S-IVB/LM or S-IVB/CSM
56	1-2			D	hours	(t) mission planning target vector
57-59	1-2			D	Er	(x, y, z) Mission planning target vector
60-62	1-2			D	Er/hr.	(x, y, z) mission planning target vector
63-71	1-2			D		AGC (CSM) cosine matrix
72	1-2			D	decisec	GMTGRR

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. GZNMINAL

DATE 7/17/67 (206)

REV 12/12/67

PAGE 1 of 2

Data Table Formats

Symbolic Name — GZNMINALProgrammer — D. McFarlandTable Name — Nominal Request Stack TableInitialization of any Element Required — NoDimensions

Blocks — 4

Words/Blocks — 42

Total Words — 168

General Description and Usage

GZNMINAL is used by the plotboard supervisor, BMSPDR, to save the queues to BMSPNM, BMSANM and BMSRNM while the projection plotboard scribing glass is being changed.

Approval	Approval
<i>Dean H. McFarland</i>	<i>George J. Smith</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Entry code
		3-4		H		MSK (scale code)
	2	1-2		H		Device address
		3				Color
		4				Slide
	3					} Same as words 1 and 2
	4					
	...					
	13					
	14					
	15	1				Starting revolution number
		2				Number of revolutions
		3-4		H		Glass change indicator
	16	1-2		H		Vehicle type or data table indicator
		3-4		H		Vehicle code
	17					} Same as words 15 and 16
	18					
	...					
	27					
	28					
	29-30	1-8		X		Cape crossing table name
	31-32					} Same as words 29 and 30
	...					
	41-42					

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. GZPLHV

DATE 3/30/67 (206)

REV

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Data Table Formats

Symbolic Name — GZPLHVProgrammer — J. HelmTable Name — Reentry/Abort Subsatellite Position Data DisplayDimensions

Blocks — 4513

Words/Blocks — 8 bytes per block

Total Words — 36104 bytes

General Description and Usage

The routine, BMMLPH, will generate GZPLHV upon request for Abort/Reentry data. The storage time interval for the data is 6 seconds. The data will be generated for start time to a maximum time of 90 minutes.

Approval	Approval
<i>J. Helm</i>	<i>D. Schiller</i>

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7. GZPLHV
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2			D		Time associated with first entry
2	1-2			D		Time associated with last entry
3	1-2					Time step of each entry
4	1			F		Number of entries
	2					OPEN
5	1-2			D		Longitude (λ) of subsatellite position at BOI
6	1-2			D		Oblate altitude (H_0) of vehicle at BOI
7	1-2			D		Longitude (λ) of subsatellite position at BOE
8	1-2			D		Oblate altitude (H_0) of vehicle at BOE
9-909	1-2			D		Subsatellite geodetic latitude (Φ)
910-1810	1-2			D		Subsatellite geodetic longitude (Λ)
1811-2711	1-2			D		Altitude above oblate earth (H_0)
2712-3612	1-2			D		Earth Relative Velocity (V_E)
3613-4513	1-2			D		Time to Free Fall (TFF)

*Type

H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)
X - Hexadecimal

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7.GZPLHV
DATE 8/3/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — GZPLHV

Programmer — J. Helm

Table Name — Reentry/Abort Subsatellite Position Data Display

Initialization of any Element Required — None

Dimensions

Blocks — 2711

Words/Blocks — 8 bytes per block

Total Words — 21688 bytes

General Description and Usage

The routine BMMLPH will generate GZPLHV upon request for abort/reentry data. The storage time is six seconds. The data will be generated for start time to a maximum time of 90 minutes.

Approval	Approval
<i>Jim Helm 6/28</i>	<i>George W. Fuller</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		8		D	Fpt hrs.	Time associated with first entry
2				D	Fpt hrs.	Time associated with last entry
3				D	Fpt hrs.	Time step of each entry
4				D		Number of entries
5				D	radians	Longitude (λ) of subsatellite position at BOI
6				D	Er	Oblate altitude (H_o) of vehicle at BOI.
7				D	radians	Longitude (λ) of subsatellite position at BOE.
8				D	Er	Oblate altitude (H_o) of vehicle at BOE.
9-909				D	radians	Subsatellite geodetic latitude φ
910-1810				D	radians	Subsatellite geodetic longitude λ
1811-2711				D	Er	Altitude above oblate Earth H_o

Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexidecimal

Data Table Formats

Symbolic Name — GZPSAD1

Programmer — E. Berry

Table Name — Predicted Site Save Table (Number 1)

Initialization of any Element Required — None

Dimensions

Blocks — 1
Words/Blocks — 10 full words
Total Words — 10 full words (40 bytes)

General Description and Usage

GZPSAD1 contains data which enables EMDPSAD to "Remember" pertinent information about the most recent set of data which was displayed on the Predicted Site Acquisition Display (MSK 55).

Approval	Approval
<i>E. F. Berry</i>	<i>D. J. Cellaris</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Trajectory update number
	2			F		Last page number displayed
	3			F		Last page indicator
	4			F		Maximum block number
	5			EBCDIC		Vehicle name
	6			EBCDIC		Station ID (8 Bytes)
	7			EBCDIC		Station ID
	8	0-1		H		First block displayed on prev. req.
		2-3		H		Last block displayed on prev. req.
	9					Open for expansion
	10					Open for expansion

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. GZPSAD2
DATE 9/6/67 (206)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — GZPSAD2Programmer — E. BerryTable Name — Predicted Site Save Table (Number 2)Initialization of any Element Required — NoneDimensions

Blocks — 1

Words/Block — 10 Full Words

Total Words — 10 Full Words (40 Bytes)

General Description and Usage

GZPSAD2 contains data which enables EMDPSAD to "remember" pertinent information about the most recent set of data which was displayed on the Predicted Site Acquisition Display (MSK 56).

Approval	Approval
<i>E. Berry</i>	<i>D. J. Pallavicini</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Description and Range
1	1			F	Trajectory Update Number
	2			F	Last Page Number Displayed
	3			F	Last Page Indicator
	4			F	Maximum Block Number
	5			EBCDIC	Vehicle Name
	6			EBCDIC	Station ID (8 Bytes)
	7			EBCDIC	Station ID
	8	0-1		H	First Block Displayed on Prev. Req.
		2-3		H	Last Block Displayed on Prev. Req.
	9				Open for Expansion
	10				Open for Expansion

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. GZSTACT1
DATE 9/15/67 (EORP)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — GZSTACT1Programmer — E. BerryTable Name — Orbit Station Contacts Table (Vehicle 1)Initialization of any Element Required — NoneDimensions

Blocks — 308
Words/Blocks — 7 full words (28 bytes)
Total Words — 2156 full words (8624 bytes)

General Description and Usage

GZSTACT1 contains information on the time and duration of track of each radar station which contacts the vehicle. The table is divided into two logical sections. The first section consists of the first eight blocks and provides necessary header information for the contents of the rest of the table. Blocks 9 through 308 contain pertinent information about each station acquisition of the vehicle.

Approval	Approval
<i>L. F. Berry</i>	<i>G. F. Cellaria</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1		S			Update in Process Indicator - If in Process + If not in Process
		1-2	H			Trajectory Update Number
		3-4	H			Maximum Revolution Number in Table
	2	1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
	3		F			AOS of Station in Given Block
	4	1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
	5		F			AOS of Station in Given Block

The data stored from Block 1, Word 2 through Block 8, Word 6 are of the same format as in words 2 and 3 above; i. e., revolution number, block number, time of acquisition. Word 7 of Block 8 is not used.

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. GZSTACT1
DATE 9/15/67 (EORP)
REV
PAGE 3 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
9	1	1-3		EBCDIC		Station ID
		4		EBCDIC		Band Type (C or S)
	2	1				Indicators (0=No, 1=Yes)
			S			AMR Indicator
			1			Command Indicator
			2			Radar Indicator
			3			Telemetry Indicator
			4			Voice Indicator
		2		X		Validity Indicators
			12			Maximum Elevation
			13			Time of Maximum Elevation
			14			Time of Descending Horizon Crossing
			15			Time of Ascending Horizon Crossing
		3-4		H		Revolution Number
	3			F	centisec	Time of Ascending Horizon Crossing
	4			F	centisec	Time of Descending Horizon Crossing
	5			F	centisec	Time of Maximum Elevation
	6			E	degrees	Maximum Elevation
	7					Open for Expansion
10-308						Contact information in the same format as above.

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. GZSTACT2
DATE 9/6/67 (EORP)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — GZSTACT2Programmer — E. BerryTable Name — Orbit Station Contacts Table (Vehicle 2)Initialization of any Element Required — NoneDimensions

Blocks — 308
Words/Blocks — 7 full words (28 bytes)
Total Words — 2156 full words (8624 bytes)

General Description and Usage

GZSTACT2 contains information on the time and duration of the track of each radar station which contacts the vehicle. The table is divided into two logical sections. The first section consists of the first eight blocks and provides necessary header information for the contents of the rest of the table. Blocks 9 through 308 contain pertinent information about each station acquisition of the vehicle.

Approval	Approval
L. E. Berry	D. F. Cellacia

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7. GZSTACT2
DATE 9/6/67 (EOR)
REV
PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1		S			Update in process indicator -If in process +If not in process
		1-2	H			Trajectory Update Number
	2	3-4	H			Maximum Revolution Number in Table
		1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
						AOS of Station in Given Block
	3		F			
	4	1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
	5		F			AOS of Station in Given Block

The data stored from Block 1, Word 2 through Block 8, Word 6 are of the same format as in Words 2 and 3 above; i. e., revolution number, block number, time of acquisition. Word 7 of Block 8 is not used.

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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 7. GZSTACT2
 DATE 9/6/67 (EORP)
 REV
 PAGE 3 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
9	1	1-3		EBCDIC		Station ID
		4		EBCDIC		Band Type (C or S)
	2	1		X		Indicators (0=No; 1=Yes)
			S			AMR Indicator
			1			Command Indicator
			2			Radar Indicator
			3			Telemetry Indicator
			4			Voice Indicator
						Validity Indicators
		2		X		Maximum Elevation
			12			Time of Maximum Elevation
			13			Time of Descending Horizon Crossing
			14			Time of Ascending Horizon Crossing
			15			Revolution Number
	3	3-4		F	centisec	Time of Ascending Horizon Crossing
	4			F	centisec	Time of Descending Horizon Crossing
	5			F	centisec	Time of Maximum Elevation
	6			E	degrees	Maximum Elevation
	7					Open for Expansion
10-308						Contact information in the same format as above.

*Type

 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. GZSTACT3

DATE 9/6/67 (206)

REV

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Data Table Formats

Symbolic Name — GZSTACT3Programmer — E. BerryTable Name — Orbit Station Contacts Table (Vehicle 3)Initialization of any Element Required — NoneDimensions

Blocks — 308
Words/Blocks — 7 full words
Total Blocks — 2156 full words (8624 bytes)

General Description and Usage

GZSTACT3 contains information on the time and duration of the track of each radar station which contacts the vehicle. The table is divided into two logical sections. The first section consists of the first eight blocks and provides necessary header information for the contents of the rest of the table. Blocks 9 through 308 contain pertinent information about each station acquisition of the vehicle.

Approval	Approval
<i>E. Berry</i>	<i>B. J. Dellaria</i>

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7. GZSTACT3
DATE 9/6/67 (206)
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PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1		S			Update in Process Indicator - If in Process + If Not in Process
		1-2	H			Trajectory Update Number
		3-4	H			Maximum Revolution Number in Table
	2	1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
	3		F			AOS of Station in Given Block
	4	1-2	H			Revolution Number
		3-4	H			Block Number of First Contact in Rev
	5		F			AOS of Station in Given Block

The data stored from Block 1, Word 2 through Block 8, Word 6 are of the same format as in words 2 and 3 above; i. e., revolution number, block number, time of acquisition. Word 7 of Block 8 is not used.

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
9	1	1-3		EBCDIC		Station ID
		4		EBCDIC		Band Type (C or S)
	2	1		X		Indicators (0 = No; 1 = Yes)
			S			AMR Indicator
			1			Command Indicator
			2			Radar Indicator
			3			Telemetry Indicator
			4			Voice Indicator
	2			X		Validity Indicators
			12			Maximum Elevation
			13			Time of Maximum Elevation
			14			Time of Descending Horizon Crossing
			15			Time of Ascending Horizon Crossing
	3	3-4		H		Revolution Number
					F centisec	Time of Ascending Horizon Crossing
					F centisec	Time of Descending Horizon Crossing
					F centisec	Time of Maximum Elevation
					E degrees	Maximum Elevation
10-308	7					Open for Expansion
						Contact information in the same format as above.

*Type
H — Fixed-point half word
F — Fixed-point full word
E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. GZSTATUS
DATE 7/17/67 (206)
REV 12/12/67
PAGE 1 of 4

Data Table Formats

Symbolic Name — GZSTATUSProgrammer — D. McFarlandTable Name — Device Status TableInitialization of any Element Required — AllDimensions

Blocks — 1
Words/Blocks — 20
Total Words — 20

General Description and Usage

GZSTATUS contains the initial value of the device code, color, and slide number for the plctboard supervisor, BMSPDR. This table is used to initialize the resource table of task BTSPDR.

Approval	Approval
<i>Dan M. McFarland</i>	<i>George W. Jackson</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2				1 Background projector - 6 x 12
		3				0 Color (white)
		4				0 Slide (sector 201)
	2	1-2				2 Scribing projector - 6 x 12
		3				5 Color (yellow)
		4				0 Slide
	3	1-2				3 Spotting projector - 6 x 12
		3				3 Color (green)
		4				0 Slide
	4	1-2				9 Background projector - 10 x 20
		3				0 Color (white)
		4				7 Slide (world map, non-sectored)
	5	1-2				10 Scribing projector #1 - 10 x 20
		3				5 Color (yellow)
		4				0 Slide
	6	1-2				11 Scribing projector #2 - 10 x 20
		3				6 Color (cyan)
		4				0 Slide
	7	1-2				12 Scribing projector #3 - 10 x 20
		3				3 Color (green)
		4				0 Slide
	8	1-2				13 Scribing projector #4 - 10 x 20

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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 7. GZSTATUS
 DATE 7/17/67 (206)
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 PAGE 3 of 4

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	8	3				1 Color (red)
		4				0 Slide
	9	1-2				14 Spotting projector #1 - 10 x 20
		3				4 Color (magenta)
	10	4				0 Slide
		1-2				15 Spotting projector #2 - 10 x 20
		3				5 Color (yellow)
		4				0 Slide
	11	1-2				17 Background projector - 10 x 10
		3				0 Color (white)
		4				0 Slide
	12	1-2				18 Scribing projector #1 - 10 x 10
		3				1 Color (red)
		4				0 Slide
	13	1-2				19 Scribing projector #2 - 10 x 10
		3				6 Color (cyan)
		4				0 Slide
	14	1-2				20 Scribing projector #3 - 10 x 10
		3				5 Color (yellow)
		4				0 Slide
	15	1-2				21 Scribing projector #4 - 10 x 10
		3				3 Color (green)

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	15	4				0 Slide
	16	1-2				22 Spotting projector #1 - 10 x 10
		3				5 Color (yellow)
		4				0 Slide
	17	1-2				23 Spotting projector #2 - 10 x 10
		3				6 Color (cyan)
		4				0 Slide
	18	1-2				25 XY plotboard - 1
		3-4				26 XY plotboard - 2
	19	1-2				27 XY plotboard - 3
		3-4				28 XY plotboard - 4
	20	1-2				29 XY plotboard - 5
		3-4				209 Initial 6 x 12 AMSK number

* FVDP

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

Data Table Formats

Symbolic Name — GZTLMTRJ

Programmer — J. Summers

Table Name — Telemetry Trajectory Interface Table

Initialization of any Element Required — None

Dimensions

Blocks — 22

Words/Blocks — 20 full words

Total Words — 440 full words

General Description and Usage

GZTLMTRJ is the interface table between telemetry and trajectory. The data has been validity checked. In addition, the optics data has some data checking done on it, and the REFSMAT has the other unit vector generated. Only the last good data is in the table. The library routine RICRNT will be provided by the Reentry Computations Department to reference vectors in GZTLMTRJ and return to the caller the vector in standard coordinates and units. AGC and LGC vectors are in Mean Besselian coords; AGS and IU are in platform coords.

Approval	Approval
J. Summers	D. J. Bellas

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2			D	hrs.	Time
	3-4			D	may	X
	5-6			D	be	Y
	7-8			D	different	Z
	9-10			D	for	X
	11-12			D	different	Y
	13-14			D	missions	Z
	15			EBCDIC	-	Station ID
2	16-20					Open
	Same as block 1					High Speed AGC LEM vector (in Mean Besselian coords.)
3	1			F	-	Star ID ₁ 0 < ID < 38
	2			F	-	Star ID ₂ 0 < ID < 38
	3-4			D	-	X ₁ } Star sighting
	5-6			D	-	Y ₁ } unit vector
	7-8			D	-	Z ₁ } for star 1
	9-10			D	-	X ₂ } Star sighting
	11-12			D	-	Y ₂ } unit vector
	13-14			D	-	Z ₂ } for star 2
4	15-16			D	rad.	Pitch 0 ≤ P ≤ 2π
	17-18			D	rad.	Yaw 0 ≤ Y ≤ 2π
	19-20			D	rad.	Roll 0 ≤ R ≤ 2π
	1-2			D	-	X ₁ } X platform
	3-4			D	-	X ₂ } unit vector
	5-6			D	-	X ₃ } (as downlinked)
	7-8			D	-	Y ₁ } Y platform
	9-10			D	-	Y ₂ } unit vector
	11-12			D	-	Y ₃ } (as downlinked)

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

(if all 3 are
zero in down-
link Roll = 2π)

High Speed
AGC
Refsmat



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7. GZTLMTRJ

DATE 7/31/67 (EORP)

REV

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
4(cont.)	13-14			D	-	Z_1 } Z platform
	15-16			D	-	Z_2 } Unit vector
	17-18			D	-	Z_3 } (computed)
	19			F	-	Indicator: = 0 no Refsmat present ≠ 0 Refsmat present
	20			F	-	Open
5	Same as block 1					Low-speed AGC CSM vector
6	Same as block 1					Low-speed AGC LEM vector
7	Same as block 3					Low-speed AGC optics data
8	Same as block 4					Low-speed AGC Refsmat
9	Same as block 1					High-speed LGC CSM vector
10	Same as block 1					High-speed LGC LEM vector
11	Same as block 1					High-speed AGS CSM vector
12	Same as block 1					High-speed AGS LEM vector
13	Same as block 3					High-speed LGC optics data
14	Same as block 4					High-speed LGC refsmat
15	Same as block 1					Low-speed LGC CSM vector
16	Same as block 1					Low-speed LGC LEM vector
17	Same as block 1					Low-speed AGS CSM vector
18	Same as block 1					Low-speed AGS LEM vector
19	Same as block 3					Low-speed LGC optics data
20	Same as block 4					Low-speed LGC refsmat
21	Same as block 1					High-speed IU vector
22	Same as block 1					Low-speed IU vector

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Data Table Format

Symbolic Names — GZTSCNS1, GZTSCNS2, ...Programmer — J. RyderTable Name — Time Constraints TableInitialization of any Element Required — Block 19: Largest positive double precision number. Block 21, word 2: Floating point 32.0Dimensions

Blocks — 24
Words/Blocks — 1 double word
Total Words — 24 double words

General Description and Usage

This table contains present position information relating to the vehicle with which it is associated, plus quantities related to the generation of the current trajectory.

There will be one table per vehicle whose name must be obtained from system parameter MDGTIM which is any array of 8-byte EBCDIC names in vehicle-index order. Use of the proper table is assured only by using MDGTIM and the vehicle index.

Approval	Approval
<i>James H. Summers</i>	<i>P. F. Palencia</i>

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7. GZTSCNS1,
7. GZTSCNS2, ...
DATE 4/6/67 (206)
REV
PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2			D	hours	T
2	1-2			D	Earth radii	X
3	1-2			D	↓	Y
4	1-2			D	↓	Z
5	1-2			D	Earth radii/hour	$\dot{X}$
6	1-2			D	↓	$\dot{Y}$
7	1-2			D	↓	$\dot{Z}$
8	1-2					Spare
9	1			E	Earth radii	a - semimajor axis
	2			E		e - eccentricity
10	1			E	radians	i - inclination angle
	2			E	↓	γ - flight-path angle
11	1			E	↓	ϕ - latitude
	2			E	↓	λ - longitude
12	1			E	Earth radii	h - altitude
	2			E	hours	T_0 - period
13	1			E	radians	TA - true anomaly
	2			E	ft. /sec.	V - velocity magnitude
14	1			E	radians	Ψ - inertial azimuth
	2			E	↓	ω - argument of perigee

Type
F - Fixed point half word
E - Fixed point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. GZTSCNS1,
7. GZTSCNS2, ...
DATE 4/6/67 (206)
REV
PAGE 3 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
15	1			E	radians	r - right ascension of ascending node
	2			E	Earth radii	l - semi-latus rectum
16	1-2					Spare
17	1-2			D	pounds	Capsule weight
18	1			F		Orbit number
	2			F		Rev. number
19	1-2			D	hours	GMTPI (if reentrable vehicle)
20	1-2			EBCDIC		Station ID of last trajectory update
21	1			F		Trajectory update number
	2			E	hours	Ephemeris extension criterion
22	1			E	hours	Orbit lifetime
	2					Spare
23	1					
	2					
24	1					
	2					

Type
H - Fixed-point half word
F - Fixed-point full word
E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. GZTSCNS1,
7. GZTSCNS2, ...
DATE 3/25/68 (EORP)
REV
PAGE 1 of 3

Data Table Format

Symbolic Names — GZTSCNS1, GZTSCNS2, ...Programmer — D. QuarlesTable Name — Time Constraints TableInitialization of any Element Required —

Block 19: largest positive double precision number. Block 21, word 2:
fixed point 32

Dimensions —

Blocks — 24
Words/Blocks — 1 doubleword
Total Words — 24 doublewords

General Description and Usage

This table contains present position information relating to the vehicle with which it is associated, plus quantities related to the generation of the current trajectory.

There will be one table per vehicle whose name must be obtained from system parameter MDGTIM, which is any array of 8-byte EBCDIC names in vehicle-index order. Use of the proper table is assured only by using MDGTIM and the vehicle index.

Approval	Approval
<i>D. Quarles</i>	<i>[Signature]</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2			D	hours	T
2	1-2			D	Earth radii	X
3	1-2			D	↓	Y
4	1-2			D	↓	Z
5	1-2			D	Earth radii/hour	↓ Present position vector
6	1-2			D	↓	X
7	1-2			D	↓	Y
8	1-2				↓	Z
9	1			E	Earth radii	Spare
	2			E		a - semimajor axis
				E		e - eccentricity
10	1			E	radians	i - inclination angle
	2			E	↓	γ - flight-path angle
11	1			E	↓	φ - latitude
	2			E	↓	λ - longitude
12	1			E	Earth radii	h - altitude
	2			E	hours	T _o - period
13	1			E	radians	TA - true anomaly
	2			E	ft./sec.	V - velocity magnitude

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
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X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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7. GZTSCNS1,
7. GZTSCNS2, (EORP)
DATE 3/25/68
REV
PAGE 3 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
14	1			E	radians	Ψ - inertial azimuth
	2			E	radians	ω - argument of perigee
15	1			E	radians	r - right ascension of ascending node
	2			E	Earth radii	l - semilatus rectum
16	1-2					Spare
17	1-2			D	pounds	Capsule weight
18	1			F		Orbit number
	2			F		Rev. number
19	1-2			D	hours	GMTPI (if reentrable vehicle)
20	1			EBCDIC		Station ID of last trajectory update
	2			F		Station ID sequence number
21	1			F		Trajectory update number
	2			F	hours	Ephemeris extension criterion
22	1					Spare
	2					
23	1					
	2					
24	1					
	2					

*Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



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7. GZTVNAME

DATE 8/2/67 (206)

REV

PAGE 1 of 2

Data Table Formats

Symbolic Name — GZTVNAMEProgrammer — B. ConryTable Name — TV Name TableInitialization of any Element Required -- NoneDimensions

Blocks — Equal to number of displays in the system plus one

Bytes/Block — 16

Total Bytes — $16 \times \text{\# of displays} + 16$ General Description and Usage

GZTVNAME table is used for the TV GUIDE display to display the name of the specific MSK on each of the TV channels currently being viewed.

Approval	Approval
<i>M. Bryan Conry</i>	<i>J. L. Hoskins</i>

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 7. GZTVNAME
 DATE 8/2/67 (206)
 REV
 PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Number of displays in the system
	2			F		Number of bytes in the table
	3	1		H		Block number of first block in table (=1)
	3	3		H		Block number of last block in table
	4			F		Unused
2	1	1		X		IFN for first display
		2		X		Display number for first display
		3		H		MSK for first display
N	2-4			C		Name of first display
	1	1		X		IFN for (N-1)st display
		2		X		Display number for (N-1)st display
		3		H		MSK of (N-1)st display
	2-4			C		Name of (N-1)st display

Type

 H = Fixed point half word
 F = Fixed point full word

 E = Single-precision (floating-point)
 D = Double-precision (floating-point)
 X = Hexadecimal

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7. GZXTPERM
DATE 7/17/67 (206)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — GZXTPERMProgrammer — D. N. McFarlandTable Name — Plotboard History TableInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 30
Total Words — 30

General Description and Usage

GZXTPERM contains history required by the plotboard supervisor, BMSPDR.

Approval	Approval
<i>Dean N. McFarland</i>	<i>D.C. Schiller</i>

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7. GZXTPERM
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REV
PAGE 2 of 3

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2				≠0, S-IVB;=0, no S-IVB
		3-4				=0, radar; ≠0, telemetry
	2	1-2				Starting rev number for CSM special
		3-4				of rev for CSM special
	3	1-2				Starting rev number for S-IVB special
		3-4				Number of rev for S-IVB special
	4	1-2				Number revs to plot on XY2, h/λ
		3-4				Number revs to plot on XY3, φ/λ
	5	1-2				Starting rev number for 6 x 12 standard
		3-4				Number of rev for 6 x 12 standard
	6	1-2				Starting rev number for 6 x 12 special
		3-4				Number of rev for 6 x 12 special
	7	1-2				Phase
		3-4				Current rev number
	8	1-2				0 = change 6 x 12 glass; ≠0, do not
						change
		3-4				Spare
						=0 get 10 x 10 background; ≠0, don't
		1-2				=0 get 6 x 12 background; ≠0, don't
		3-4				Current 6 x 12 AMSK
	11	1-2				MSK value - 6 x 12
		3-4				Current 10 x 20 AMSK
	12	1-2				MSK value - 10 x 20
		3-4				Current 10 x 10 AMSK
	13	1-2				MSK value - 10 x 10
						Abort/Re-entry Plot Indicator
	14	3-4				= 0, no LES separation; ≠0, LES
						separation
		1-2				Spare
		3-4				Spare

Type
H — Fixed-point half word
F — Fixed-point full word
E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	15	1-2				First block used in GZNMINAL Next available block in GZNMINAL
		3-4				
	16	1				Symbol for 10x20 spot 1
		2				Symbol for 10x20 spot 2
		3				Symbol for 10x10 spot 1
		4				Symbol for 10x10 spot 2
	17	1				Symbol for 6x2 spot
		2				Current plot indicator for XY5
	18	1-2				Resource table initialization indicator
		3-4				
	19	1-2				Active Indicator -
		3-4				
	20	1-2				- 10x10
		3-4				- 10x20
	21	1-2				- XY1
		3-4				- XY2
	22	1-2				- XY3
		3-4				- XY4
	23	1-2				- XY5
		3-4				
	24-30	1-2				Initial tape crossing indicator
		3-4				Current ID Indicator
						Spare
						Spare

* Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7. GZXTPERM
DATE 12/12/67 (EORP)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — GZXTPERMProgrammer — D. McFarlandTable Name — Plotboard History TableInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 30

Total Words — 30

General Description and Usage

GZXTPERM contains history required by the plotboard supervisor, BMSPDR.

Approval	Approval
<i>Dan H. McFarland</i>	<i>George W. Spaulding</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		≠0, LM initialized; = 0, not initialized
		3-4				Data Source: ≠0, TLM; = 0, Radar
	2	1-2				Starting rev. number for CSM special
		3-4				Number of revs. for CSM special
	3	1-2				Starting rev. number for LM special
		3-4				Number of revs. for LM special
	4	1-2				Number of revs. for XY2, h vs λ
		3-4				Number of revs. for XY4, O vs λ
	5	1-2				Starting rev. number for 6x12 standard
		3-4				Number of revs. for 6x12 standard
	6	1-2				Starting rev. number for 6x12 special
		3-4				Number of revs. for 6x12 special
	7	1-2				Mission phase
		3-4				Current CSM rev. number
	8	1-2				≠0, Do not change 6x12 glass; = 0, change
		3-4				Current LM rev. number
	9	1-2		X		Scale number for AMSK 142
		3-4				Scale number for AMSK 143
	10	1-2				Current AMSK for 6x12
		3-4				Entry code for 6x12
	11	1-2				Current AMSK for 10x20
		3-4				Entry code for 10x20
	12	1-2				Current AMSK for 10x10
		3-4				Entry code for 10x10
	13	1-2		H		Special character indicator
		3-4				Scale for XY3, V _T vs ET _{MT}
	14	1-4				First vehicle launched
	15	1-2				First block used in GZNMINAL
		3-4				Last block used in GZNIMINAL
	16	1				10x20, Spot 1 symbol: 0 = CSM 2 = IP 1 = LAUNCH 3 = LM

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

F — Double-precision (floating-point)

λ — Hexadecimal



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7. GZXTPERM
DATE 12/12/67 (EORP)
REV
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
		2				10x20, Spot 2 symbol: 0 = CSM 2 = IP 1 = LAUNCH 3 = LM
		3				6x12, Spot symbol: 0 = CSM 1 = IP
		4				10x10, Spot 1 symbol: 0 = ⊗ 2 = ∇ 1 = ● 3 = Δ
	17	1				10x10, Spot 2 symbol: same as spot 101
		2				Spare
		3-4		H		= 0, Resource table not initialized; ≠ 0, initialized
	18	1-2				= 0, 6x12 Not active; ≠ 0, active
		3-4				= 0, 10x10 Not active; ≠ 0, active
	19	1-2				= 0, 10x20 Not active; ≠ 0, active
		3-4				Spare
	20	1-4				Spare
	21	1-3				Spare
		4				= 0, No CSM queue; ≠ 0, CSM queue
	22	1				= 0, No LM queue; ≠ 0, LM queue
		2				Spare
		3-4		H		= 0, Don't queue BMSPPP; ≠ 0, queue BMSPP
	23	1-2		H		Scale for γ vs V plot
		3-4				Spare
	24-30					Spare

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



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7. LZASDRAW
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Data Table Formats

Symbolic Name — LZASDRAWProgrammer — D. McFarlandTable Name — Launch Plotboard ConstraintsInitialization of any Element Required — NoDimensions

Blocks — 1
Words/Blocks — 17
Total Words — 17

General Description and Usage

Module BMSINIT loads LZASDRAW with values used by LMXPPB to plot present position data on the MOCR and XY plotboards.

Approval	Approval
<i>Alan M. McFarland</i>	<i>John H. Miller</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				6 x 12 scribe address (2)
		2				6 x 12 spot address (3)
		3				10 x 20 scribe 1 address (10)
		4				↓ 2 (11)
	2	1				↓ 3 (12)
		2				↓ 4 (13)
		3				spot 1 (14)
		4				spot 2 (15)
	3	1				10 x 10 scribe 1 (18)
		2				scribe 2 (19)
		3				spot 1 (22)
		4				spot 2 (23)
	4	1				XY1 address (25)
		2				XY2 (26)
		3				XY3 (27)
		4				XY4 (28)
	5	1-4	F			Control, symbol, size and color
	6					— 6 x 12, scribe 1
	7					— 6 x 12, spot 1
	8					— 10 x 20, scribe 1
	9					— 10 x 20, scribe 2
	10					— 10 x 20, scribe 3
	11					— 10 x 20, scribe 4
	12					— 10 x 20, spot 1
	13					— 10 x 20, spot 2
	14					— 10 x 10, scribe 1
	15					— 10 x 10, scribe 2
	16					— 10 x 10, spot 1
	17					— 10 x 10, spot 2
						Control — all XY plotboards

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. LZCRIT
DATE 10/20/67 (206
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Data Table Formats

Symbolic Name — LZCRITProgrammer — G. WarnerTable Name — LZCRITInitialization of any Element Required —Dimensions

Blocks — 4

Words/Blocks — 16 double words/block

Total Words — 64 double words

General Description and Usage

LZCRIT contains the high-speed raw radar editing criteria and short arc weight factors.

Approval	Approval
GL Warner P-20-67	RHW Williams 9-20-67



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-5			D	feet	Raw radar range editing criteria for IPR and land C-band radars
	6-10			D	radians	Raw radar azimuth angle editing criteria for IPR and land C-band radars
	11-15			D	radians	Raw radar elevation angle editing criteria for IPR and land C-band radars
	16			D		Short arc weight factor for IPR and land C-band radars
2	1-5			D	feet	Raw radar range editing criteria for USB radars
	6-10			D	radians	Raw radar X-angle editing criteria for USB radars
	11-15			D	radians	Raw radar Y-angle editing criteria for USB radars
	16			D		Short arc weight factor for USB radars
3-4						Spares (Identical to block 1)

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. LZDLVCNS

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REV 12/21/67

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Data Table Formats

Symbolic Name — LZDLVCNSProgrammer — G. WarnerTable Name — Delta V Constants for CSM SeparationInitialization of any Element Required — NoneDimensions

Blocks — 184

Words/Blocks — 1 (double word)

Total Words — 184

General Description and Usage

Four logical groups of constants are contained in this table:

1. Mode I curve fit (LES tower separation)
2. Mode II curve fit (CSM separation - low)
3. Mode III curve fit (CSM separation - high)
4. Mode IV curve fit*

In addition to these constants, is an elapsed time constant for Mode II/III curve fits and Mode III/IV curve fits. *

This table is used during Launch phase to add on a ΔV to the current vector. The ΔV computed represents the amount of ΔV that might be expected if the LES Tower was fired (Mode I), or if CSM separation occurred (Mode II or Mode III).

*The "Mode IV" constants do not physically exist in this data table but exist for logical compatability with the curve fit program that uses a set of constants for a LM Abort maneuver, which does include the Mode IV set. The elapsed time constant for Mode III/IV is set to a very large number to make it essentially never.

Approval	Approval
D. C. Warner 12-6-67	R. H. Williams 12-8-67



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Number of alt. constants (Mode I)
	2			F		Number of alt. constants (Mode II)
2	1			F		Number of alt. constants (Mode III)
	2			F		Number of alt. constants (Mode IV)
3				D	hrs.	Elapsed time for Mode III
4				D	hrs.	Elapsed time for Mode IV
5				D		} Mode I constants
...				↓		
84				↓		} Mode II constants
85				D		
...				↓		} Mode III constants
132				↓		
133				D		} Mode III constants
...				↓		
184				↓		
						Note: There are no Mode IV constants

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

Data Table Formats

Symbolic Name — LZGNGCNS

Programmer — L. Gourley

Table Name — GO/NO-GO Constants

Initialization of any Element Required — None

Dimensions

Blocks — 656
 Words/Blocks — 1 (double word)
 Total Words — 656

General Description and Usage

This table contains constants used only by the GO/NO-GO recommendation and the delta velocity for insertion (DVINS) routines.

Approval	Approval
<i>L. Gourley 4/4/67</i>	<i>W. A. Young 4/4/67</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			D	ft. /sec.	Bias velocity for GNG decision routine
2	2			D	ft. /sec.	Minimum velocity limit for GNG decision routine
3	3			D	ft. /sec.	Maximum velocity limit for GNG decision routine
4	4			D	nm	Minimum altitude limit for GNG decision routine
5	5			D	nm	Maximum altitude limit for GNG decision routine
6	6			D	degrees	Minimum Gamma limit for GNG decision routine
7	7			D	degrees	Maximum Gamma limit for GNG decision routine
8 ⋮ 61	8 ⋮ 61			D ↓		Coefficient array for GNG decision (54 double words)
62 ⋮ 71	62 ⋮ 71			D ↓		
62 ⋮ 71	62 ⋮ 71			D ↓	ft. /sec.	Epsilon for DVINS routine
72 ⋮ 78	72 ⋮ 78			D ↓	nm ↓	Altitude array for DVINS routine (9 double words)
72 ⋮ 78	72 ⋮ 78			D ↓	ft. /sec. ↓	Delta velocity array for DVINS routine (7 double words)

Type
D — Fixed point half word
E — Fixed point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
79	79			D		} Coefficient array for DVINS routine (567 double words)
:	:			↓		
645	645					} Spare cells
646	646					
:	:					
656	656					

Type
 H — Fixed-point half word
 F — Fixed-point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Formats

Symbolic Name — LZHLDPHSProgrammer — W. HussTable Name — Hold Phase Data TableInitialization of any Element Required — YesDimensions

Blocks — 421

Words/Blocks — one double word (8 bytes)

Total Words — 421 double words

General Description and Usage

The hold phase data table contains vectors from each high-speed data source*, time of S-IVB cutoff, time of SPS cutoff, time of N-second cycle, calculation codes and other indicators necessary for input to Hold Phase. This table also contains the output from Hold Phase, i. e., Hold Phase output vector, ΔV_{ins} vector, N-second cycle vector, GO/NO-GO recommendation, ΔV_{ins} , Mode II Impact Point, Mode III SPS Burn Maneuver and the completion codes associated with these quantities.

NOTE: Size and content of this table is mission dependent.

*The IPS vector is not required for Hold Phase calculations, but is included in LZHLDPHS for compatibility with Launch Phase processing.

Approval	Approval
<i>W. Huss</i>	<i>RA Williams</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
Variable						Refer to Macro writeup for LKMHLDPH. Initialization: Only the EBCDIC source names need initialization via DTFILL. All time tags are initialized by the Powered Flight Supervisor - LMSSUPER.

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Data Table Formats

Symbolic Name — LZHLDPHSProgrammer — W. HussTable Name — Hold Phase Data TableInitialization of any Element Required — YesDimensions

Blocks — 500

Words/Blocks — one double word (8 bytes)

Total Words — 500 double words

General Description and Usage

The hold phase data table contains vectors from each high-speed data source*, time of S-IVB cutoff, time of secondary propulsion system (SPS) cutoff, time of N-second cycle, calculation codes and other indicators necessary for input to Hold Phase. This table also contains the output from Hold Phase, i. e., Hold Phase output vector, maneuver vectors, phase interface vector, GO/NO-GO recommendation, ΔV_{ins} , Mode II impact point, Mode III SPS burn maneuver and the completion codes associated with these quantities.

NOTE: Size and content of this table is mission dependent.

*The IPS vector is not required for Hold Phase calculations; it is included in LZHLDPHS for compatibility with Launch Phase processing.

Approval	Approval
<i>A. C. Huss</i>	<i>R. H. Williams</i>

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 7. LZHLDPHS
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
Variable						Refer to Macro writeup for LKMHLDPH. Initialization: Only the EBCDIC source names need initialization via DTFILL. All time tags are initialized by the Powered Flight Supervisor - LMSSUPER.

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. LZHSAPLT
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Data Table Formats

Symbolic Name — LZHSAPLTProgrammer — E. PotterTable Name — High-Speed Abort Plotboard Data TableInitialization of any Element Required — NoneDimensions

Blocks — 9

Words/Blocks — 1 double word

Total Words — 9 double words

General Description and Usage

LZHSAPLT contains the quantities computed by the high-speed abort output task and used as input to the plotboard task, BTSPDR. This data table is updated every six seconds during high-speed abort.

Approval	Approval
<i>E. Potter</i> 5/24/67	<i>R. H. Williams</i>

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7. LZHSAPLT
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
Refer to Macro Writeup LKHSAPLT						

*Type

H ~ Fixed-point half word

F ~ Fixed-point full word

E ~ Single-precision (floating-point)

D ~ Double-precision (floating-point)

X ~ Hexadecimal



Data Table Formats

Symbolic Name — LZIMPACTProgrammer — R. SimermeyerTable Name — Launch Impact Prediction ConstantsInitialization of any Element Required — YesDimensions

Blocks — 524

Bytes/Block — 8

Total Bytes — 4192

General Description and Usage

This table contains the impact prediction constants used by LCMIMPCT and LCMIMPCF - parts of LMSSUPER.

Approval	Approval
<i>R. Simermeyer</i>	<i>M. Young</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F	bytes	Index to constants for LCMIMPCF
	2			X		Mission ID
2				D	CUL	Minimum apogee for fictitious alt.
3				D	CUV	Velocity limit for fictitious alt.
4				D	CUL	Apogee limit for fictitious alt.
5				D	CUL	Apogee limit for apogee fict. alt.
6				D	CUV	Velocity range limit 1
7				D	CUV	Velocity range limit 2
8				D	CUL	Apogee range limit 1
9				D		CA10
10				D		CA20
11				D		CA21
12				D		CA22
13				D		CV10
14				D		CV11
15				D		CV20
16				D		CV21
17				D		CV30
18				D		CV31
19				D	CUL	Radius of spherical Earth
20	1			F		Number of basic velocity ranges (CF)
	2			F		Index to CLAI from CF
21				D		Constant of velocity and gamma

Type
 F — Fixed point half word
 E — Fixed point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
22				D		Weight correction constant
23				D		Inclination
24				D		Inclination difference
25				D		Azimuth range 1
26				D		Azimuth range 2
27				D		Limit of theta correction
28-				D		Velocity range limits
--				D		Curve'fit constants CLAI ---

Type
 H — Fixed-point half word
 F — Fixed-point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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Data Table Formats

Symbolic Name — LZLDVCNSProgrammer — G. WarnerTable Name — Delta V Constants for LM SeparationInitialization of any Element Required — NoneDimensions

Blocks — 104
Words/Blocks — 1 (double word)
Total Words — 104

General Description and Usage

Four logical groups of constants are contained in this table:

- a. Mode I curve fit*
- b. Mode II curve fit (LM separation - low)
- c. Mode III curve fit (LM separation - high)
- d. Mode IV curve fit (LM abort maneuver logical third group)**

In addition to these constants, is an elapsed time constant for Mode II/III curve fits and Mode III/IV curve fits. **

This table is used during LM Launch phase to add on a ΔV to the current vector. The ΔV computed represents the amount of ΔV that might be expected if LM separation occurred.

*Mode I curve fits are not anticipated for LM launch, but are included for compatibility with the ΔV program.

**The "Mode IV" constants are the third logical group of a set of constants for a LM Abort maneuver. They do not physically exist in this data table but do exist logically for generality in the curve fit program. The elapsed time constant for Mode III/IV constants is set to a very large number to make it essentially never.

Approval	Approval
J L Warner 12-6-67	RH Williams 12-8-67



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Number of alt. constants (Mode I)
	2			F		Number of alt. constants (Mode II)
2	1			F		Number of alt. constants (Mode III)
	2			F		Number of alt. constants (Mode IV)
3				D	hours	Elapsed time for Mode III
4				D	hours	Elapsed time for Mode IV
5				D		} Mode II constants
⋮				↓		
52				↓		
53				D		} Mode III constants
⋮				↓		
104				↓		
						Note: There are no Mode I or Mode IV constants

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. LZNPUT
DATE 7/7/67 (206)
REV
PAGE 1 of 2Symbolic Name — LZNPUTProgrammer — T. MillerTable Name — Launch Display Interface TableInitialization of any Element Required — NoneDimensions

Blocks — 610
Words/Blocks — 2 wrds./blk.
Total Words — 1220

General Description and Usage

This is the launch interface table for transmitting data between tasks for processing, printing, D/TV displays and DDD's. It carries the vectors, event times, computations and all logic indicators necessary for control and output.

Approval	Approval
<i>T. H. Miller</i>	<i>R. A. Williams</i>

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7. LZNPUT
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
This table consists of the following Macro's in order. Refer to Macro Write-up for details.						LKVECTS LKEVENT LKDDD LKDIGITAL LKPARAM LKLGIND LKMHLDPH

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



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7. LZPRBN

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Data Table FormatSymbolic Name — LZPRBNProgrammer — T. MillerTable Name — Phase Interface Preburn Data TableInitialization of any Element Required — NoneDimensions

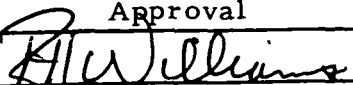
Blocks — 470

Words/Blocks — 2 wrds./blk.

Total Words — 940

General Description and Usage

The preburn quantities necessary for phase interface are saved in this table. All powered flight and maneuver vectors with respective weights are saved in LZPRBN under a thrust condition.

Approval	Approval
	



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
This table consists of the following Macro's in order. Refer to Macro Write-up for details.						
1-421	1					LKMHLDPH
422						
:						
429						IU t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
430						
:						
437						USB t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
438						
:						
445						AGC t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
446						
:						
453						IPS t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
454						
:						
461						IPR t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
462						
:						
470						SHIP t, x, y, z, $\dot{x}$, $\dot{y}$, $\dot{z}$
471						LKVECTS
:						
519						

*Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. LZSPSCNS
DATE 4/17/67 (206)
REV
PAGE 1 of 2Data Table FormatsSymbolic Name — LZSPSCNSProgrammer — W. HussTable Name — SPS Burn Mode III ConstantsInitialization of any Element Required — NoneDimensions

Blocks — 91
Words/Blocks — 1 (double word)
Total Words — 91

General Description and Usage

Five logical groups of constants are contained in this table:

1. Miscellaneous
2. $\Delta\theta$ coefficients posigrade burn
3. θ coefficients posigrade burn
4. $\Delta\theta$ coefficients retrograde burn
5. $\dot{\theta}$ coefficients retrograde burn

These constants are used by the SPS burn program (LCMSPSBN) during Hold Phase, to compute the amount of burn needed to achieve the Mode III Impact Point.

Approval	Approval
<i>H. C. Huss</i>	<i>W. E. Johnson</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1				D		} Miscellaneous constants
:				↓		
9						
10				D		} $\Delta \theta$ posigrade constants
:				↓		
39						
40				D		} $\dot{\theta}$ posigrade constants
:				↓		
69						
70				D		} $\Delta \theta$ retrograde constants
:				↓		
80						
81				D		} $\dot{\theta}$ retrograde constants
:				↓		
91						

Type
 F — Fixed point half word
 F — Fixed point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. LZSPSCNS
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Date Table Formats

Symbolic Name — LZSPSCNS

Programmer — W. Huss

Table Name — SPS Burn Mode III Constants

Initialization of any Element Required — None

Dimensions

Blocks — 80
Words/Blocks — 1 (double word)
Total Words — 80

General Description and Usage

Six logical groups of constants are contained in this table:

1. Miscellaneous Mode III
2. $\Delta \theta$ coefficients posigrade burn
3. θ coefficients posigrade burn
4. $\Delta \theta$ coefficients retrograde burn
5. θ coefficients retrograde burn
6. Miscellaneous 1B Area.

These constants are used by the secondary propulsion system (SPS) burn programs (LCMSPSBN, LCMSPSDV) during Hold Phase to compute the amount of burn needed to achieve the Mode III Impact Point.

Approval	Approval
<i>W. L. Huss</i>	<i>RH Williams</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1				D	hrs.	Time to free fall constant
2				D	rad.	Geocentric angle of no maneuver
3				D	rad.	Convergence criterion (Mode III)
4				D	rad.	$\Delta \theta$ criterion (Mode III)
5				D		} $\Delta \theta$ posigrade constants
⋮				↓		
30				↓		
31				D		} $\dot{\theta}$ posigrade constants
⋮				↓		
56				↓		
57				D		} $\Delta \theta$ retrograde constants
⋮				↓		
66				↓		
67				D		} $\dot{\theta}$ retrograde constants
⋮				↓		
76				↓		
77				D	rad.	Convergence criterion (1B target)
78				D	rad.	$\Delta \theta$ criterion (1B target)
79				D		Not used
80				D		Not used

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexidecimal

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Data Table Formats

Symbolic Name — LZXCNCMProgrammer — R. McCrelessTable Name — Launch Output Tasks Constants Data TableInitialization of any Element Required — Entire table must be assembled using Macro LKXCMSTR.DimensionsBlocks — 400
Words/Blocks — 2
Total Words — 800General Description and Usage

The Launch Output Task's Constants Data Table contains all the constants necessary for formatting the launch digitals, analogs, X-Y plotboards, and projection plotboards. It is read into the output task subpool area by the task initialization load module (LMXINITL) only at the time of the initialization queue.

Approval	Approval
R. O. McCreless	R. H. Williams



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
						Variable — Described in Macro writeup LKXCMSTR
						Note: Any differences between LM and CSM constants are handled by use of the ORG Macro to initialize these quantities during assembly of the data table.

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. LZXCNLEM
DATE 10/27/67 (EORP)
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Data Table Formats

Symbolic Name — LZXCNLEMProgrammer — R. McCrelessTable Name — Launch Output Tasks Constants Data TableInitialization of any Element Required — Entire table must be assembled using Macro LKXCMSTR.DimensionsBlocks — 400
Words/Blocks — 2
Total Words — 800General Description and Usage

The Launch Output Task's Constants Data Table contains all the constants necessary for formatting the launch digitals, analogs, X-Y plotboards, and projection plotboards. It is read into the output task subpool area by the task initialization load module (LMXINITL) only at the time of the initialization queue.

Approval	Approval
<i>R.O. McCreless</i>	<i>R.H. Williams</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
						Variable — Described in Macro writeup LKXCMSTR
						Note: Any differences between LM and CSM constants are handled by use of the ORG MACRO to initialize these quantities during assembly of the data table.

♦ **Type**

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. LZXCNSTS
DATE 6/23/67 (206)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — LZXCNSTSProgrammer — R. O. McCrelessTable Name — Launch Output Tasks Constants Data TableInitialization of any Element Required — Entire table must be assembled using Macro LKXCMSTR.Dimensions

Blocks — 350

Words/Blocks — 2

Total Words — 700

General Description and Usage

The Launch Output Task's Constants Data Table contains all the constants necessary for formatting the launch digitals, analogs, X-Y plotboards, and projection plotboards. It is read into the output task subpool area by the task initialization load module (LMXINITL) only at the time of the initialization queue.

Approval	Approval
<i>Richard O McCreless</i>	<i>FA Williams</i>



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7. LZXCNSTS

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	Variable	—				described in Macro writeup LKXCMSTR

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. LZXHSACN
DATE 6/22/67 (206)
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Data Table Formats

Symbolic Name — LZXHSACNProgrammer — E. PotterTable Name — High-Speed Abort Display ConstantsInitialization of any Element Required — YesDimensions

Blocks — 150

Words/Blocks — 1 double word

Total Words — 150 double words

General Description and Usage

LZXHSACN contains constants used by LMXHSDTV, the high-speed abort display module. This data table is initialized at phase change to high-speed abort.

Approval	Approval
C Potter 5/24/67	R.H. Williams



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
Refer to Macro writeup LKXHSCNS						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. LZXHSAPM
DATE 6/22/67 (206)
REV
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Data Table Formats

Symbolic Name — LZXHSAPMProgrammer — E. PotterTable Name — High-Speed Abort Parameter TableInitialization of any Element Required — NoneDimensions

Blocks — 55

Words/Blocks — 1 double word

Total Words — 55 double words

General Description and Usage

This data table is the means by which the quantities computed by the high-speed abort output task, LTXHSABT, are transferred to low-speed abort. LZXHSAPM contains quantities reflecting the vector transferred by the launch transfer table, and high-speed vectors from the launch input task. LZXHSAPM is updated on a six-second cycle during high-speed abort.

Approval	Approval
<i>E. Potter</i> 5/24/67	<i>R. A. Williams</i>



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7. LZXHSAPM

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
Variable — Refer to Macro writeup on LKXHSPAR						

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. LZXTVGEN
DATE 6/23/67 (206)
REV 10/27/67
PAGE 1 of 3

Data Table Formats

Symbolic Name — LZXTVGEN

Programmer — R. McCreless

Table Name — Launch and High-Speed Abort TV Generate Data Table

Initialization of any Element Required — All zeros

Dimensions

Blocks — 2

Words/Blocks — 5

Total Words — 10

General Description and Usage

The Launch and High-Speed Abort TV Generate Data Table is used to pass queues to the launch and high-speed abort displays. These queues indicate that the display has been requested, and that load module LMXTVGEN has initialized the display in the TV buffer. The data table is updated each time a launch or high-speed abort display is requested.

Approval	Approval
R.O. McCreless	R.H. Williams



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1	***	MOCR	***	Generate queue for FDO launch dig. #2
		2		X	NA	Generate queue for RFO launch dig.
		3		X	NA	Generate queue for FDO launch analog #1
		4		X	NA	Generate queue for FDO launch analog #2
	2	1		X	NA	Generate queue for RFO T_{ff} versus R_{ip}
		2		X	NA	Generate queue for gamma versus velocity, BS
		3		X	NA	Generate queue for gamma versus velocity, Raw
		4		X	NA	Generate queue for contingency insertion capability
	3	1		X	NA	Generate queue for FDO abort/entry digitals
		2		X	NA	Generate queue for RFO Mode I/II abort digitals
		3		X	NA	Generate queue for FDO abort/entry analog #1
		4		X	NA	Generate queue for Mode I/Mode II abort phases
	4	1		X	NA	Spare
		2		X	NA	Spare

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS
 7. LZXTVGEN
 DATE 6/23/67 (206)
 REV 10/27/67
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
2	5	3		X	NA	Spare
		4		X	NA	Spare
						Spares
		*** ADEG ***				
		Same image as block 1				

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. LZXTVGEN
DATE 10/27/67 (EORP)
REV
PAGE 1 of 3

Data Table Formats

Symbolic Name — LZXTVGENProgrammer — R. McCrelessTable Name — Launch and High-Speed Abort TV Generate Data TableInitialization of any Element Required — All zerosDimensions

Blocks — 2

Words/Blocks — 5

Total Words — 10

General Description and Usage

The Launch and High-Speed Abort TV Generate Data Table is used to pass queues to the launch and high-speed abort displays. These queues indicate that the display has been requested and that load module LMXTVGEN has initialized the display in the TV buffer. The data table is updated each time a launch or high-speed abort display is requested.

Approval	Approval
R.O.M. Creless	R.W. Williams



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	***MOCR***				
		1		X	NA	Generate queue for FDO abort/entry digitals (MSK 44)
		2		X	NA	Generate queue for RFO Mode I/II abort digitals (MSK 331)
		3		X	NA	OPEN-Left for FDO abort/entry analog #1 (MSK 42)
	2	4		X	NA	Generate queue for Tracking Data Select (MSK 1615)
		1		X	NA	Generate queue for Entry Interface Evaluation Display (MSK 338)
		2		X	NA	Generate queue for RFO T_{ff} versus R_{ip} (MSK 333)
		3		X	NA	Generate queue for FDO launch launch digital #2
	3	4		X	NA	Generate queue for Wedge Angle Monitor (MSK 288)
		1		X	NA	Generate queue for RFO launch digital (MSK 330)
		2		X	NA	Generate queue for FDO launch analog #1 (MSK 40)
		3		X	NA	Generate queue for FDO launch analog #2 (MSK 41)
	4	4		X	NA	Generate queue for contingency in- sertion capability (MSK 52)
		1		X	NA	Generate queue for gamma versus velocity, BS (MSK 1613)
		2		X	NA	Generate queue for gamma versus velocity, Raw (MSK 1614)
		3		X	NA	Generate queue for FDO launch analog #1 (MSK 39)

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. LZXTVGEN
DATE 10/27/67 (EORP)
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
2	5	4		X	NA	Generate queue for FDO launch analog #2 (MSK 68)
		1		X	NA	Generate queue for contingency insertion capability (MSK 67)
		2		X	NA	Generate queue for gamma versus velocity, BS (MSK 1626)
		3		X	NA	Generate queue for gamma versus velocity, Raw (MSK 1627)
		4		X	NA	SPARE
		ADEG				
	SAME IMAGE AS FOR MOCR					

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. PZCMLD
DATE 9/7/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — PZCMLDProgrammer — J. A. SteedTable Name — Maneuver Line DefinitionInitialization of any Element Required — NoneDimensionsBlocks — 1
Words/Blocks — 12
Total Words — 12General Description and Usage

The first four items are initialized by MED input. This information is used by PMMMIG to compute the maneuver line definition which is stored with the NAG in the table to be used by the DKI Rendezvous Program.

Approval	Approval
J. A. Steed	A. Amietti

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7. PZCMLD

DATE 9/7/67 (EORP)

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0-3		F	nu	Indicator
		4-7				Unused
	2			D	hrs.	Time or Δ time increment
	3			D	rad.	Argument of latitude
	4			D		NA number
	5			D	hrs.	Time of NA
	6			D	rad.	u (argument of latitude)
	7			D	rad.	$\dot{g}$ (rate of change of perigee)
	8			D	rad.	i (inclination angle)
	9			D	rad.	h (argument of asc. node)
	10			D	nu	NAG (NA for target vehicle)
	11			D		Spare
	12			D		Spare

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



Data Table Format

Symbolic Name - PZDMTLEMProgrammer - R. TaylorTable Name - Detailed Maneuver Table (LM)Initialization of any Element Required - Not applicableDimensions

Blocks - 1
Words/Blocks - 120 double words
Total Words - 120

General Description and Usage

This table is maintained by PMMDMT and PMDDMT, the detailed maneuver table math and display load modules. It is used for determining command loads for the on-board computer.

Approval	Approval
<i>R Taylor</i>	<i>J.E. James</i>

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 7. PZDMTLEM
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1, 2		H		Attitude mode option: 0 for no maneuvers requested 1 for inertial 8 for LM descent orbit injection guidance 9 for LM powered landing guidance 10 for LM ascent guidance
1	1	3, 4		H		Thruster code: 10 for LM DPS 11 for LM APS 12 for LM RCS#1(2 thrusters) 13 for LM RCS#1(4 thrusters) 14 for LM RCS#2(2 thrusters) 15 for LM RCS#2(4 thrusters)
1	2	1, 2		H		Termination code: 0 for terminate at end of maneuver
1	2	3, 8				Open for expansion
1	3	1-8		D	hr.	Time to begin maneuver(first phase)
1	4	1-8		D	hr.	Δt of ullage (= 0 for RCS)
1	5	1-8		D	hr.	Δt of maneuver [no pure ullage or tailoff (=0 if ΔV given)] (GMTCO-GMTBI)
1	6	1-8		D	Er/ hr	If = 0, ΔV not input to NI. If <0, it is ΔV desired along x-body axis excluding tailoff. If > 0, it is total ΔV desired.
1	7	1-8		D	rad.	Pitch ($0 \leq P \leq 2\pi$)
1	8	1-8		D	rad.	Yaw ($0 \leq Y \leq \pi/2$ or $3\pi/2 \leq Y \leq 2\pi$)
1	9	1-8		D	rad.	Roll ($0 \leq R < 2\pi$) Desired attitude of navigation base at GMTBI.

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	10	1-8		D	Er	X } Y } Xp Z } X } Y } Yp Z } X } Y } Zp Z } Inertial coordinates of the unit vector in the direction of the platform X-, Y- and Z-axes.
	11					
	12					
	13					
	14					
	15					
	16					
	17	↓		↓	↓	
1	18	1-8		D	Er	
1	19-30					Reserved for LM target parameters (See Appendix A for the format for the different cases.)
1	31-48					Open for expansion
1	49	1-8		D	lbs.	MDPS (fuel remaining for DPS thruster)
1	50	1-8		D	lbs.	MLEMD(dry wt. of LM descent stage)
1	51	1-8		D	hr.	t } X } Y } Z } X } Y } Z } R & V vectors at GMTBI
	52			D	Er	
	53			D	Er	
	54			D	Er	
	55			D	Er/hr	
	56			D	Er/hr	
	57			D	Er/hr	
	58			D	hr	t } X } Y } Z } X } Y } Z } R & V vectors after the maneuver at burnout. (includes tailoff)
	59			D	Er	
	60			D	Er	
	61			D	Er	
	62			D	Er/hr	
	63			D	Er/hr	
	64	1-8		D	Er/hr	
	65	1-8		D	Er/hr	ΔVman-total ΔV (includes ullage and tailoff)

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexidecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	66	1-8		D	Er/ hr	ΔV - along x-body axis (includes ullage; excludes tailoff)
	67			D	Er/ hr	ΔV_{xbt} - ΔV along x-body axis (includes ullage and tailoff)
	68			D	Er/ hr	ΔV_{to} - total tailoff ΔV . (after the
	69			D	lbs.	MAPS - APS fuel weight maneuver)
	70			D	Er/ hr	ΔV_{rem} (for specified thruster (after the maneuver) (after the
	71	1-8		D	lbs.	Mrcs - RCS fuel weight maneuver)
	72	1-8		D		Open for expansion
	73			D	lbs.	MLEMA - (dry wt. of LM ascent stage) (negative if due to weight change)
	74			D	hr.	ΔT_{BD} - (GMTCO - GMTBI)
	75			D	hr.	GMTBI - burn initiate time
	76			D	Er/ hr	V_{gx} } Coordinates of ΔV vector
	77			D	Er/ hr	V_{gy} } in the platform coordi-
	78	1-8		D	Er/ hr	V_{gz} } nate system. Computed at GMTBI.
	79	1-8		D	Er/ hr	V_F - Component of ΔV in the local horizon plane. (Perpendicular to the position vector and posi- tive in the direction of motion.)
	80	1-8		D	Er/ hr	V_D - Component of ΔV along the radius vector, positive toward Earth's center.
	81	1-8		D	Er/ hr	V_N - Component of ΔV along the angular momentum vector.
	82	1-8		D	rad	P_H Pitch } In the LVLH
	83	1-8		D	rad	Y_H Yaw } Coordinate System
	84	1-8		D	rad	R_H Roll }

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	85	1-8		D	rad	P_G } Initial pitch & yaw gimbal
	86	1-8		D	rad	Y_G } setting.
	87	1-8			Er	h_{BI} - Spherical alt. at burn initiate (GMTBI)
	88				rad	ϕ_{BI} - Geocentric lat. at burn initiate
	89				rad	λ_{BI} - Earth-fixed long. at burn initiate
	90				hr	GMTCO-GMT of cutoff (excludes tailoff)
	91				Er	h_a - Spherical alt. at first apogee after the maneuver.
	92				rad	ϕ_a - Apogee latitude (geocentric)
	93				rad	λ_a - Apogee longitude (Earth-fixed)
	94				hr	GMTa - Apogee time after maneuver
	95				Er	h_p - Spherical altitude at first perigee after the maneuver.
	96				rad	ϕ_p - Perigee latitude (geocentric)
	97				rad	λ_p - Perigee longitude (Earth-fixed)
	98				hr	GMTp - Perigee time after maneuver
	99				Er	a }
	100					e } Orbital elements after
	101				rad	i } the maneuver
	102	1-8		D	rad	λ_{AN} - Earth-fixed longitude of ascending node after maneuver
	103	1-8		D	rad	θ - Phase angle between rendezvous vehicles.
	104	1-8		D	rad/hr	$\dot{\theta}$ - Phase angle rate between rendezvous vehicle.
1	105	1-8		D	rad	δW - Wedge angle between vehicles
	106	1-4		E	min	Δt until daylight
	106	5-8		E	min	Δt until darkness

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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 7. PZDMTLEM (206)
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1 ↓ 1	107					Open for expansion Reference matrix name and ID for this maneuver.
	...					
	111					
	112	1-8				
	113					Open for expansion Maneuver purpose code Vehicle code 1=CSM, 2=LM, 3=S-IVB 0=normal, 1=undocking, 3=docked Δt_{to} - Tailoff Δt (total) Maneuver code
	...					
	114					
	115	1-4		F		
	115	5, 6		H		Reserved for Trajectory Determina- nation
	115	7, 8		H		
	116	1-8		D	hr	
	117					
	118					
	...					
	120					

 Type
 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

APPENDIX A

Following is a description of the contents of cells 19 through 30 of the descriptive maneuver block for each of the three types of LM guidance.



Detailed Contents

Descent Orbit Injection Guidance

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	19	1-8		D	Er	r_D - Desired radius vector magnitude 180 degrees forward from maneuver burn out Open for expansion
	20-30					
<u>Powered Landing Guidance</u>						
1	19	1-8		D		$\overline{CPT6}$ - unit vector normal
	20	1-8		D		to the plane of the target orbit.
	21	1-8		D		Given in RTCC Inertial Coordinate System
	22	1-8		D	Er/hr^2	$\overline{a_T}$ - thrust acceleration vector
	23	1-8		D	Er/hr^2	at maneuver initiation (in RTCC
	24	1-8		D	Er/hr^2	Inertial Coordinate System)
	25	1-8		D	hr	t_F - approximate maneuver end time
	26-30					Open for expansion
	31-33					$\overline{CPT6}$ unit vector in IMU Coordinate System
<u>Ascent Guidance</u>						
1	19	1-8		D	hrs	t_A - time of arrival at the target vector
	20	1-8		D	Er	} $r_{CSM}(t_A)$ - down-range target position vector (RTCC Inertial Coordinate System)
	21	1-8		D	Er	
	22	1-8		D	Er	
	23	1-8		D	Er	
	24-30					R_D - desired position vector magni- tude at maneuver burnout
	31-33					Open for expansion $r_{CSM}(t_A)$ (IMU Coordinate System)

Type

H - Fixed point half word
F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)
X - Hexadecimal

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7. PZEFDATA
DATE 4/17/67 (206)
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Data Table Formats

Symbolic Name — PZEFDATAProgrammer — C. R. ScottTable Name — Sun - Moon Ephemeris Generator OutputInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 50

Total Words — 50

General Description and Usage

Output data from load module PMMEPHEM are put onto PZEFDATA. Sun, Moon, and Earth positions, Earth and Moon velocities and the Moon's libration matrix for any given time may be obtained. All vectors are referenced to an inertial coordinate system defined at the beginning of the nearest Besselian year. The x-axis is along the ascending node of the mean ecliptic on the mean equator, the z-axis is along the mean pole, and the y-axis completes the right-handed set. Multiplication of selenocentric vector (referenced to the coordinate system of nearest beginning of Besselian year) by the Moon's libration matrix yields a true-of-date selenographic vector.

Approval	Approval
C. R. Scott	R. O. Sogard



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-6			D	Er	Cartesian geocentric Moon position or selenocentric Earth position
1	7-12			D	Er per hr.	Cartesian geocentric Moon velocity or selenocentric Earth velocity
1	13-14			D	hours	Delta time past base time
1	15-16			D	Er	Radius magnitude of words 1-6
1	17-18			D	Er ²	Radius magnitude of words 1-6 squared
1	19-20			D	Er ³	Radius magnitude of words 1-6 cubed
1	21-22			D	Er per hr.	Velocity magnitude of words 7-12
1	23-24			D	Er ² per hr. ²	Velocity magnitude of words 7-12 squared
1	25-26			D	Er ³ per hr. ³	Velocity magnitude of words 7-12 cubed
1	27-32			D	Er	Cartesian geocentric or selenocentric Sun position
1	33-50			D		Moon's 3 x 3 libration matrix for converting from selenocentric to selenographic coordinates

Type
 H — Fixed point half word
 F — Fixed point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal



Data Table Formats

Symbolic Name — PZEFEMProgrammer — C. R. Scott —Table Name — Sun - Moon Ephemeris Data TableInitialization of any Element Required — NoneDimensions

Blocks — 120

Words/Blocks — 38

Total Words — 3560

General Description and Usage

Each block of this table is equivalent to one record of tape #8317. The table is initialized by load module QMGEPH and used solely by load module PMMEPHEM. It contains 60 days of Sun and Moon ephemeris data in 12 hour intervals. The coordinate system for the ephemeris data is defined by the line of intersection of the mean equatorial plane and the mean ecliptic at the nearest beginning of the Besselian year. The X-axis is along the ascending node of the ecliptic on the equator, the Z-axis is along the mean pole, and the Y-axis completes a right-handed set. The beginning of the Besselian solar year is the instant when the right ascension of the mean Sun measured from the mean equinox is 18 hours, 14 minutes.

Approval	Approval
C. R. Scott	R. O. Sogard



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
All ↓	1			F	Years	Besselian year of coordinate system
	2			E	Hours	Hour (in ephemeris time and relative to year prior to Besselian year) corresponding to data in block
	3-4			D	Er	Geocentric X-coordinate of Sun pos.
	5-6					Geocentric Y-coordinate of Sun pos.
	7-8					Geocentric Z-coordinate of Sun pos.
	9-10					Geocentric X-coordinate of Moon pos.
	11-12					Geocentric Y-coordinate of Moon pos.
	13-14					Geocentric Z-coordinate of Moon pos.
	15-16				None	(1, 1) element of Moon's libration matrix
	17-18					(1, 2)
	19-20					(1, 3)
	21-22					(2, 1)
	23-24					(2, 2)
	25-26					(2, 3)
	27-28					(3, 1)
	29-30					(3, 2)
	31-32					(3, 3)
	33-34				Er per hr.	Geocentric $\dot{X}$ -coordinate of Moon velocity
	35-36				Er per hr.	Geocentric $\dot{Y}$ -coordinate of Moon velocity
	37-38				Er per hr.	Geocentric $\dot{Z}$ -coordinate of Moon velocity

Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



Data Table Formats

Symbolic Name — PZMPTCSM/PZMPTLEM

Programmer — R. Oliver

Table Name — CSM and LM Mission Plan Tables

Initialization of any Element Required — Yes

Dimensions —

Blocks — 16

Words/Blocks — 120 doublewords

Total Words — 1920 doublewords

General Description and Usage

These tables contain parameters associated with executed maneuvers and planned maneuvers for the CSM, LM, or S-IVB. These parameters are used in powered flight integration, in the generation of command loads, for display, and for other trajectory related tasks. The maneuvers described in PZMPTCSM are reflected in the current CSM orbit ephemeris, whereas those described in PZMPTLEM are reflected in the current LM orbit ephemeris.

Approval	Approval
<i>Robert E. Oliver</i>	<i>S. E. James</i>

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 7. PZMPTCSM
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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1	1, 2	H	-	Trajectory Update No. (-if in process)
1	1	3, 4	H	-	No. of maneuvers in table
1	1	5, 6	H	-	No. of words per block
1	1	7, 8	H	-	No. of allowable maneuvers (15 for EORP)
1	2	1-8	EBCDIC	-	Station ID of last DC update vector
1	3	1-8	D	hours	Anchor vector time (GMTAV)
1	4	1-8	D	-	K-factor (density mult. coeff.)
1	5-7				Open for expansion
1	8	1-8	D	hours	GMT of LM jettison of descent stage
1	9	1-8	D	hours	GMT of upcoming maneuver (10 ⁷⁰ if none)
1	10	1-8	D	hours	Anchor time for prelaunch maneuver processing
1	11	1-8	D	hours	GET to begin continuous venting on S-IVB
1	12	1-2	H	-	Initial configuration code: 0 - CSM 1 - LM 2 - CSM and LM 3 - CSM and S-IVB 4 - LM and S-IVB 5 - CSM, LM, S-IVB
1	12	3, 4			Launch vehicle configuration code
1	12	5-8			Open

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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Block	Word	Byte	Type*	Units	Description and Range
1	13	1-8	D	ft ²	Initial CSM cross sectional area
1	14	1-8	D	lbs.	Initial CSM total weight
1	15	1-8	D	ft ²	Initial S-IVB cross sectional area
1	16	1-8	D	lbs.	Initial S-IVB total weight
1	17	1-8	D	ft ²	Initial LM cross sectional area
1	18	1-8	D	lbs.	Initial LM total weight
1	19-20				Open for expansion
1	21				Docking angle
1	22-25				Open for expansion
1	26	1-2	H	-	Man. no. of last frozen man. in this table
1	26	3-4			Open for expansion
1	26	5-6			Open for expansion
1	26	7-8	H	-	Man. no. of last executed maneuver in this table
1	27	1-8	D	ft ²	Initial cross sectional area
1	28	1-8	D	lbs.	Initial vehicle weight
1	29	1-8	D	hours	Time to begin first maneuver
1	30	1-8	D	hour	Time to end first maneuver
1	31	1-8	D	ft ²	Area after first maneuver
1	32	1-8	D	lbs.	Weight after first maneuver
1	33-120				Words 29-32 are repeated in words 33-120 for each additional maneuver added to the table.

*Type

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D - Double-precision (floating-point)

X - Hexadecimal

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-16	1	1, 2	H		Attitude Code 1 - fixed inertial 2 - manual holding body orientation invariant 3 - Lambert Guidance* 4 - external ΔV (primary) 5 - external ΔV (LM AGS) } set negative if initial vehicle attitude is given
2-16	1	3, 4	H		Thruster Code: 1 - CSM RCS + X (2 thrusters) 2 - CSM RCS + X (4 thrusters) 3 - CSM RCS - X (2 thrusters) 4 - CSM RCS - X (4 thrusters) 16 - S-IVB Blowdown Vent 17 - LM RCS + X (2 thrusters) 18 - LM RCS + X (4 thrusters) 19 - LM RCS - X (2 thrusters) 20 - LM RCS - X (4 thrusters) 33 - CSM SPS 34 - LM APS 35 - LM DPS 36 - S-IVB Main Thrust
2-16	1	5, 6			Ullage Thruster Option: 0 for two thrusters +1 for four thrusters

*Type

H - Fixed-point half word

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E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-16	1	7, 8			Open for expansion
2-16	2	1, 2			Configuration code at maneuver initiation: 0 - CSM; 1 - LM; 2 - CSM & LM; 3 - CSM & S-IVB; 4 - LM & S-IVB; 5 - CSM, LM, & S-IVB
2-16	2	3-8			Open for expansion
2-16	3	1-8	D	hours	Time to begin maneuver (first phase)
2-16	4	1-8	D	hours	Δt of ullage (=0 for RCS)
2-16	5	1-8	D	hours	Δt of maneuver, no pure ullage or tailoff (=0 if ΔV given) (GMTCO minus GMTI)
2-16	6	1-8	D	Er/hr.	If =0, ΔV not input to NI; If <0, it is ΔV desired along X-body axis excluding tailoff; If >0, it is total ΔV desired
2-16	7-9	1-8	D		X } unit thrust vector at Y } $\hat{a}_T$ designated thruster ignition time in RTCC inertial coord. sys. Z }
2-16	10	1-8	D	Er	X } $\hat{X}_B$ RTCC inertial coordinates Y } of the unit vectors in the Z }
	11				X } direction of the vehicle Y } $\hat{Y}_B$ body X, Y, and Z-axes, Z }
	12				
	13				
	14				
	15				respectively.

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Block	Word	Byte	Type*	Units	Description and Range
2-16	16	1-8	D	Er	$\left. \begin{matrix} X \\ Y \\ Z \end{matrix} \right\} \hat{Z}_B$ Δt of 10% thrust level for DPS thruster, set negative if DPS short burn test is to be ignored.
	17				
	18				
	19			hours	
2-16	20	1-2	H		Maneuvering Vehicle Code: 1 - for CSM 2 - for S-IVB 3 - for LM
2-16	20	3-4	H		Thruster Trim Angle Indicator: -1 if angles to be computed +1 if sys. params. are to be used
2-16	20	5-8			Open for expansion
2-16	21	1-8	D		Docking angle
2-16	22-23				Open for expansion
2-16	24	1-8	D		$\left. \begin{matrix} V_X \\ V_Y \\ V_Z \end{matrix} \right\}$ External $\overline{\Delta V}$ in RTCC inertial coordinate system
2-16	25	1-8	D		
2-16	26	1-8	D		
2-16	27-43				Open for expansion
2-16	44	1, 2	H		Configuration Code at the end of this maneuver: 0 - CSM 1 - LM

*Type

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Block	Word	Byte	Type*	Units	Description and Range
2-16	44	1, 2	H		2 - CSM and LM 3 - CSM and S-IVB 4 - LM and S-IVB 5 - CSM, LM, S-IVB
2-16	44	3, 4	H		Configuration Change Indicator: 0 - no change from configuration at end of previous maneuver 1 - undocking (normal) 2 - docking (normal) 3 - separation of LM ASCENT from LM DESCENT
2-16	44	5, 6			Open for expansion
2-16	44	7, 8			Open for expansion
2-16	45	1-8	D	ft ²	CSM cross sectional area after this maneuver
	46	1-8	D	lbs.	CSM total weight after this maneuver
	47	1-8	D	ft ²	S-IVB cross sectional area after this maneuver
	48	1-8	D	lbs.	S-IVB total weight after this maneuver

 Set nega-
 tive if due
 to weight
 or area
 change
 MED

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Block	Word	Byte	Type*	Units	Description and Range
2-16	49	1-8	D	ft ²	LM cross sectional area after this maneuver
2-16	50	1-8	D	lbs.	LM total weight after this maneuver
2-16	51	1-8	D	hours	t } Set negative if due to weight or area change MED
	52			Er	X } $\bar{R}$ & $\bar{V}$ vectors
	53			Er	Y } at GMTI (in the
	54			Er	Z } RTCC Inertial
	55			Er/hr.	$\dot{X}$ } Coordinate
	56			Er/hr.	$\dot{Y}$ } System)
	57			Er/hr.	$\dot{Z}$ }
	58			hours	t } $\bar{R}$ & $\bar{V}$ vectors after the
	59			Er	X } maneuver at burnout.
	60			Er	Y } (includes tailoff) (In the
	61			Er	Z } RTCC Inertial Coordinate
	62			Er/hr.	$\dot{X}$ } System)
	63			Er/hr.	$\dot{Y}$ }
	64			Er/hr.	$\dot{Z}$ }
	65			Er/hr.	ΔV_{man} - total ΔV (incl. ullage & tailoff)
	66	1-8	D	Er/hr.	ΔV_c - along X-body axis (includes ullage; excludes tailoff)
	67	1-8	D	Er/hr.	ΔV_{xht} - ΔV along X-body axis (includes ullage and tailoff)

*Type

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Block	Word	Byte	Type*	Units	Description and Range
2-16 ↓	68	1-8	D	Er/hr.	ΔV_{to} - total tailoff ΔV
	69	1-8	D	hours	Δt_{to} - Δt of tailoff
	70	1-8	D	lbs.	Total configuration weight at GMTI
	71	1-8	D	Er/hr.	V_X } Components of primary external V_Y } ΔV in the command and display V_Z } coordinate system
	72	1-8	D	Er/hr.	
	73	1-8	D	Er/hr.	
	74	1-8	D	hours	Δt_{BD} - (GMTCO minus GMTI)
	75	1-8	D	hours	GMTI - ignition time for specific thruster
	76	1-8	D	hours	GMTCO - GMT of cutoff (excluding tailoff)
	77	1-8	D	hours	Impulsive Maneuver Time
	78	1-8	D	lbs.	Total configuration weight at maneuver initiation
	79	1-8	D	Er/hr.	V_F - Component of ΔV in the local horizon plane at ignition, perpendicular to the position vector and positive in the direction of motion
	80	1-8	D	Er/hr.	V_S - Component of ΔV along the negative of the angular momentum vector at ignition
	81	1-8	D	Er/hr.	V_D - Component of ΔV along the radius vector at ignition, positive toward the earth
	82	1-8	D	radians	P_H } Pitch, Yaw, and Roll, Y_H } respectively, in the LVLH R_H } coordinate system at GMTI
	83	1-8	D	radians	
	84	1-8	D	radians	

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Block	Word	Byte	Type*	Units	Description and Range
2-16 ↓	85	1-8	D	radians	P_G } Pitch & Yaw or Roll
	86	1-8	D	radians	Y_G or R_G } gimbal setting at GMTI
	87	1-8	D	Er	h_{BI} - Height above geodetic Earth at GMTI
	88	1-8	D	radians	Φ_{BI} - Geodetic latitude at GMTI
	89	1-8	D	radians	λ_{BI} - Earth fixed longitude at GMTI
	90	1-8	D	radians	f_{BI} - True anomaly at GMTI
	91			Er	h_a - Spherical altitude at first apo-gee after the maneuver
	92			radians	Φ_a - Apogee latitude (geocentric)
	93			radians	λ_a - Apogee longitude (Earth fixed)
	94			hours	GMT_a - Apogee time after maneuver
	95			Er	h_p - Spherical altitude at first peri-gee after the maneuver
	96			radians	Φ_p - Perigee latitude (geocentric)
	97			radians	λ_p - Perigee longitude (Earth fixed)
	98			hours	GMT_p - Perigee time after maneuver
	99				e - eccentricity of orbit after this maneuver
	100			radians	i - inclination of orbit after this maneuver
	101			hours	GMT_{AN} - GMT of next upcoming ascending node
	102			radians	λ_{AN} - Earth fixed longitude of next upcoming ascending node
	103	1-8			Open for expansion

*Type

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Block	Word	Byte	Type*	Units	Description and Range
2-16 ↓	104	1-8			Open for expansion
	105	1-8			Open for expansion
	106	1-4	E	hours	Δt until daylight
	106	5-8	E	hours	Δt until darkness
	107-113	1-8			Open for expansion
	114	1-8			Open for expansion
	115	1-8			Open for expansion
	116	1-8			Open for expansion
	117	1-8	EBCDIC		Maneuver Code:
		1			Mission Plan Table
		2			Maneuvering vehicle
		3			Thruster
		4			Mode
		5-6			Order
		7-8			Purpose
	118-120				Reserved for Trajectory Determination

*Type

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X — Hexadecimal

Data Table Formats

Symbolic Names — PZMPTLEM

Programmer — R. Gayle

Table Name — LM Mission Plan Table

Initialization of any Element Required — Yes

Dimensions —

Blocks — — 11
Words/Blocks — 120 doublewords
Total Words — 1320 doublewords

General Description and Usage

This table contains parameters associated with executed maneuvers and planned maneuvers for the LM. These parameters are used in powered flight integration, in the generation of command loads, for display, and for other trajectory related tasks. The maneuvers described in this table are reflected in the current LM ephemeris.

Approval	Approval
<i>R. Gayle</i>	<i>S. E. James</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1	1-2	H		Trajectory update no. (-if in process)
1	1	3, 4	H		No. of maneuvers in table
1	1	5, 6	H		No. of words per block
1	1	7, 8	H		No. of allowable maneuvers (10 for AS-206)
1	2	1-8	EBCDIC		Station ID of last DC update vector
1	3	1-8	D	hours	Anchor vector time (GMTAV)
1	4	1-8	D		K-factor (density mult. coeff.)
1	5	1-8	D	lbs.	M_{LEMA} - dry wt. of LM ascent stage
1	6	1-8	D	lbs.	Initial APS fuel weight
1	7	1-8	D	lbs.	Initial RCS fuel weight
1	8	1-8	D	hours	LM insertion time
1	9	1-8	D	hours	GMT of upcoming maneuver (10^{70} if none)
1	10	1-8	D	ft ²	Undocked vehicle area
1	11	1-8	D	hours	Time to end venting maneuver on S-IVB
1	12	1-2	H		Vehicle status indicator prior to first maneuver; 0=undocked, 3=docked
1	12	3-8	3H		DMT MED quantities
1	13	1-8	D	lbs.	M_{LEMD} - LM descent stage dry wt.
1	14	1-8	D	lbs.	M_{DPS} - initial DPS fuel weight
1	15-20				Open for expansion
1	21-25				Reserved for manual control

*Type

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	26	1-2	H		Man. No. of last frozen LM man.
1		3-4	H		Man. No. of last non-iterable LM man.
1		5-6	H		Man. No. of 1st iterable LM man.
1		7-8	H		Man. No. of last executed LM man.
1	27	1-8	D	ft ²	Initial cross sectional area.
1	28	1-8	D	lbs.	Initial vehicle weight
1	29	1-8	D	hours	Time to begin first maneuver
1	30	1-8	D	hours	Time to end first maneuver.
1	31	1-8	D	ft ²	Area after first maneuver
1	32	1-8	D	lbs.	Weight after first maneuver
1	33-120				Words 29-32 are repeated in words 33-120 for each additional maneuver added to the table.
2-11	1	1, 2	H		Attitude mode option: 1 for inertial 2 for manual holding body orientation invariant in inertial space 3 for manual line of sight to Earth's horizon 4 for Lambert Guidance 5 for external ΔV guidance 8 for LM descent orbit injection guidance 9 for LM powered landing guidance

*Type

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Block	Word	Byte	Type*	Units	Description and Range
2-11	1	3, 4	H		10 for LM ascent guidance Thruster code: 1 for CSM SPS 2 for CSM RCS+X(2 thruster's firing) 3 for CSM RCS+X(4 thruster's firing) 4 for CSM RCS-X(2 thruster's firing) 5 for CSM RCS-X(4 thruster's firing) 6 for CSM RCS+Y(2 thruster's firing) 7 for CSM RCS-Y(2 thruster's firing) 8 for CSM RCS+Z(2 thruster's firing) 9 for CSM RCS-Z(2 thruster's firing) 10 for LM DPS 11 for LM APS 12 for LM RCS#1(2 thruster's firing) 13 for LM RCS#1(4 thruster's firing) 14 for LM RCS#2(2 thruster's firing) 15 for LM RCS#2(4 thruster's firing) 16 for LM RCS#3 17 for LM RCS#4 18 for LM RCS#5 19 for LM RCS#6 20 for S-IVB main thruster 21 for S-IVB blowdown vent

*Type

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
					(This list of attitude mode and thruster codes includes all the codes believed to be necessary for 206 and EORP. Not all the associated internal program capability will exist for 206.)
2-11	1	5-8			Open
2-11	2	1, 2	H		Termination code: 0 for terminate at end of maneuver
2-11	2	3, 4	H		Maneuver Integrator Output Table option: always set +1 to indicate that the auxiliary output table is required
2-11	2	5, 6	H		Ullage thruster option: 0 for two thrusters +1 for four thrusters
2-11	2	7, 8	H		Open for expansion
2-11	3	1-8	D	hours	Time to begin maneuver (first phase)
2-11	4	1-8	D	hours	Δt of ullage (=0 for RCS)
2-11	5	1-8	D	hours	Δt of maneuver [no pure ullage or tailoff (=0 if ΔV given)] (GMTCO - GMTBI)
2	6	1-8	D	Er/hr.	If = 0, ΔV not input to NI. If < 0, it is ΔV desired along X-body axis excluding tailoff. If > 0, it is total ΔV desired.
2-11	7	1-8	D	radians	Pitch ($0 \leq P \leq 2\pi$)

*Type

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E - Single-precision (floating-point)

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X - Hexadecimal

Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-11	8	1-8	D	radians	Yaw ($0 \leq Y \leq \pi/2$ or $3\pi/2 \leq Y < 2\pi$)
2-11	9	1-8	D	radians	Roll ($0 \leq R < 2\pi$)
					Desired attitude of navigation base at GMTBI.
2-11	10	1-8	D	Er	X } $\hat{X}_P$ Y } Z } Inertial coordinates X } of the unit vector in Y } $\hat{Y}_P$ the direction of the Z } platform X, Y and X } Z-axes. Y } $\hat{Z}_P$ Z }
	11				
	12				
	13				
	14				
	15				
	16				
	17				
2-11	18	↓	↓	↓	
2-11	19-30				Reserved for LM target parameters
					See Appendix A for the format for each guidance mode
2-11	31-48				Open for expansion
2-11	49	1-8	D	lbs.	M_{DPS} (fuel remaining for DPS thruster)
2-11	50	1-8	D	lbs.	M_{LEMD} (dry wt. of LM descent stage)

*Type

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Block	Word	Byte	Type*	Units	Description and Range
2-11	51	1-8 ↓	D	hours	t
	52		D	Er	X
	53		D	Er	Y
	54		D	Er	Z
	55		D	Er/hr.	$\dot{X}$
	56		D	Er/hr.	$\dot{Y}$
	57		D	Er/hr.	$\dot{Z}$
	58		D	hours	t
	59		D	Er	X
	60		D	Er	Y
	61		D	Er	Z
	62		D	Er/hr.	$\dot{X}$
	63		D	Er/hr.	$\dot{Y}$
	64		D	Er/hr.	$\dot{Z}$
	65		D	Er/hr	$\Delta V_{\text{man-total}} \Delta V$ (includes ullage and tailoff)
	66		D	Er/hr.	ΔV_c - along X-body axis (includes ullage; excludes tailoff)
	67		D	Er/hr.	ΔV_{xbt} - ΔV along X-body axis (includes ullage and tailoff)
	68		D	Er/hr.	ΔV_{to} - total tailoff ΔV . (after the
	69		D	lbs.	M_{APS} - APS fuel weight maneuver)
	70		D	Er/hr.	ΔV_{rem} (for specified thruster after the maneuver)
	71		D	lbs.	M_{rcs} - RCS fuel weight (after the maneuver)

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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Block	Word	Byte	Type*	Units	Description and Range
2-11 ↓	72	1-8	D		Open for expansion
	73		D	lbs.	M_{LEMA} - dry wt. of LM ascent stage (negative if due to weight change)
	74		D	hours	ΔT_{BD} - (GMTCO - GMTBI)
	75		D	hours	GMTBI-ignition time for designated thruster
	76		D	Er/hr.	V_{gx} } Coordinates of ΔV vector in V_{gy} } the platform coordinate V_{gz} } system. Computed at GMTBI.
	77	↓	D	Er/hr.	
	78	1-8	D	Er/hr.	
	79	1-8	D	Er/hr.	V_F - Component of ΔV in the local horizon plane. (Perpendicular to the position vector and positive in the direction of motion.)
	80	1-8	D	Er/hr.	V_D - Component of ΔV along the radius vector, positive toward Earth's center.
	81	1-8	D	Er/hr.	V_N - Component of ΔV along the angular momentum vector.
	82	1-8	D	radians	P_H Pitch } In the LVLH Y_H Yaw } Coordinate System R_H Roll }
	83	1-8	D	radians	
	84	1-8	D	radians	

*Type

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-11 ↓	85	1-8	D	radians	P_G } Initial pitch and yaw gimbal
	86	1-8	D	radians	Y_G } setting.
	87	1-8		Er	h_{BI} - Spherical alt. at burn initiate (GMTBI)
	88			radians	ϕ_{BI} - Geocentric lat. at burn initiate
	89			radians	λ_{BI} - Earth fixed long. at burn initiate
	90			hours	GMTCO - GMT of cutoff (excludes tailoff)
	91			Er	h_a - Spherical alt. at first apogee after the maneuver
	92			radians	ϕ_a - Apogee latitude (geocentric)
	93			radians	λ_a - Apogee longitude (Earth fixed)
	94			hours	GMTa - Apogee time after maneuver
	95			Er	h_p - Spherical altitude at first perigee after the maneuver
	96			radians	ϕ_p - Perigee latitude (geocentric)
	97			radians	λ_p - Perigee longitude (Earth fixed)
	98			hours	GMT _p - Perigee time after maneuver
	99			Er	a } e } orbital elements after the i } maneuver
	100				
	101	▼	▼	radians	
	102	1-8	D	radians	λ_{AN} - Earth fixed longitude of ascending node after maneuver
	103	1-8	D	radians	θ - phase angle between rendezvous vehicles

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-11	104	1-8	D	rad/hr	$\dot{\theta}$ - phase angle rate between rendezvous vehicle
	105	1-8	D	radians	δW - Wedge angle between vehicles
	106	1-4	E	min	Δt until daylight
	106	5-8	E	min	Δt until darkness
	107-111				Open for expansion
	112	1-8			Reference matrix name and ID for this maneuver
	113-114				Open for expansion
	115	1-4	F		Maneuver purpose code
	115	5, 6	H		Vehicle code: 1=CSM, 3=LM, 2=S-IVB
	115	7, 8	H		0=normal, 1=undocking, 2=docking, 3=docked
2-11	116	1-8	D	hours	Δt_{to} = tailoff Δt (total)
	117	1-8	EBCDIC		Maneuver Purpose Code
		1	EBCDIC		Blank
		2	EBCDIC		Vehicle (L = LM)
		3	EBCDIC		Thruster (A=APS, D=DPS, R=RCS)
		4	EBCDIC		Attitude Mode: A=Ascent guidance D=Descent orbit injection guidance L=Powered landing guidance I=Inertial
		5-6	EBCDIC		Order (Sequence Number)
		7-8	EBCDIC		Purpose

*Type

H — Fixed-point half word

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D — Double-precision (floating-point)

X — Hexadecimal



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
2-11	118-120				PC - Plane Change CR - Circularization HA - Height at apogee HP - Height at perigee HO - Height adjust 180° from maneuver point NS - Nodal Shift HB - Change height at both apogee and perigee NH - Nodal shift and height change AH - Apsidal shift and height adj. FC - Manual input of maneuver execution parameters Reserved for Trajectory Determination

*Type

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APPENDIX A

Following is a description of the contents of cells 19 through 30 of the descriptive maneuver block for each of the three types of LM guidance.

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POWERED LANDING GUIDANCE

Block	Word	Byte	Type*	Units	Description and Range
2	19	1-8	D	-	$\overline{CPT6}$ = unit vector normal to the plane of the target orbit. Given in RTCC inertial coordinate system
	20	1-8	D	-	
	21	1-8	D	-	
	22	1-8	D	Er/hr ²	$\overline{a_T}$ = thrust acceleration vector at maneuver initiation (in RTCC inertial coordinate system)
	23	1-8	D	Er/hr ²	
	24	1-8	D	Er/hr ²	
	25	1-8	D	hour	t_F = approximate maneuver end time
	26-30				Open for expansion
	31	1-8	D	-	} $\overline{CPT6}$ = unit vector to the plane of the target orbit in LM IMU Coordinate System
	32	1-8	D	-	
	33	1-8	D	-	

*Type
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 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal



Detailed Contents

DESCENT ORBIT INJECTION GUIDANCE

Block	Word	Byte	Type*	Units	Description and Range
2	19 20-30	1-8	D	Er	r_D = desired radius vector magnitude 180 degrees foreward from maneuver burn out Open for expansion

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexidecimal

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Detailed Contents

ASCENT GUIDANCE

Block	Word	Byte	Type*	Units	Description and Range
2	19	1-8	D	hours	t_A = time of arrival at the target vector
	20	1-8	D	Er	} $\bar{r}_{CSM}(t_A)$ = down range target position vector (In RTCC inertial coordinate system)
	21	1-8	D	Er	
	22	1-8	D	Er	
	23	1-8	D	Er	R_D = desired position vector magnitude at maneuver burn out
	24-30				Open for expansion
	31	1-8	D	Er	} $\bar{r}_{CSM}(t_A)$ in LM IMU Coordinate System
	32	1-8	D	Er	
	33	1-8	D	Er	

*Type

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D — Double-precision (floating-point)

X — Hexadecimal

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7. PZPADDIS

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Data Table Formats

Symbolic Name — PZPADDISProgrammer — C. PeabodyTable Name — Perigee AdjustInitialization of any Element Required — NADimensions

Blocks — 1

Words/Blocks — 50 double words

Total Words — 50 double words

General Description and Usage

PMDPAD will be attached from the display supervisor. Information for six maneuvers to raise perigee to the requested value will be displayed. This information is in the PZPADDIS table.

Approval	Approval
C. Peabody	A. Arnett

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7. PZPADDIS

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	1			D		Solution Indicator
	2			D	hrs.	Time of Elements
	3			D	hrs.	Thresh Time
	4			D	hrs.	Time Step
	5			D	Er.	Apogee Height
	6			D	Er.	Perigee Height
	7			D		Not Used
	8			D	rad.	Pitch at Ignition
	9			D	hrs.	Burn Time
	10			D	Er/hr.	Velocity Increment
	11			D	hrs.	Burn Duration
	12			D	rad.	True Anomaly
	13			D	Er.	Height Above Earth
	14			D	Er.	Height of Resultant Apogee
	15-21			D		Same as Words 8-14 (for 2nd Maneuver)
	22-28			D		Same as Words 8-14 (for 3rd Maneuver)
	29-35			D		Same as Words 8-14 (for 4th Maneuver)
	36-42			D		Same as Words 8-14 (for 5th Maneuver)
	43-49			D		Same as Words 8-14 (for 6th Maneuver)
	50			D		Not Used

*Type

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X — Hexadecimal

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DATE 11/22/67 (EORP)
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Data Table Formats

Symbolic Name — PZSLVCONProgrammer — T. CopperTable Name — Saturn Launch Vehicle (SLV) Targeting ConstantsInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 20 double words

Total Words — 20 double words

General Description and Usage

This table of constants is used in computing the SLV targeting parameter.

Approval	Approval
<i>T. Copper</i>	<i>A. Anietti</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	hrs.	BIAS - Time bias to add to GMTLO*
	2	9-16		D	rad.	Δ DN - Amount the target descending node is biased
	3	17-24		D	rad/hr.	$\dot{\Delta\theta}$ - Differential nodal regression rate
	4	25-32		D	CUL	RP - Radius at perigee
	5	33-40		D	CUL	Δ R - Bias to add to RP to get R_{IGM}
	6	41-48		D	rad.	γ_{IGM} - Insertion flight-path angle
	7	49-56		D	rad.	PFA - Powered flight angle
	8	57-64		D	hrs.	TPE - Time of powered flight
	9	65-72		D	rad.	YSMAX - Amount of wedge angle to be steered out
	10	73-80		D	hrs.	Δ TSRR - Time to sub. from GMTLOR
	11	81-88		D	Earth radii/hr.	ΔV_{CO} - Velocity to be sub. from V_{IGM} to get V_{CO}
	12	89-96		D	rad.	I_{NOM} - Nominal inclination angle
	13	97-104		D	rad.	Aerospace constants
	14	105-112		D		
	15	113-120		D		
	16	121-128		D		
	17	129-136		D		Spare
	18	137-144		D		Spare
	19	145-152		D		Spare
	20	153-160		D		Spare

*Type

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D - Double-precision (floating-point)

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7. PZSLVTAR
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Data Table Formats

Symbolic Name — PZSLVTARProgrammer — T. CopperTable Name — Saturn Launch Vehicle (SLV) Targeting Parameters TableInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 25 double words
Total Words — 25 double words

General Description and Usage

The table is used by PMMPAR, which stores the SLV targeting parameters during prelaunch II for displaying by PMDTAR.

Approval	Approval
<i>T. Copper</i>	<i>A. Amicetti</i>

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7. PZSLVTAR

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	hrs.	GMTLOR - GMT of recommended lift-off time
	2	9-16		D	hrs.	GETLOR - GET of recommended lift-off time
	3	17-24		D	hrs.	GMTLO - GMT of planned lift-off time
	4	25-32		D	hrs.	GETLO - GET of planned lift-off time
	5	33-40		D	hrs.	TGRR - Predicted time of guidance reference release
	6	41-48		D	hrs.	TW - Difference between GMTLOR and GMTLOS
	7	49-56		D	deg	AZL - Flight azimuth for insertion
	8	57-64		D	ft/sec	V _{IGM} - Insertion velocity
	9	65-72		D	n.miles	H - Planned insertion altitude
	10	73-80		D	deg.	XR - Launch vehicle roll gimble angle error
	11	81-88		D	ft/sec.	VCO - Inertial cut-off velocity
	12	89-96		D	n.miles	ΔH - Height to target
	13	97-104		D	deg.	AZP - Flight azimuth (no yaw steering)
	14	105-112		D	ft.	R _{IGM} - Radius vector magnitude
	15	113-120		D	deg.	ML - Maneuver line position
	16	121-128		D	deg.	Y - Magnitude of wedge angle

*Type

H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	17	129-136		D	deg	Y_{IGM} - Inertial flight-path angle
	18	137-144		D	deg	HE - Ascending node
	19	145-152		D	deg	I_{IGM} - Inclination angle
	20	153-160		D	deg	θ_{IGM} - Nodal parameters
	21	161-168		D	deg/sec	$\dot{\theta}_{IGM}$ - Regression rate of target orbit
	22	169-176		D	EBIDIC	Station ID of target orbit
	23	177-184		D		Spare
	24	185-192		D		Spare
	25	193-200		D		Spare

*Type

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7. RZAREH

DATE 7/12/67 (206)

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Data Table Formats

Symbolic Name — RZAREHProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (18-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 12

Total Words — 12

General Description and Usage

RZAREH describes ephemeris stored in Data Table RZARET updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
Thomas E. Roberts	Robert H. Hillington



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	cs.	Time Left of Ephemeris
	2	1-4		F	cs.	Time Right of Ephemeris
	3	1-4		F	cs.	ΔT of Ephemeris
	4	1-2		H		Update Number
	4	3	1	X		Reserved
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time Left of Ephemeris
	7	1-8		D	hrs.	Time Right of Ephemeris
	8	1-8		D	hrs.	ΔT of Ephemeris

*Type

H - Fixed-point half word

F - Fixed-point full word

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X - Hexadecimal



Data Table Formats

Symbolic Name — RZAREHProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (18-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks	—	1
Words/Blocks	—	12
Total Words	—	12

General Description and Usage

RZAREH described ephemeris stored in Data Table RZARET updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
J. E. Roberts	Robert T. Shillington

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7. RZAREH
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	centisec.	Time left of ephemeris
	2	1-4		F	centisec.	Time right of ephemeris
	3	1-4		F	centisec.	ΔT of ephemeris
	4	1-2		H		Update number
	4	3	1	X		Reserved
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time left of ephemeris
	7	1-8		D	hrs.	Time right of ephemeris
	8	1-8		D	hrs.	ΔT of ephemeris

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. RZARET
DATE 7/12/67 (206)
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Data Table Format

Symbolic Name — RZARET

Programmer — T. Roberts

Table Name — Reentry/Abort Ephemeris (18-second) Data

Initialization of any Element Required — None

Dimensions

Blocks — 301
Words/Blocks — 12
Total Words — 3612

General Description and Usage

; RZARET contains ephemeris data (X, Y, Z, $\dot{X}$, $\dot{Y}$, $\dot{Z}$). Updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
<i>Thomas E. Roberts</i>	<i>Robert H. Stellingman</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er.	X Position Component
	3	1-8		D	Er.	Y Position Component
	5	1-8		D	Er.	Z Position Component
	7	1-8		D	Er./hr.	X Velocity Component
	9	1-8		D	Er./hr.	Y Velocity Component
	11	1-8		D	Er./hr.	Z Velocity Component
2-301						Identical to Block 1

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZARET

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Data Table Formats

Symbolic Name — RZARETProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (18-second) DataInitialization of any Element Required — NoneDimensions

Blocks — 301

Words/Blocks — 12

Total Words — 3612

General Description and Usage

RZARET contains ephemeris data (X, Y, Z, $\dot{X}$, $\dot{Y}$, $\dot{Z}$), and is updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
T. E. Roberts	Robert H. Shillinglaw

IBM RTCC APOLLO PROGRAMMING SYSTEMS

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 7. RZARET
 DATE 8/30/67 (EORP)
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 PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er	X-position component
	3	1-8		D	Er	Y-position component
	5	1-8		D	Er	Z-position component
	7	1-8		D	Er/hr.	X-velocity component
	9	1-8		D	Er/hr.	Y-velocity component
	11	1-8		D	Er/hr.	Z-velocity component
2-301						Identical to Block 1

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. RZDBMP

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Data Table Format

Symbolic Name — RZDBMPProgrammer — J. CaryTable Name — Retrofire Digitals Data TableInitialization of any Element Required — NADimensions

Blocks — 155
Bytes/Block — 8
Total Bytes — 1240

General Description and Usage

RZDBMP contains time to fire data. The data is displayed by Retrofire Digitals Display (RMDDDBMP), Retrofire External Delta V Digital Display (RMDRV DV), and Entry Interface Evaluation Analog Display (RMDEID). The data is generated and stored by RMSDBMP and RMSTFF.

Blocks 1-55 contain the primary data. Blocks 56-100 contain the contingency data in the same format as the primary data blocks 1-45. The data in blocks 46-55 is not required for the contingency data. Blocks 101-155 contain the manual data in the same format as the primary data blocks 1-55.

Approval	Approval
<i>J. Cary</i>	<i>Robert L. Phillips</i>

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 7. RZDBMP
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Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0-1		H		Indicator 0 = good data +1 = no data -1 = bad data
	2	2-3		H		Ullage quad (2 of 4)
		0-3		X	EBCDIC	Burn code
2		0-5		X	EBCDIC	Area (rev-zone)
3		0-5		X	EBCDIC	Refsmat matrix ID
4		0-7		D	lbs.	CSM weight at retrofire
5		0-7		D	deg.	True anomaly at retrofire
6		0-7		D	deg.	Roll local horizontal attitudes
7		0-7		D	deg.	Pitch local horizontal attitudes
8		0-7		D	deg.	Yaw local horizontal attitudes
9		0-7		D	deg.	Roll o IMU attitudes
10		0-7		D	deg.	Pitch i IMU attitudes
11		0-7		D	deg.	Yaw m IMU attitudes
12		0-7		D	FPS	Velocity counter - tailoff
13		0-7		D	STU	Burn time
14		0-7		D	FPS	Total velocity + tailoff
15		0-7		D	STU	Delta T of ullage
16		0-7		D	STU	GMTI
17		0-7		D	STU	GETI
18		0-7		D	STU	RET 400k (elapsed time from GETI to 400k)
19		0-7		D	FPS	Velocity 400k
20		0-7		D	deg.	Gamma 400k
21		0-7		D	deg.	Bank angle
22		0-7		D	STU	RETRB (elapsed time from GETI to reverse bank)
23		0-7		D	deg.	ϕ ML
24		0-7		D	deg.	λ ML
25		0-7		D	deg.	ϕ T
26		0-7		D	deg.	λ T
27		0-7		D	deg.	ϕ IP
28		0-7		D	deg.	λ IP

* Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal



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7. RZDBMP

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
29		0-7		D	deg.	ϕ ZL
30		0-7		D	deg.	λ ZL
31		0-7		D	nm	$\Delta\phi$ miss distance
32		0-7		D	nm	$\Delta\lambda$ miss distance
33		0-7		D	nm	Height at retrofire above the oblate Earth
34		0-1		H		Ballistic Indicator
		2-3		H		Rev. number of impact
		4-7		F		**Open**
35		0-7		D	rad.	Pitch engine, trim angle
36		0-7		D	rad.	Yaw engine trim angle
37-45				9D		Refsmat
46		0-7		D	FPS	ΔV Tail off
47		0-7		D	STU	ΔT Tail off
48		0-7		D	FPS	VGX (X Δ X)
49		0-7		D	FPS	VGX (X Δ X)
50		0-7		D	FPS	VGZ (X Δ X)
51		0-7		D	FPS	VGX (THR)
52		0-7		D	FPS	VGX (THR)
53		0-7		D	FPS	VGZ (THR)
54		0-7		D	nm	Height of apogee
55		0-7		D	nm	Height of perigee
56-100						Contingency data
101-155						Manual data

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZDBSC

DATE 7/31/67 (EORP)

REV

PAGE 1 of 2

Symbolic Name — RZDBSCProgrammer — J. CaryTable Name — Spacecraft Retrofire Setting Data TableInitialization of any Element Required — NADimensions

Blocks — 25

Bytes/Blocks — 8

Total Bytes — 400

General Description and Usage

RZDBSC contains the spacecraft retrofire setting data. The data is stored by RMSSCS and is displayed by RMDDDBMP.

Approval	Approval
<i>J. Cary</i>	<i>Robert T. Shilligaw</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0-1		H		Indicator 0 = good data +1 = no data -1 = bad data
		2-3		H		Entry mode (codes 1-9)
	2	0-3		X	EBCDIC	Burn mode
2		0-5		X	EBCDIC	Area (rev-zone)
3		0-5		X	EBCDIC	Refsmat matrix ID
4		0-7		D	STU	GETI
5		0-7		D	FPS	Total velocity + tailoff
6		0-7		D	DEG	ϕT
7		0-7		D	DEG	λT
8		0-7		D	STU	Burn time
9		0-7		D	DEG	Bank angle
10		0-7		D	STU	RETRB (elapsed time from GETI to reverse bank)
11		0-7		D	DEG	IMU attitudes Roll
12		0-7		D	DEG	IMU attitudes Pitch
13		0-7		D	DEG	IMU attitudes Yaw
14		0-7		D	DEG	Local horizontal attitudes Roll
15		0-7		D	DEG	Local horizontal attitudes Pitch
16		0-7		D	DEG	Local horizontal attitudes Yaw
17-25		0-7		9D		Refsmat

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZDEAD
DATE 8/3/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — RZDEADProgrammer — T. J. BrzozowskiTable Name — Entry/Low-Speed Abort Present Position DataInitialization of any Element Required — NoDimensions

Blocks — 2

Words/Block — 20 full words

Total Words — 40 full words

General Description and Usage

This table is loaded by RMSDEAD, the Entry/Low-speed Abort Display Supervisor, during time cycle updates. It will contain the present position quantities required to update the X-Y and projection plotboards and the reentry D/TV displays; it will also contain the present position and velocity vectors used to compute these quantities.

Approval	Approval
<i>T. J. Brzozowski</i>	<i>Robert T. Shilling</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2			D	hrs.	Time of present position quantities
	3-4			D	rad.	Geodetic latitude ($-\pi/2 \leq \text{lat} \leq \pi/2$)
	5-6			D	rad.	Geodetic longitude ($0 \leq \text{long} \leq 2\pi$)
	7-8			D	Er	Height above an oblate Earth
	9-10			D	Er/hr.	Earth relative velocity
	11-12			D	hrs.	Time to free fall
	13-14			D	Er/hr.	Arc range to impact
	15-16			D	rad.	Flight-path angle
	17-18					Spare
	19-20					Spare
	1-6			3D	Er	Present position vector
	7-12			3D	Er/hr.	Present velocity vectors
	13-20					Spares

Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. RZDFEH

DATE 7/12/67 (206)

REV

PAGE 1 of 2

Data Table Formats

Symbolic Name — RZDFEHProgrammer — T. RobertsTable Name — Reentry/Abort (2-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 12
Total Words — 12

General Description and Usage

RZDFEH describes ephemeris stored in Data Table RZDFEM updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert H. Schillig</i>

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7. RZDFEH

DATE 7/12/67 (206

REV

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	cs.	Time Left of Ephemeris
	2	1-4		F	cs.	Time Right of Ephemeris
	3	1-4		F	cs.	ΔT of Ephemeris
	4	1-2		H		Update Number
	4	3		X		Reserved
	4	4	1	X		Error Flag Update in Process
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time Left of Ephemeris
	7	1-8		D	hrs.	Time Right of Ephemeris
	8	1-8		D	hrs.	ΔT of Ephemeris

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. RZDFEH
DATE 8/30/67 (EORP)
REV
PAGE 1 of 2

Data Table Formats

Symbolic Name — RZDFEHProgrammer — T. RobertsTable Name — Reentry/Abort (2-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 12

Total Words — 12

General Description and Usage

RZDFEH describes ephemeris stored in Data Table RZDFEM updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert A. Shilling</i>

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7. RZDFEH
DATE 8/30/67 (EORP)
REV
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	centisec.	Time left of ephemeris
	2	1-4		F	centisec.	Time right of ephemeris
	3	1-4		F	centisec.	ΔT of ephemeris
	4	1-2		H		Update number
	4	3		X		Reserved
	4	4	1	X		Error flag update in process
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time left of ephemeris
	7	1-8		D	hrs.	Time right of ephemeris
	8	1-8		D	hrs.	ΔT of ephemeris

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

Data Table Formats

Symbolic Name — RZDFEM

Programmer — T. Roberts

Table Name — Reentry/Abort Ephemeris (2-second) Data

Initialization of any Element Required — None

Dimensions

Blocks — 301
Words/Blocks — 12
Total Words — 3612

General Description and Usage

RZDFEM contains ephemeris data (X , Y , Z , $\dot{X}$, $\dot{Y}$, $\dot{Z}$) updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert T. Shultz</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er.	X Position Component
	3	1-8		D	Er.	Y Position Component
	5	1-8		D	Er.	Z Position Component
	7	1-8		D	Er./hr.	X Velocity Component
	9	1-8		D	Er./hr.	Y Velocity Component
	11	1-8		D	Er./hr.	Z Velocity Component
2-301						Identical to Block 1

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZDFEM

DATE 8/30/67 (EORP)

REV

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Data Table Formats

Symbolic Name — RZDFEMProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (2-second) DataInitialization of any Element Required — NoneDimensions

Blocks — 301

Words/Blocks — 12

Total Words — 3612

General Description and Usage

RZDFEM contains ephemeris data (X, Y, Z, $\dot{X}$, $\dot{Y}$, $\dot{Z}$) updated by Load Module RMGEPH with data provided by Task RTASPECT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert T. Shillington</i>

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 7. RZDFEM
 DATE 8/30/67 (EORP)
 REV.
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er	X-position component
	3	1-8		D	Er	Y-position component
	5	1-8		D	Er	Z-position component
	7	1-8		D	Er/hr.	X-velocity component
	9	1-8		D	Er/hr.	Y-velocity component
	11	1-8		D	Er/hr.	Z-velocity component
2-301						Identical to Block 1

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

Data Table Formats

Symbolic Name — RZETAB

Programmer — T. Roberts

Table Name — Reentry/Abort Ephemeris (12-second) Data

Initialization of any Element Required — None

Dimensions

Blocks — 301
Words/Blocks — 12
Total Words — 3612

General Description and Usage

RZETAB contains ephemeris data (X , Y , Z , $\dot{X}$, $\dot{Y}$, $\dot{Z}$). Updated by load module RMGEPH with data provided by Task LTXHSABT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert H. Shilling</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er.	X Position Component
	3	1-8		D	Er.	Y Position Component
	5	1-8		D	Er.	Z Position Component
	7	1-8		D	Er./hr.	X Velocity Component
	9	1-8		D	Er./hr.	Y Velocity Component
	11	1-8		D	Er./hr.	Z Velocity Component
2-301						Identical to Block 1

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZETAB

DATE 8/30/67 (EORP)

REV

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Data Table FormatsSymbolic Name — RZETABProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (12-second) DataInitialization of any Element Required — NoneDimensions

Blocks — 301

Words/Blocks — 12

Total Words — 3612

General Description and Usage

RZETAB contains ephemeris data (X , Y , Z , $\dot{X}$, $\dot{Y}$, $\dot{Z}$) and is updated by load module RMGEPH with data provided by Task LTXHSABT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert T. Phillips</i>

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7. RZETAB

DATE 8/30/67 (EORP)

REV.

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-8		D	Er	X-position component
	3	1-8		D	Er	Y-position component
	5	1-8		D	Er	Z-position component
	7	1-8		D	Er/hr.	X-velocity component
	9	1-8		D	Er/hr.	Y-velocity component
	11	1-8		D	Er/hr.	Z-velocity component
2-301						Identical to Block 1

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZHTAR
DATE 7/12/67 (206)
REV
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Data Table Formats

Symbolic Name — RZHTABProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (12-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks — 1
Words/Blocks — 12
Total Words — 12

General Description and Usage

This data table describes the ephemeris stored in Data Table RZETAB updated by Load Module RMGEPH with data provided by Task LTXHSABT.

Approval	Approval
<i>T. E. Roberts</i>	<i>Robert H. Shillinglaw</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	cs.	Time Left of Ephemeris
	2	1-4		F	cs.	Time Right of Ephemeris
	3	1-4		F	cs.	ΔT of Ephemeris
	4	1-2		H		Update Number
	4	3		X		Reserved
	4	4	1	X		Error Flag, Update or Progress
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time Left of Ephemeris
	7	1-8		D	hrs.	Time Right of Ephemeris
	8	1-8		D	hrs.	ΔT of Ephemeris

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZHTAB
DATE 8/30/67 (EORP)
REV
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Data Table Formats

Symbolic Name — RZHTABProgrammer — T. RobertsTable Name — Reentry/Abort Ephemeris (12-second) HeaderInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 12

Total Words — 12

General Description and Usage

This data table describes the ephemeris stored in Data Table RZETAB updated by Load Module RMGEPH with data provided by Task LTXHSABT.

Approval	Approval
<i>T. S. Roberts</i>	<i>Robert F. Shillington</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-4		F	centisec.	Time left of ephemeris
	2	1-4		F	centisec.	Time right of ephemeris
	3	1-4		F	centisec.	ΔT of ephemeris
	4	1-2		H		Update number
	4	3		X		Reserved
	4	4	1	X		Error flag, update or progress
	4	4	2-8	X		Reserved
	5	1-8		D		Reserved
	6	1-8		D	hrs.	Time left of ephemeris
	7	1-8		D	hrs.	Time right of ephemeris
	8	1-8		D	hrs.	ΔT of ephemeris

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

Data Table Format

Symbolic Name — RZLMED

Programmer — J. Cary

Table Input — Input From L00 and L01 MED

Initialization of any Element Required — No

Dimensions

Blocks — 3
Words/Blocks — 30
Total Words — 90

General Description and Usage

The time-to-fire parameters are entered via L00 and L01 MED to be used by RMSDBMP.

Approval	Approval
<i>J. Cary</i>	<i>R. V. Wadding</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1						PRIMARY
	1	0-1		H	None	TARGET TYPE
		2-3		H	None	REV OF IMPACT
	2	4-5		H	None	RFSMAT
						CUR = 1 MED = 5
						PCR = 2 DMT = 6
						TLM = 3 DOD = 7
						OST = 4 LVC = 8
		6-7		H	None	TYPE (T = 1 or V = 2)
	3-4	8-15		D	hours	ΔT
					Er/hr	ΔV
	5-6	16-23		X	None	Rev/Zone
	7-8	24-31		D	radians	ϕT
	9-10	32-39		D	radians	λT
	11-12	40-47		D	radians	Yaw
	13-14	48-55		D	radians	Pitch
	15-16	56-63		D	radians	Roll
	17-18	64-71		D	hours	GETI
	19	72-73		H	None	THRUSTER
						S2 = 1 R4 = 4
						S4 = 2 - R2 = 5
						R2 = 3 - R4 = 6

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

[illegible]

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



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7. RZRCNS
DATE 10/4/67 (EORP)
REV 4/4/68
PAGE 1 of 5

Data Table Formats

Symbolic Name — RZRCNS

Programmer — T. Stern

Table Name — Reentry Constraints Table

Initialization of any Element Required — None

Dimensions

Blocks — 1

Words/Blocks — 65

Total Words — 65

General Description and Usage

RZRCNS contains a description of the deorbit maneuver and the reentry lift profile.

Approval	Approval
<i>T. Stern 3/14/68</i>	<i>Robert A. Shilly</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	1	1-4		F		Lift Mode Indicator (LIFTOP) 1 for zero lift 2 for maximum lift 3 for guided reentry 4 for B-GMTRB reentry 5 for constant bank angle 6 for constant bank angle until a prescribed g-level then zero lift to impact 7 for constant bank angle until a prescribed g-level then maximum lift to impact 8 for constant bank angle until a prescribed g-level then B-GMTRB to impact 9 for constant bank angle until a prescribed g-level then another bank angle until impact
		7, 8		H		Rev (Restart)
	2			D	rad.	G&N initial bank angle
	3			D	rad.	Bank angle for lift options 3, 4, and 5 and bank angle after prescribed g-level for lift options 8 and 9
	4			D	hr.	GMT to reverse bank angle for LIFTOP = 4 or 3
	5			D	rad.	Initial bank angle for LIFTOP = 6, 7, 8, or 9
	6			D	rad.	Geodetic latitude of target for LIFTOP = 3
	7			D	rad.	Longitude of target for LIFTOP = 3
	8			D	rad.	Average flight time for LIFTOP = 3
	9-11			3D		X - platform axis
	12-14			3D		Y - platform axis
	15-17			3D		Z - platform axis

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

 } Unit vectors
 (Refsmat)

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7. RZRCNS

DATE 10/4/67 (EORP)

REV 4/4/68

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	18	1-8			ft. ²	CSM (preburn) cross-sectional area
	19	1-8			lbs.	CSM (preburn) weight
	20					Specified g-level
	21-22					Open for expansion
	23	1, 2				Attitude mode option 0 for no maneuvers requested 1 for inertial 2 for holding body attitude invariant in inertial space. (For single phase maneuvers, the thrust will be applied in the direction of the $\pm X$ -body axis. For multi-phase maneuvers, the thrust direction will vary from +X direction as a function of the gimbal angles.) +3 for Lambert guidance (initially this will not be a capability) -3 for Lambert guidance with initial alignment input +4 for external ΔV guidance -4 for external ΔV with initial alignment input
	23	3, 4				Thruster Code 1 for CSM RCS +X (2 quad) 2 for CSM RCS +X (4 quad) 3 for CSM RCS -X (2 quad) 4 for CSM RCS -X (4 quad) 5 - 15 not used 16 S-IVB Blowdown vent 17 LM RCS +X (2 quad) 18 LM RCS +X (4 quad) 19 LM RCS -X (2 quad) 20 LM RCS -X (4 quad)

*Type

H = Fixed-point half word
F = Fixed-point full wordE = Single-precision (floating-point)
D = Double-precision (floating-point)
X = Hexadecimal



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
						21 - 32 not used
						32 CSM SPS
						34 LM APS
						35 LM DPS
						36 S-IVB main thrust
	23	5, 6				Ullage option 0 for 2 quad +1 for 4 quad
	24	1-8				Configuration Code (to be required at a later date)
	25	1-8			hr.	GMTB time-to-begin maneuver (first phase)
	26	1-8			hr.	Δt of ullage (=0 for RCS)
	27	1-8			hr.	Δt of maneuver (no pure ullage of tailoff) (= 0 if ΔV given)
	28	1-8			Er/hr.	ΔV desired. If $\Delta V < 0$, it is inter- preted as ΔV along x body axis, excluding tailoff If $\Delta V < 0$, it is interpreted as total ΔV . Words 27, 28, and 29 need be input only when the attitude mode option is 1.
	29	1-8				a_T } inertial coordinates of unit thrust vector (Inertial) at burn initiate
	30	1-8				
	31	1-8				
	32	1-8			rad.	Pitch - (IMU)
	33	1-8			rad.	Yaw - (IMU)
	34	1-8			rad.	Roll - (IMU)
	35	1-8			rad.	Yaw - (LVLH)
	36	1-8			rad.	Pitch - (LVLH)
	37	1-8			rad.	Roll - (LVLH)
	38	1-8			rad.	Pitch gimbal
	39	1-8			rad.	Yaw gimbal

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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DATE 10/4/67 (EORP)

REV 4/4/68

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	40	1-8				Spare
	41	1-8			hr.	ΔT 10% for DPS
	42-44	1-8		3D		X-body direction
	45	1-8				Open
	46-48	1-8				External ΔV (Inertial)
	49-51					External ΔV (LVLH)
	52-61					Open
	62				hr.	GMT separation
	63				lbs.	CSM postburn weight (to CSM sep)
	64				hr.	Threshold time
	65	1-6				Flags
		7, 8				Refsmat ID

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7. RZREAD

DATE 9/21/67 (EORP)

REV 4/4/68

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Data Table Formats

Symbolic Name — RZREADProgrammer — T. SternTable Name — RFO Entry/Mode III DigitalsInitialization of any Element Required — NoDimensions

Blocks — 376

Words/Blocks — 1 (double precision), 8 bytes

Total Words — 376

General Description and Usage

RZREAD consists of four data areas: pre, post, tracking, and telemetry. There is also a "header" area. Flags are set indicating whether data is available in each area and whether that area reflects deorbit burn data. "Current" ephemeris data can be found by searching for the first available: the tracking, post, or pre areas.

Approval	Approval
<i>Thomas J. Stern</i> 3/19/68	<i>Robert L. Hull</i>



Detailed Contents

RZREAD Format

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1	1			On - PREBURN burn parameters available
			2			On - POSTBURN burn parameters available
			3			On - TRACKING burn parameters available
			4			On - TELEMETRY burn parameters available
			5			On - PREBURN data available
			6			On - POSTBURN data available
			7			On - TRACKING data available
			8			On - TELEMETRY data available
2	2			F		REFSMAT ID Code
		1-3		X		Burn Mode (G&N, SCS, +R2, +R4, -R2, -R4)
		4-8		X		Lift mode (MAX, MIN, BRB, G&N, BNK, B.MAX, B.MIN, B.BRB, B.BNK)
3	1			F		QID
	2	1, 2				Thruster option
		3, 4				Ullage option
4						Specified G-level
PREBURN DATA						
5				D	hrs.	Anchor time
6-8				3D	Er	Anchor position vector
9-11				3D	Er/Hr.	Anchor velocity vector
12				D		Anchor source
13				D	hr.	Separation time
14				D	hr.	Entry interface time (400K)
15-17				3D	Er	Entry interface position vector
18-20				3D	Er/Hr.	Entry interface velocity vector
21				D	rad.	Initial bank angle
22				D	rad.	Bank angle
23				D	hr.	GMTRB - Time to reverse bank

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. RZREAD

DATE 9/21/67 (EORP)

REV 4/4/68

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Detailed Contents

RZREAD Format

Block	Word	Byte	Bit	Type*	Units	Description and Range
24-26				3D	Er	GMTRB position vector
27-29				3D	Er/hr.	GMTRB velocity vector
30				D	hr.	GMTPI
31				D	hr.	GMTCO
32				D	hr.	ΔT_{IP}
33				D	Er/hr.	ΔV_{IP}
34				D	rad.	Roll - nominal
35				D	rad.	Pitch - nominal
36				D	rad.	Yaw - nominal
37				D	rad.	Roll - referenced to local horizontal
38				D	rad.	Pitch - referenced to local horizontal
39				D	rad.	Yaw - referenced to local horizontal
40				D	rad.	ϕ - Target latitude
41				D	rad.	λ - Target longitude
42				D	rad.	ϕ_{MN} - Zero Lift Impact Latitude
43				D	rad.	λ_{MN} - Zero Lift Impact Longitude
44				D	hr.	T_{MN} - Zero Lift Impact Time
45				D	rad.	ϕ_{MX} - Max. Lift Impact Latitude
46				D	rad.	λ_{MX} - Max. Lift Impact Longitude
47				D	hr.	T_{MX} - Max. Lift Impact Time
48				D	rad.	ϕ_{IP} - Predicted Impact Latitude
49				D	rad.	λ_{IP} - Predicted Impact Longitude
50				D	hr.	T_{IP} - Predicted Impact Time
51				D	Er/hr.	V_{EI} - Entry Interface Velocity
52				D	rad.	γ_{EI} - Entry Interface Flight Path Angle
53				D	hr.	GMTBOI - Blackout Initiate
54				D	hr.	GMTBOE - Blackout Exit

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



Detailed Contents

RZREAD Format

Block	Word	Byte	Bit	Type*	Units	Description and Range
55				D	hr.	GMT .2g
56				D	hr.	GMT .05g
57				D	hr.	GMT Specified G-level
58				D	hr.	GMTDD - Drogue Deploy
59				D	hr.	GMTMD - Main Deploy
60				D	hr.	GMTLC - Landing Computed
61				D	hr.	GMT - Max -g
62				D	Er/hr. ²	MAX -g
63				D	hr.	GMT - Sensible Atmosphere
64				D	hr.	GMT - 400K ft.
65				D	NM	θ - Range Angle at 400K ft.
66				D	NM	(Pred. Angle - Range Angle) at .2g
67				D	Er/hr.	Velocity at .05g
68				D	NM	Range at .05g
69				D	Er/hr.	VEMS - Velocity at 297431 ft.
70				D	hr.	GMTEMS - Time at 297431 ft.
71				D	NM	Range EMS
72-74				3D	Er/hr.	External ΔV (uplink)
75				D	NM	Miss distance
76				D	ft. ²	CSM Area
77				D	lbs.	CSM wt.
297				3D	Er	Specified-g position vector
300				3D	Er/hr.	Specified-g velocity vector
303				D	hr.	GMT-SEPARATION
304				3D		Separation position vector
307				3D		Separation velocity vector
310	1			F		Entry lift mode
	2			F		OPEN
311				D	rad.	G&N initial bank angle
312-316				6D		OPEN
POSTBURN DATA						
78-150						
317-336						Same as 5-77, 297-316

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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 7. RZREAD
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Detailed Contents

RZREAD Format

Block	Word	Byte	Bit	Type*	Units	Description and Range
151-223, 337-356	TRACKING DATA					Same as 5-77, 297-316
	TELEMETRY DATA					
224-296, 357-376						Same as 5-77, 297-316

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

Data Table Formats

Symbolic Name — RZRCNSProgrammer — T. SternTable Name — Reentry Constraints TableInitialization of any Element Required — NoneDimensions

Blocks — 1

Words/Blocks — 65

Total Words — 65

General Description and Usage

RZRCNS contains a description of the deorbit maneuver and the reentry lift profile.

Approval	Approval
<i>[Signature]</i> 7/20/67	<i>R. T. Stullington</i> <i>by J. L. P.</i> 9/20/67

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	1	1-4		F		Lift Mode Indicator (LIFTOP) 1 for zero lift 2 for maximum lift 3 for guided reentry 4 for B-GMTRB reentry 5 for constant bank angle 6 for constant bank angle until a prescribed g-level then zero lift to impact 7 for constant bank angle until a prescribed g-level then maximum lift to impact 8 for constant bank angle until a prescribed g-level then B-GMTRB to impact 9 for constant bank angle until a prescribed g-level then another bank angle until impact
	2	7, 8		H		Rev (Restart)
	3			D	rad.	Open Bank angle for lift options 3, 4, and 5 and bank angle after prescribed g-level for lift options 8 and 9
	4			D	hr.	GMT to reverse bank angle for LIFTOP = 4 or 8
	5			D	rad.	Initial bank angle for LIFTOP = 6, 7, 8, or 9
	6			D	rad.	Geodetic latitude of target for LIFTOP = 3
	7			D	rad.	Longitude of target for LIFTOP = 3
	8			D	rad.	Average flight time for LIFTOP = 3
	9-11			3D		X - platform axis
	12-14			3D		Y - platform axis
	15-17			3D		Z - platform axis

 Unit vectors
 (Refsmat)

*Type

 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexidecimal

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 7. RZRCNS
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	18	1-8			ft. ²	CSM (preburn) cross-sectional area
	19	1-8			lbs.	CSM (preburn) weight
	20					Specified g-level
	21-22					Open for expansion
	23	1, 2				Attitude mode option 0 for no maneuvers requested 1 for inertial 2 for holding body attitude invariant in inertial space. (For single phase maneuvers, the thrust will be applied in the direction of the $\pm X$ -body axis. For multi-phase maneuvers, the thrust direction will vary from +X direction as a function of the gimbal angles.) +3 for Lambert guidance (initially this will not be a capability) -3 for Lambert guidance with initial alignment input +4 for external ΔV guidance -4 for external ΔV with initial alignment input
	23	3, 4				Thruster Code 1 for CSM RCS +X (2 quad) 2 for CSM RCS +X (4 quad) 3 for CSM RCS -X (2 quad) 4 for CSM RCS -X (4 quad) 5 - 15 not used 16 S-IVB Blowdown vent 17 LM RCS +X (2 quad) 18 LM RCS +X (4 quad) 19 LM RCS -X (2 quad) 20 LM RCS -X (4 quad)

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
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 7. RZRCNS
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
						21 - 32 not used 32 CSM SPS 34 LM APS 35 LM DPS 36 S-IVB main thrust Ullage option 0 for 2 quad +1 for 4 quad Configuration Code (to be required at a later date) 23 5, 6 24 1-8 25 1-8 hr. GMTB time-to-begin maneuver (first phase) 26 1-8 hr. Δt of ullage (=0 for RCS) 27 1-8 hr. Δt of maneuver (no pure ullage of tailoff) (= 0 if ΔV given) 28 1-8 Er/hr. ΔV desired. If $\Delta V < 0$, it is inter- preted as ΔV along x body axis, excluding tailoff If $\Delta V < 0$, it is interpreted as total ΔV . Words 27, 28, and 29 need be input only when the attitude mode option is 1. a_T } inertial coordinates of unit } thrust vector (Inertial) at } burn initiate 29 1-8 30 1-8 rad. Pitch - (IMU) 31 1-8 rad. Yaw - (IMU) 32 1-8 rad. Roll - (IMU) 33 1-8 rad. Yaw - (LVLH) 34 1-8 rad. Pitch - (LVLH) 35 1-8 rad. Roll - (LVLH) 36 1-8 rad. Pitch gimbal 37 1-8 rad. Yaw gimbal 38 1-8 39 1-8

*Type

 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	40	1-8				Spare
	41	1-8			hr.	ΔT 10% for DPS
	42-44	1-8		3D		X-body direction
	45	1-8				Open
	46-48	1-8				External ΔV (Inertial)
	49-51					External ΔV (LVLH)
	52-61					Open
	62				hr.	GMT separation
	63				lbs.	CSM postburn weight (to CSM sep)
	64				hr.	Threshold time
	65	1-6				Flags
		7, 8				Refsmat ID

*Type
 H — Fixed-point half word
 F — Fixed-point full word
 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. RZRTSD

DATE 8/3/67 (EORP)

REV

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Data Table Formats

Symbolic Name — RZRTSDProgrammer — T. J. BrzozowskiTable Name — Recovery Target Selection Display TableInitialization of any Element Required — NoDimensions

Blocks — 41

Words/Blocks — 5 double words

Total Words — 205 double words

General Description and Usage

This table is used by RMDRTSD, which generates and updates the Recovery Target Selection Display, MSK1454. The first block is used as a save area, and the remaining forty blocks contain the data to be displayed.

Approval	Approval
TJ Brzozowski	Robert L. Shillington



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Vehicle name
	2	1		X		Message number
	3			F		Revolution number
	4			F		Mission number
	5-6			D		Input longitude
	7-8			D		Station ID
	9			F		Orbit trajectory update number
	10	1		X		Current page viewed on MOCR D/TV's
		2		X		Current page viewed on ADEG D/TV's.
		3		X		Total number of pages in display
2		4		X		Total number of entries in table
	1	1	1			Data ₁ indicator: 0 = data, 1 = no data, end of table.
		2			EBCDIC	blank or * Blank = data associated with input longitude.
						* = Cape-crossing routine could not converge on the given long., the nearest accurate longitude was used.
		3-4		H		Revolution number ₁
	2			E	deg.	AZIMUTH ₁
	3-4			D	deg.	Latitude ₁
	5-6			D	deg.	Longitude ₁ (input longitude)
	7-8			D	hr.	GET ₁
	9-10			D	hr.	GMT ₁
3	1	1	1			Data ₂ Indicator
		2				Alternate Longitude Indicator: EBCDIC blank or *

*Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7. RZRTSD

DATE 8/3/67 (EORP)

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
		3-4		H		Rev. no. ₂
	2			E	deg.	Azimuth ₂
	3-4			D	deg.	Latitude ₂
	5-6			D	deg.	Longitude ₂ (Long ₁ + 1°)
	7-8			D	hr.	GET ₂
	9-10			D	hr.	GMT ₂
 Blocks 4 - 40  						
41	1	1	1			Data ₄₀ Indicator
		2				Alternate Longitude Indicator: EBCDIC blank or *
		3-4		H		Rev. no. ₄₀
	2			E		Azimuth ₄₀
	3-4			D		Latitude ₄₀
	5-6			D		Longitude ₄₀ (Long. ₃₉ + 1°)
	7-8			D		GET ₄₀
	9-10			D		GMT ₄₀

*Type

H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexidecimal

Data Table Formats

Symbolic Name — RZRTSEPProgrammer — J. MassingillTable Name — Retrofire Separation TableInitialization of any Element Required — NoDimensions

Blocks — 3
Words/Blocks — 40 (20 double words)
Total Words — 120

General Description and Usage

RZRTSEP will contain data to be displayed by the Retro Separation Table Display program. Blocks 1, 2, and 3 will contain data for the primary, contingency and manual landing area columns of the display, respectively.

Approval	Approval
Jayce Massingill	Robert G. Hillington

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F	-	Indicator: 0 = good data 1 = no data -1 = bad data
	2			X		EBCDIC PLA CODE
	3-4			X		EBCDIC AREA - Rev. of landing
	5-6			X		EBCDIC MATRIX - Refs mat for maneuver
	7-8			D	lbs.	Separation Wt.
	9-10			D	deg.	R_{LH}
	11-12			D	deg.	P_{LH}
	13-14			D	deg.	Y_{LH}
	15-16			D	deg.	R_O
	17-18			D	deg.	P_I
	19-20			D	deg.	Y_M
	21-22			D	fl./hrs.	GMT_{SEP}
	23-24			D	fl./hrs.	GET_{SEP}
	25-26			D	fl./hrs.	GMT_I
	27-28			D	fl./hrs.	GET_I
	29-30			D	fl./hrs.	ΔT_{SEP}
	31-32			D	f.p.s.	ΔV_{SEP}
	33-34			D	fl./hrs.	BT_{SEP}

* Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. RZRTSEP

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
2	35			F	-	Thruster: 1, 2=SPS; 3-6=RCS
	36			-	-	Open
	37-38			D	deg.	True Anomaly of Separation
	39-40			D	nm	Vacuum Perigee
	1			F	-	Indicator : 0 = good data 1 = no data -1 = bad data
	2			X	EBCDIC	CLA Code
	3-4			X	EBCDIC	AREA
3	.			.	.	(Same as in block 1)
	.			.	.	
	.			.	.	
	39-40			D	nm	Vacuum Perigee
	1			F	-	Indicator: 0=good data +1=no data
	2			X	EBCDIC	MAN Code
	3-4			X	EBCDIC	AREA - Rev. of landing
	.			.	.	(Same as for PLA, CLA columns)
	.			.	.	
	.			.	.	
	39-40			D	nm	Vacuum Perigee

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7. RZSAVE

DATE 8/30/67 (EORP)

REV

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Symbolic Name — RZSAVEProgrammer — J. MassingillTable Name — Analog Display Save TableInitialization of any Element Required — NoDimensions

Blocks — 1
Words/Blocks — 10
Total Words — 10

General Description and Usage

RZSAVE contains Digital-to-Television (D/TV) buffer addresses used to update present position data locations for the Time to Free Fall versus Range to Impact Analog Display (RMDATVR).

Approval	Approval
Joyce Massingill	Robert T. Stillinger

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7. RZSAVE

DATE 8/30/67 (EORP)

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PAGE 2 of 2

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-4			F		Open
	5	1-4		F		RMDATVR-Last location used after generate queue.
	6	1-4		F		RMDATVR-Last location used after update queue.
	7-10					Open

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZSHAP
 DATE 8/10/67 (EORP)
 REV 3/1/68
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Data Table Formats

Symbolic Name — RZSHAP

Programmer — J. Cary

Table Name — Input from L09 MED (Shaping)

Initialization of any Element Required — No

Dimensions

Blocks — 3

Words/Blocks — 16

Total Words — 48

General Description and Usage

RZSHAP contains shaping quantities entered via L09 MED to be used by RMSDBMP.

Approval	Approval
<i>J. Cary</i>	<i>Robert Z. Shillingham</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-2	0-7		D	hours	PRIMARY
	3-4	8-15		D	hours	GETISH
	5-6	16-23		D	hours	ΔT SEPARATION
					$\frac{\Delta T}{\text{Er/hr.}}$	ΔV
	7-8	24-31		D	hours	ΔT ULLAGE
	9-10	32-39		D	radians	Pitch
	11-12	40-47		D	radians	Yaw
	13-14	48-55		D	radians	Roll
	15	56-57		H	None	Type (T=1 or V=2)
		58-59		H	None	THRUSTER SEPARATION
						S2 = 1
						S4 = 2
						R2 = 3
						R4 = 4
						-R2 = 5
						-R4 = 6
	16			H		Gimbal Indicator
				H		OPEN
2	Block Contents Same as Block 1.					CONTINGENCY
3	Block Contents Same as Block 1.					MANUAL

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7. RZTARGET
DATE 7/31/67 (EORP)
REV
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Data Table Formats

Symbolic Name — 'RZTARGETProgrammer — J. MassingillTable Name — RFO Target TableInitialization of any Element Required — YesDimensions

Blocks — 30

Words/Blocks — 6 double words

Total Words — 180 double words

General Description and Usage

'RZTARGET contains primary and contingency landing targets. These targets appear on the RFO target table display and are used for computations in the time to fire supervisor.

Approval	Approval
<i>J. E. Massingill</i>	<i>Robert A. Skelton</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1			F		Oldest block number
	2			F		Oldest rev number
	3			F		Newest primary target rev - 1
	4			F		Newest contency target rev - 1
	5-6			D		
	7-8			D		
	9-10			D		
	11-12			D		
2	1-2			EBCDIC		Primary rev-zone
	3-4			D		Primary latitude
	5-6			D		Primary longitude
	7-8			EBCDIC		Contingency rev-zone
	9-10			D		Contingency latitude
	11-12			D		Contingency Longitude
3	↓					↓
30	1-2			EBCDIC		Primary rev-zone
	3-4			D		Primary latitude
	5-6			D		Primary longitude
	7-8			EBCDIC		Contingency rev-zone
	9-10			D		Contingency latitude
	11-12			D		Contingency longitude

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7. RZVKTR
DATE 6/23/67 (206)
REV
PAGE 1 of 2Symbolic Name — RZVKTRProgrammer — S. PankeyTable Name — Telemetry Averaged Cutoff VectorsInitialization of any Element Required — YesDimensions

Blocks — 4
Words/Blocks — 9 double words
Total Words — 36 double words

General Description and Usage

This table contains the averaged cutoff telemetry vector for each source required for the mission. For 501, the vector will be AGC or IU, depending on the selected source switch setting at the time of averaging. The vector will be placed in block 1. For 206, only the LGC source will be averaged and placed in block 1.

Approval	Approval
<i>Susan Pankey</i>	<i>Robert T. Shilling</i>

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DATE 6/23/67
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7. RZVKTR
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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1				Indicator = 0, vector available = X'80', vector not available
	2			D	Hrs	Time of vector
	3-5			D	ER	Position of vector
	6-8			D	ER/HR	Velocity vector
	9			EBCDIC		Station ID
2-4						As above

* Type
H — Fixed-point half word
E — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

TELEMETRY DATA TABLES FOR EORP

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7. TELEMETRY DATA TABLES FOR EORP

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- 7.1 Control Tables
TZCCMASK, TZLCMASK, TZSTATUS
- 7.2 Calibration Tables
TZAGCAL1, TZAGCAL2, TZAGCAL3, TZAGCAL4,
TZCCALIB, TZICALIB, TZLCALIB, TZLGICAL1,
TZLGICAL2, TZLGICAL3, TZLGICAL4, TZMCALIB,
TZSCALIB, TZUCALIB
- 7.3 Cross-reference Tables
TZAXREF1, TZAXREF2, TZAXREF3, TZAXREF4,
TZCXREFS, TCGXREF1, TZGXREF2, TZGXREF3,
TZGXREF4, TZIXREFS, TZLSXREF, TZLXREFS,
TZMXREFS, TZSXREFS, TZUXREFS
- 7.4 Limit Tables
TZCLIMIT, TZILIMIT, TZLLIMIT, TZMLIMIT,
TZULIMIT
- 7.5 High-Speed Vehicle Data Arrays
TZHSAGCL, TZHSAGCP, TZHSAGSL, TZHSAGSP,
TZHSAMD, TZHSAMD^P, TZHSCSML, TZHSCSMP,
TZHSLEML, TZHSLEMP, TZHSLGCL, TZHSLGCP,
TZHSSI^BL, TZHSSI^UL
- 7.6 Guidance Tables
TZGDNDSP, TZGDNLXG, TZGDNREF, TZGDNSAV
- 7.7 Switch Selector Tables
TZDISPSS, TZUSSDSP, TZUSSMAC
- 7.8 MED Data Tables
TZMEDCSM, TZMEDLEM, TZMEDSIU
- 7.9 Low-Speed Task Control Tables
TZAGCSDB, TZAGSSDB, TZAMDSDB, TLCSMSDB,
TZLEMSDB, TZLGCSDB, TZSIUSDB

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7.10 Low-Speed Data Tables

7.10.1 Low-Speed Format History Tables

TZLOGDIC, TZLSFM03 through TZLSFM11, and
TZLSFM18 through TZLSFM30

7.10.2 Low-Speed Message Log Tables

TZLGDICT, TZCSMLLS, TZLEMLLS, TZSLVLLS

7.11 Display Format Tables

TZDISPLL, TZDISPMD, TZDISPPN, TZDISPTH,
TZDISPTP

7.12 DDD Data Tables

TZADDDTB, TZCDDDTB, TZGDDDTB, TZIDDDTB,
TZLDDDTB, TZMDDDTB, TZSDDDTB, TZUDDDTB

7.13 System Plots Data Tables

TZDISPLE, TZDISPLG, TZDISPME, TZDISPMG,
TZDISPSE, TZDISPSG

7.14 Rebroadcast Data Tables

TZLSREBA, TZLSREBB, TZLSREBC, TZLSREBD,
TZLSREBE, TZLSREBF, TZLSFMTS

7.15 Task Resource Initialization Tables

TZHSAGSR, TZHSAMDR, TZHSCSMR, TZHSLEMR,
TZLGCREs



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7.1 CONTROL TABLES

Basic control information needed by the subsystem is saved in the control tables described below.

- a. TZCCMASK (CSM Category Mask Table) — The table accomplishes the same purpose for the CSM frame that TZLCMASK does for the LM.
- b. TZLCMASK (LM Category Mask Table) — This table controls the parameters to be limit sensed for each of the LM limit categories. A request for the limit sensing of a category (by PBI) causes interrogation of that category's control bit for each parameter in the frame.
- c. TZSTATUS (Telemetry Status Table) — Certain control information that is shared by two or more tasks is stored in this table. It may be read and updated by any task. The contents of this table are displayed (MSK's 2001 and 2002) by the Telemetry Supervisor.

Approval	Approval
<i>R. J. [Signature]</i>	<i>John Arnold</i>

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7.1 TZCCMASK
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PAGE 1 of 2Symbolic Name — TZCCMASKProgrammer — R. Harrington, R. SamuelsohnTable Name — CSM Category Mask TableGeneral Description and Usage

TZCCMASK is structured to parallel (in a one-to-one correspondence) the CSM intermediate array. For each category a bit is designated in the word. It is set to one if the parameter falls in that category. Otherwise it is zero (in cases of a double-word parameter the second word in the table is set to zero). Each bit is used, along with the PBI's, to manipulate the limit sense table.

Approval	Approval
<i>R. Harrington</i>	<i>R. Samuelsohn</i>

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Block	Word	Byte	Bit	Type*	Units	Description and Range
	All		0			Category A — SCS rates
			1			B — SCS att. error
			2			C — OSS
			3			D — ISS main
			4			E — CM/SM sep.
			5			F — SPS burn
			6			G — Low-bit rate
			7-14			Spare
			15			All CSM GNC categories
			16			Category J — Launch
			17			K — High-bit rate
			18			L — Main EECOM sum.
			19			M — ECS/Cyro. cont. sum.
			20			N — EPS cont. sum.
			21			O — C/I cont. sum.
			22			P — Calc.
			23			T — Orbit
			24			U — Rates
			25			V — FC1
			26			W — FC2
			27			X — FC3
			28			Y — Structures
			29			Z — Entry Phase
			30			Spare
			31			All CSM EECOM categories

*Type
F — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7.1 TZLCMASK
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PAGE 1 of 2Symbolic Name — TZLCMASKProgrammer — R. Harrington, R. SamuelsohnTable Name — LM Category Mask TableGeneral Description and Usage

TZLCMASK is structured to parallel (in a one-to-one correspondence) the LM intermediate array. For each category a bit is designated in the word. It is set to one if the parameter falls in that category. Otherwise it is zero (in cases of doubleword parameters, the second word in the MASK Table is set to zero). Each bit is used along with PBI's to manipulate the Limit Sense Table.

Approval	Approval
<i>R. Samuelsohn</i>	<i>Jay Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	All		0			Category W — Launch
			1			X — Coast
			2			Y — Abort
			3			All LM GNC catagories
			4			Category V — LBR
			5-26			Spare
			27			All LM EECOM categories
			28			Category B — Staged
			29			C — LBR
			30			D — S-band
			31			E — ACS batt

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

Y — Hexidecimal

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7.1 TZSTATUS
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PAGE 1 of 5Symbolic Name — TZSTATUSProgrammer — R. Harrington, R. SamuelsohnTable Name — Telemetry Status TableGeneral Description and Usage

TZSTATUS indicates the present status of the system and contains items that are used by two or more tasks on the system.

Approval	Approval
<i>R. Samuelsohn</i>	<i>R. Harrington</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Name	Description and Range
		0-7		D	GMTLA	CSM GMTLO
		8-15		D	GMTLB	LM GMTLO
		16-23		D	GMTLS	Effective GMTLO for SLV
		24-31		D	LSHDT	Low-speed ΔT for Header validation
		32-39		D	LSTCS	Low-speed time correction SLV
		40-47		D	LSTCC	Low-speed time correction CSM
		48-55		D	LSTCL	Low-speed time correction LM
		56-63		D	DLGCT	ΔLGC time - K-factor
		64-71		D	DAGCT	ΔAGC time - K-factor
		72-79		D	DAMDT	ΔAMD time - K-factor
		80-87		D	TTIME	Trend scale start time
		88-95		D	CMCGT	Corrected CMC GET
		96-103		D	OLIFT	ESOS time liftoff
		104-111		D	OTWRJ	ESOS time tower jet
		112-119		D	OS4CO	ESOS time S-IVB CLO
		120-127		D	OSLAS	ESOS time S-IVB CSM separation
		128-135		D	OLES	ESOS time LES abort
		136-147		X	VALVH	Vehicle validity array
		148	0-1	X	ELIFT	ESOS positive liftoff
		148	2-3	X	ETWRT	ESOS positive tower jet
		148	4-5	X	ES4CO	ESOS positive S-IVB CLO
		148	6-7	X	ESLAS	ESOS positive S-IVB CSM separation
		149	0-1	X	ELES	ESOS positive LES Abort
		150-151				Spare
		152	0-1	X	ROSCS	SLV Rebroadcast switch
		152	2-3	X	LMLIM	LM Limit Sense Switch
		152	4-5	X	IULIM	IU/S-IVB Limit Sense Switch
		152	6-7	X	S2LIM	SII Limit Sense Switch

*Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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Block	Word	Byte	Bit	Type*	Name	Description and Range
		153	0-1	X	SILIM	SIB Limit Sense Switch
		153	2-3	X	ROSCC	CSM Rebroadcast Control Switch
		153	4-5	X	CMUM	CSM Limit Sense Switch
		153	6-7			Spare
		154		F	CCATS	CSM category save area
		158		F	CCACC	CSM category accumulator
		162		F	LCATS	LM category save area
		166		F	LCACC	LM category accumulator
		170		H	LSMSG	L/S message count for report process
		172				Spare
		174		F	SMCNT	H/S source module dictionary
		178		F	SMCN1	H/S source module (1)
		182		F	SMCN2	H/S source module (2)
		186		F	SMCN3	H/S source module (3)
		190		F	LSTAT	H/S live active table control
		194		F	AGLCT	AGC H/S input status word (live)
		198		F	CMLCT	CSM H/S input status word (live)
		202		F	LGLCT	LGC H/S input status word (live)
		206		F	LMLCT	LM H/S input status word (live)
		210		F	AMLCT	AMD H/S input status word (live)
		214		F	ASLCT	AGS H/S input status word (live)
		218		F	IULCT	IU/S-IV H/S input status word (live)
		222		F	SILCT	SIB H/S input status word (live)
		226		F	PSTAT	H/S P/D active table control
		230		F	AGPCT	AGC H/S input status word (P/D)
		234		F	CMPTCT	CSM H/S input status word (P/D)
		238		F	LMPCT	LM H/S input status word (P/D)
		242		F	AMPCT	AMD H/S input status word (P/D)
		246		F	ASPCT	AGS H/S input status word (P/D)
		250		F	IUPCT	IU/S-IV H/S input status word (P/D)
		254		F	SIPCT	SIB H/S input status word (P/D)
		258		F	SMKA1	SMEK panel A, word 1 (GNC)
		262		F	SMKA2	SMEK panel A, word 2 (GNC)
		266		F	SMKE1	SMEK panel B, word 1 (EEC)

 *Type
 H - Fixed-point half word
 F - Fixed-point full word

 E - Single-precision (floating-point)
 D - Double-precision (floating-point)
 X - Hexadecimal

Detailed Contents

Block	Word	Byte	Bit	Type*	Name	Description and Range
		270		F	SMKB2	SMEK panel B, word 2 (EEC)
		274		F	SMKC1	SMEK panel C, word 1 (BSE)
		278		F	SMKC2	SMEK panel C, word 2 (BSE)
		282		F	SMKD1	SMEK panel D, word 1 (LM/GNC)
		286		F	SMKD2	SMEK panel D, word 2 (LM/GNC)
		290		F	SMKE1	SMEK panel E, word 1 (LM/EEC)
		294		F	SMKE2	SMEK panel E, word 2 (LM/EGC)
		298		F	SMKF1	SMEK panel F, word 1 (AMD)
		302		F	SMKF2	SMEK panel F, word 2 (AMD)
		306		F	REBSA	SLV REB save data pointer, word 1
		310		F	REBSB	SLV REB save data pointer, word 2
		314		F	REBSC	SLV REB save data pointer, word 3
		318		F	REBCA	CSM REB save data pointer, word 1
		322		F	REBCB	CSM REB save data pointer, word 2
		326		F	REBCC	CSM REB save data pointer, word 3
		328		H	TS4IG	TMEVENT - S-IVB ignition
		330		H	TS4CO	TMEVENT - S-IVB cutoff
		332		H	TTWRJ	TMEVENT - Tower jett
		334		H	LSLAS	TMEVENT - S-IVB/CSM sep.
		336		H	TGRRC	TMEVERN - GRR CSM
		338		H	RGRRS	TMEVENT - GRR S-IVB
		340		H	TOBEC	TMEVENT - OBOCO
		342		H	TSPSA	TMEVENT - SPS abort
		346		H	TLESA	TMEVENT - LES abort init.
		348		H	TSPSI	TMEVENT - SPS ignition
		350		H	TSPSC	TMEVENT - SPS cutoff
		351		X	PHASE	Mission phase, 0-255
		352	0	X	SHDSI	SIB shutdown PBI (1-shutdown)
		352	1	X	DSPSW	TMSTATUS Display Switch (1=5 sec.)
		352	2	X	CSMES	CSM event source/playback (PBI)
		352	3	X	LEMES	LM event source/playback (PBI)
		352	4	X	LNCHA	Launch A - Flag
		352	5	X	LNCHB	Launch B - Flag
		352	6-7	X		Spare

* Type
H - Fixed-point half word
F - Fixed-point full word

E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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Block	Word	Byte	Bit	Type*	Name	Description and Range
		353	0	X	PLSSV	PLSS in volt mode
		353	1	X	PLSSC	PLSS in current mode
		353	2	X	LHAGS	AGS local horizontal
		353	3	X	LHLGC	LGC local horizontal
		353	4	X	GBIAS	General bias comp.
		353	5	X	COMP6	
		353	6	X	COMP7	
		353	7	X	COMP8	
		354		H	HICSI	H/S input char. count SIB
		356		H	HICIU	H/S input char. count IU/S-IVB
		358		H	HICCM	H/S input char. count CSM
		360		H	HICAG	H/S input char. count AGC
		362		H	HICLM	H/S input char. count LM
		364		H	HICLG	H/S input char. count LGC
		366		H	HICAS	H/S input char. count AGS
		368		H	HICAM	H/S input char. count AMD
		370		H	RSDPN	Line FMT/SF sync. array (11H
		381				Spare
		382				Spare
		383				Spare
		384		F	AUPLP	AGC down link ID's
		388		F	AUPLR	AGC down link ID's
		392		F	AUPLC	AGC down link ID's
		396		F	AUPLU	AGC down link ID's
		400		F	GUPLP	LGC down link ID's
		404		F	GUPLR	LGC down link ID's
		408		F	GUPLC	LGC down link ID's
		412		F	GUPLU	LGC down link ID's

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7.2 CALIBRATION TABLES

The telemetry calibration tables contain the coefficients scale factors and data point coordinates required to calibrate the PCM data in the INPUT STREAM. The curve code from the cross-reference table dictates what and how much can be used in the calibration table for a particular parameter. A curve code (which can range from one to five) indicates that coefficients are provided to calibrate the parameter in a polynomial of the first through fifth degree. (NOTE: a fifth-degree polynomial requires six coefficients.) A curve code of six indicates a simple scale factor is provided for calibration. A curve code of 12 states that raw points in X- and Y- coordinate form are provided, where the first word of such a case is a count of the number of points involved. For a description of all possible curve codes, see Memo TLQCAL, by J. Minnoch, dated November 8, 1966.

Approval	Approval
<i>Ralph E. Kummer</i>	<i>Garth E. Bagley</i>

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List of Calibration Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	Vehicle	Responsible Programmer
TZAGCAL1	1	1000	1000	AGC	R. Van Kummer ↓
TZAGCAL2	1	1000	1000	AGC	
TZAGCAL3	1	1000	1000	AGC	
TZAGCAL4	1	1000	1000	AGC	
TZCCALIB	3	2240	6720	CSM	
TZICALIB	1	196	196	SII	
TZLCALIB	1	3200	3200	LM	
TZLGCAL1	1	1200	1200	LGC	
TZLGCAL2	1	1200	1200	LGC	
TZLGCAL3	1	1200	1200	LGC	
TZLGCAL4	1	1200	1200	LGC	
TZMCALIB	1	500	500	AMD	
TZSCALIB	1	500	500	AGS	
TZUCALIB	3	1600	4800	SIU	

Approval	Approval
<i>Ralph E. Van Kummer</i>	<i>Garth E. Bagley</i>

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7.3. CROSS-REFERENCE TABLES

The cross-reference tables used by telemetry are constructed to provide a convenient means of calibrating and storing the input data in a real time operation. The tables, however, are not generated in real time.

Each cross-reference table is constructed by parameter in the order of the parameters in the "INPUT STREAM". There are three fullword entries for each parameter. The first halfword provides a bit count of the number of bits the parameter occupies in the INPUT STREAM. The second halfword is a relative position in some intermediate array where the calibrated parameter will be stored. The third halfword provides a curve code that directs the real time calibration program in the manner of usage of the coefficients or scale factors provided. The fourth halfword is a relative position in a calibration table where the coefficients or scale factors or curve points can be found for this parameter. The last word contains coded information defining the main and subcommutated line formats, in which the parameter is supposed to be present.

Approval	Approval
<i>L. J. Van Lummel</i>	<i>Garth E. Bagley</i>

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List of Cross-Reference Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	Vehicle	Responsible Programmer
TZAXREF1	1	2400	2400	AGC	R. Van Kummer ↓
TZAXREF2	1	2400	2400	AGC	
TZAXREF3	1	2400	2400	AGC	
TZAXREF4	1	2400	2400	AGC	
TZCXREFS	3	2240	6720	CSM	
TZGXREF1	1	2400	2400	LGC	
TZGXREF2	1	2400	2400	LGC	
TZGXREF3	1	2400	2400	LGC	
TZGXREF4	1	2400	2400	LGC	
TZIXREFS	1	264	264	SII	
TZLSXREF	36	1100	39600	Low-Speed	
TZLXREFS	1	3200	3200	LM	
TZMXREFS	1	500	500	AMD	
TZSXREFS	1	900	900	AGS	
TZUXREFS	3	1600	4800	S-IU	

Approval	Approval
<i>Ralph E. Van Kummer</i>	<i>Gaith E. Bagley</i>

7.4 HIGH-SPEED VEHICLE LIMIT TABLES

Each vehicle that has limit sensed parameters will have a limit table. Each table is mapped by a macro, which relates each limit sensed parameter to its limits. The macro uses the services of the intermediate data array (IDA) macros to build and format each table. Contained within each table are two sections, a control section, which has an entry for every parameter in the IDA for that vehicle, and a limit section.

The entry of a control section results in: (1) a flag that indicates whether or not the limits for a parameter are to be used (this flag is changed dynamically to inhibit the limit sensing); and (2) a pointer that enters in the limit section.

A two-section table is used to allow the dynamic changing of limits by a MED entry.

The naming convention used is as follows:

TZxLIMIT

where x is the single letter vehicle code.

List of Limit Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	Vehicle
TZCLIMIT	2	2528	5056	CSM
TZILIMIT	1	800	800	S-IC
TZLLIMIT	3	2176	6528	LM
TZMLIMIT	2	608	1216	AMD
TZTLIMIT	2	352	704	S-II
TZULIMIT	2	2400	4800	SIU

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7.5 HIGH-SPEED VEHICLE DATA ARRAYS

These data tables contain the most recent values for all high-speed telemetry parameters and the special computations results derived from these parameters. Each array may also contain information that must be saved from one processing cycle to the next. These tables are often called "intermediate data arrays".

Each array is mapped by a QTDATA macro, which describes the relative location, length and attribute type of each parameter in the array (see Data Structure Description and Access, Section 5.1.4). The latest version of the mapping macro is kept in the mission macro library. Thus a parameter may be added to or deleted from the system by modifying the mapping macro and re-assembling each load module or table referencing the array. The length of each array is defined in an EQU statement by the mapping macro and is named vDLNG (where v is the single character vehicle code). The status (dead, off-scale, out-of-limits, etc.) of each parameter is kept in a block at the end of the array. One byte of storage is allocated for the status of each parameter. The status bytes begin at a displacement of vDLNG into the array and occupy exactly vDLNG/4 bytes. Therefore, the status of any parameter in the array may be referenced by specifying a displacement of

$$vDLNG + (\text{internal parameter name})/4.$$

It should be noted that the live array and the playback array for a vehicle have exactly the same format; i.e., a given parameter will have the same displacement in both arrays.

Naming of the arrays was done according to the following convention:

TZHSveht

where veh = three-character vehicle code

$$t = \begin{cases} L & \text{for live data} \\ P & \text{for palyback data.} \end{cases}$$

Figure 1 describes the arrangement of all intermediate data arrays. The lists below describe the specific information found in the Array Header and Parameter Status Indicators.

Approval	Approval
<i>J. J. Flowers</i>	<i>James Arnold</i>

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Array Header

0	7 8	15 16	23 24	31
Control Bits	Time Format	Vehicle	Station	
Data Type	Spare	Spare	Spare	

Control Bits:

A	O	M	O	C	O	S	O
---	---	---	---	---	---	---	---

A — Active

M — Missing

C — CCATS validity - bit error

S — Sub-frame sync. error

Data Type: 0 = Live

4 = Playback

Parameter Status Indicator

1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	H

A — Missing (special computations only)

B — Off-scale low

C — Off-scale high

D — Dead (not in external-line format)

E — Static (sub-frame sync error)

F — Limit-sense alarm (secondary)

G — Parity error (low-speed only)

H — Limit-sense alarm (primary)

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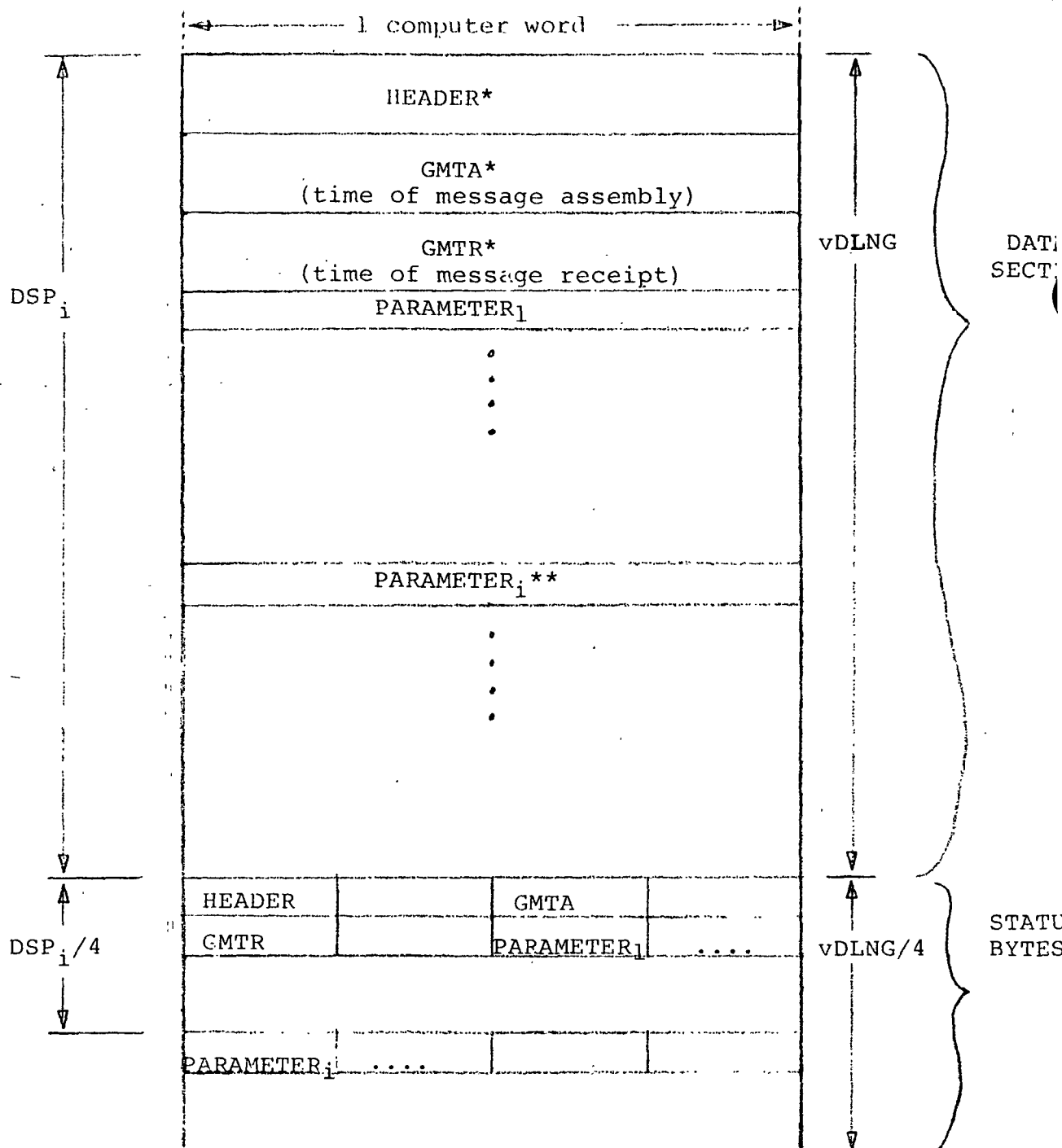
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Table 1. High-Speed Vehicle Data Arrays

Array Name	Number Blocks	Bytes/Block	Total Bytes	vDLNG	Responsible Programmer
TZHSAGCL	1	2400	2400	1920	J. Paris
TZHSAGCP	1	2400	2400	1920	J. Paris
TZHSAGSL	1	960	960	480	S. Van Norden
TZHSAGSP	1	960	960	480	S. Van Norden
TZHSAMDL	1	760	760	608	J. Powell
TZHSAMDP	1	760	760	608	J. Powell
TZHSCSML	1	3400	3400	2528	S. Van Norden
TZHSCSMP	1	3400	3400	2528	S. Van Norden
TZHSLEML	1	2280	2280	1824	J. Powell
TZHSLEMP	1	2280	2280	1824	J. Powell
TZHSLGCL	1	2504	2504	1984	S. Van Norden
TZHSLGCP	1	2504	2504	1984	S. Van Norden
TZHSSIBL	1	480	480	384	M. Gamble
TZHSSIUL	1	2400	2400	1920	R. Harrington



* - This quantity occupies a doubleword

** - Parameters may occupy single or doubleword

Figure 1. High-Speed Intermediate Data Array

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7.6 GUIDANCE TABLES

This group of data tables contains data used by the guidance task for the purpose of displaying guidance parameters in digital and plot forms. The tables included in this section are described below.

- a. TZGDNDSP (Guidance Format Control List Table) — TZGDNDSP contains all the information necessary to control the D/TV formatting of digitals and plots on the guidance displays.
- b. TZGDNLXG (Guidance Table of Logged Data) — The savedata table contains a history of each plotted parameter.
- c. TZGDNREF (Guidance Cross-reference Table) — This table contains a list of all parameters needed by the guidance processor.
- d. TZGDNSAV (Guidance Savedata Table) — This table contains control information such as elapsed time and stage of each plot, record of events, non-telemetry parameters, etc.

Approval	Approval
Patricia Saus	J. J. Arnold

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7.6 TZGDNDSP
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PAGE 1 of 2Symbolic Name — TZGDNDSPProgrammer — P. LawsTable Name — Guidance Format Control List TableInitialization of any Element Required — NoDimensions

Blocks — 5

Bytes/Blocks — 520

Total Bytes — 2600

General Description and Usage

Each block of this table contains the format pointers necessary to control the D/TV formatting of plotted points and digitals on one of the five guidance displays. It also contains synchronous exits to a routine, which puts out the appropriate amount of logged data on the launch plots at the correct time.

Approval	Approval
Patricia Laws	Jerry Donaldson



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1 : 2 : : : : 103					Format description header for MSK 223 Display request initialization Format pointers for labels Synchronous exit control Format pointers for plots Format pointers for digitals
2	1 : 2-118					Format description header for MSK 224 Same as Block 1
3	1 : 2 : : : 98					Format description header for MSK 227 Display request initialization Format pointers for labels Format pointers for plots Format pointers for digitals
4	1 : 2-105					Format description header for MSK 253 Same as Block 3
5	1 : 2-103					Format description header for MSK 254 Same as Block 3

Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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PAGE 1 of 2Symbolic Name — TZGDNLXGProgrammer — P. LawsTable Name — Guidance Table of Logged DataInitialization of any Element Required — NoDimensions

Blocks — 2

Bytes/Blocks — 650

Total Bytes — 1300

General Description and Usage

Each block of this table contains logged data for use on the guidance launch displays. The table is accessed by the guidance processor at the appropriate time. Data in the overlap areas (multiples of 150 plus 30 seconds of elapsed time) is saved in formatted form in this table. The table is later accessed by guidance's synchronous exit routine, which merely puts this formatted data out to the D/TV.

Approval	Approval
Patricia Laws	Jay Arnold

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		1-650				Thirty seconds of formatted data for the Guidance Launch Display
2		1-650				Thirty seconds of formatted data for the Yaw Launch Display

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexidecimal

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7.6 TZGDNREF
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PAGE 1 of 3Symbolic Name -- TZGDNREFProgrammer -- P. LawsTable Name -- Guidance Cross-reference TableInitialization of any Element Required -- NoDimensions

Blocks -- 1

Total Bytes -- 1000

General Description and Usage

The purpose of this table is to aid the guidance processor in accessing every parameter used on the guidance displays. The parameters are obtained from appropriate data arrays (telemetry intermediate arrays or launch arrays) according to codes set up in this table. If necessary, computations are performed and the results are stored in the guidance processor's own data array.

Accessing the various parameters is controlled by a macro, which generates various bit combinations, each unique to a specific type of parameter. From the bit combination, the guidance processor determines what parameter to access, where it is found, and whether or not to perform a computation.

Approval	Approval
Patricia Laws	Jay Arnold



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-n* *n = max. 250 words					One word generated for each parameter referenced on any guidance display as described in Table 1.

*Type

 H — Fixed-point half word
 F — Fixed-point full word

 E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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Table 1. Bit Combinations

TYPE OF PARAMETER	BYTE 1	BYTE 2	BYTES 3 & 4
COMPUTATION	0001 0000	DISPLACEMENT INTO GUIDANCE DATA ARRAY	DISPLACEMENT INTO TABLE OF COMP ADDRESSES
LAUNCH	0010 0000	SAME AS ABOVE	DISPLACEMENT INTO TABLE OF LAUNCH CODES
TELEMETRY		SAME AS ABOVE	DISPLACEMENT INTO INTERME- Diate DATA ARRAY
LEAD	001* 0000		
IU	001* 0001		
LGC	001* 0011		
AGS	001* 0100		
AGC	001* 0101		
CSM	001* 0111		
ORBIT	0000 0000	SAME AS ABOVE	DISPLACEMENT INTO GUIDANCE TZGDN SAV

* 1 IF PARAMETER IS TO BE PLOTTED
 0 IF PARAMETER IS NOT PLOTTED

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Symbolic Name — TZGDNSAV

Programmer — P. Laws

Table Name — Guidance Savedata Table

Initialization of any Element Required — Yes

Dimensions

Blocks — 1
Words/Blocks —
Total Words — 36

General Description and Usage

This table is used to record the occurrence or non-occurrence of certain events critical to the guidance processor. It contains information as to the elapsed time and stage of each plot as well as several parameters obtained from subsystems other than telemetry.

Approval	Approval
<i>Patricia Sauer</i>	<i>Jay Arnold</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1					Vehicle ID from orbit
	2-3					X-velocity vector from orbit
	4-5					Y-velocity vector from orbit
	6-7					Z-velocity vector from orbit
	8-9					Total velocity vector
	10-11					Elapsed time for plot - MSK 223
	12-13					Elapsed time for plot - MSK 224
	14-15					Elapsed time for plot - MSK 227
	16-17					Elapsed time for plot - MSK 253
	18-19					Elapsed time for plot - MSK 254
	20					Stage for MSK 223
	21					Stage for MSK 224
	22					Stage for MSK 227
	23					Stage for MSK 253
	24					Stage for MSK 254
	25					Record of past events
	26-27					GET of S-IVB cutoff
	28-29					GMT of liftoff
	30-31					GMT of SPS cutoff
	32					No. logged points - MSK 223
	33					No. logged points - MSK 224
	34-35					GMT
	36					Address of GETMAIN area

*Type
H — Fixed-point half word
F — Fixed-point full word

E — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7.7 SWITCH SELECTOR TABLES

The three data tables needed to process and display switch selector commands are described below.

- a. TZDISPSS (Switch Selector Display Formats Table) — This table contains the format control list information necessary to format all Switch Selector displays and the SLV GN/D No. 7 display.
- b. TZUSSDSP (Switch Selector Data Display Table) — Actual event times and their special characters are saved in this table as they occur. Five samples of the LVDC Orbital Error Words 1, 2, and 3 are also saved.
- c. TZUSSMAC (Switch Selector Command Codes Table) — This table contains a list of all valid command-stage codes that are ordered by time and divided into time segments.

Approval	Approval
<i>L. L. Flowers</i>	<i>Jay Arnold</i>

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PAGE 1 of 2Symbolic Name — TZDISPSSProgrammer — F. FlowersTable Name — Telemetry Switch Selector Display Formats TableInitialization of any Element Required — YesDimensions

Blocks — 9
Bytes/Blocks — 1832
Total Bytes — 16488

General Description and Usage

This data table contains all the format pointer information necessary for the D/TV formatter to display switch selector data and GN/D No. 7 (MSK 1410). Five TKDISP statements are generated by the TKSSW macro from each of the Switch Selector Definition cards supplied by NASA. One statement is generated for each of the following: (1) BCD command name, (2) nominal time, (3) a test to determine if the event has occurred, (4) actual time of event, (5) special character. A total of 75 commands may be shown on each display with a maximum of five displays.

Approval	Approval
<i>J. L. Flowers</i>	<i>Jay Arnold</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		All			None	Format pointer information for SSW page 1 display, text data only (BCD name and nominal time). Continued in block 2
2		0-283 284-1831				Text information format pointers continued Format pointers for dynamic data (actual event times and special characters) for page 1
3-4		All				SSW Page 2 format pointers. Same format as page 1
5-6		All				SSW Page 3 format pointers. Same format as page 1
7-8		All				SSW Page 4 format pointers. Same format as page 1
9		0-563 564-1831				Format pointers for the SLV GN/D No. 7 display (MSK 1410) Not used

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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PAGE 1 of 2Symbolic Name — TZUSSDSPProgrammer — F. FlowersTable Name — Switch Selector Data Display TableInitialization of any Element Required — NoDimensions

Blocks — 1

Bytes/Blocks — 3000

Total Bytes — 3000

General Description and Usage

This data table contains all the information necessary to update a Switch Selector TV display or the SLV GN/D No. 7 display (MSK 1410). Actual event times are saved in this table when they are received. A flag is also set to indicate to the TV formatter that the event has occurred. The five latest detailed error messages are saved (for MSK 1410) in a circular fashion (i. e., the first message is replaced by the sixth, etc.). A part of the table is reserved for storing the special character to be displayed adjacent to each actual time. Loading switch selector inputs by PBI does not change this table.

Approval	Approval
<i>J. L. Flowers</i>	<i>J. Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	0-1	All	All	D	STU	MSG 1 - Time from Error Word 1
	2			X		- Orbital Error Word 1
	3			X		- Orbital Error Word 2
	4			X		- Orbital Error Word 3
	5			X		Flags and pointer
	6-7			D	STU	MSG 2 - Time from Error Word 1
	8			X		- Orbital Error Word 1
	9			X		- Orbital Error Word 2
	10			X		- Orbital Error Word 3
	11			X		Orbital Mode Word
	12-13			D	STU	MSG 3 - Time from Error Word 1
	14			X		- Orbital Error Word 1
	15			X		- Orbital Error Word 2
	16			X		- Orbital Error Word 3
	17			X		Orbital Status Word
	18-19			D	STU	MSG 4 - Time from Error Word 1
	20			X		- Orbital Error Word 1
	21			X		- Orbital Error Word 2
	22			X		- Orbital Error Word 3
	23			X		Not used
	24-25			D	STU	MSG 5 - Time from Error Word 1
	26			X		- Orbital Error Word 1
	27			X		- Orbital Error Word 2
	28			X		- Orbital Error Word 3
	29-46			BITS	None	Flag bits
	47-183			X		Special display characters
	184-728			E	secs.	Actual event times
	729-749					Not used

*Type

H - Fixed-point half word

F - Fixed-point full word

F - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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Symbolic Name — TZUSSMACProgrammer — F. FlowersTable Name — Telemetry Switch Selector Command Codes TableInitialization of any Element Required — YesDimensions

Blocks — 1

Bytes/Blocks — 2200

Total Bytes — 2200

General Description and Usage

This data table contains all of the acceptable Switch Selector Codes for a mission phase ordered by time. Each entry is composed of an eight-bit command code concatenated with a two-bit stage code and contained in a halfword. This table is compared with each Switch Selector input to determine a valid event occurrence. The commands are ordered by ascending expected time of occurrence with another portion of the table defining the time segments. A third part of the table contains a list of commands that drive DDD's.

TZUSSMAC may be replaced any time during a mission by use of the "LOAD SWITCH SELECTOR" PBI on the Telemetry Computer Controller console.

Approval	Approval
<i>F. L. Flowers</i>	<i>Jay Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	0	All	All	F	None	Total number of commands
	1					Relative address of command table
	2					Not used
	3					Relative address of the time address table
	4					Total number of time segments
	5					Rel. address of time segment table
	6					Total number of DDD's
	7					Rel. address of DDD table
	8					Previous command
	9					Matched command - Word 1
	10					Matched Word 2
	11			↓		Not used
	12			F		Input parameters for one frame
	41-229			H		Command table
	230-418			H		Time address table
	419-515			F		Time segments table
	516-546	↓	↓	H	↓	DDD - Driven Command Table
	547-549					Not used

Type
H - Fixed-point half word
F - Fixed-point full word
E - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7.8 MED DATA TABLES

The MED tables contain initial values as stated in Section 7 of TR165/TR170. These values can be changed via the manual entry device. Their use is varied: as constants, in overriding outputs, or in determining when to start or perform a computation.

The MED tables are also used by the computation programs to store cumulative data values, flags and elapsed time.

Approval	Approval
<i>Donna J. McLaughlin</i>	<i>Gaith E. Bagley</i>

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List of Manual Entry Device Data Tables

Array Name	Number of Blocks	Bytes/Block	Total Bytes	Responsible Programmer
TZMEDCSM	1	800	800	D. McCabe
TZMEDLEM	1	425	425	M. Cox
TZMEDSIU	1	40	40	D. McCabe

Approval	Approval
<i>Donna J. McCabe</i>	<i>Garth E. Bagley</i>

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7.9 LOW-SPEED PROCESSING CONTROL TABLES

TZvehSDB

To maintain special processing and data table continuity, the low-speed/SMEK data array is identical to the high-speed array. Since low-speed/SMEK messages contain a subject of the high-speed frame, many vehicle oriented parameters are not applicable to a given low-speed format; hence the status bytes for these parameters are set to static-dead (by reading the appropriate data table into the status byte area (TMQLSDCD), or by ORing into the status bytes using the data table TMSMEKIN). The data tables are generated by invoking the TKQTvehK macro and using the 'LS=' attributes to set the static-dead bits. This assembly generates one data table per vehicle and one block per applicable low-speed format.

Approval	Approval
<i>ST Vaytoski</i>	<i>Jack E. Bagley</i>

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List of Low-Speed Task Control Tables

Array Name	Number of Blocks	Bytes/Block	Total Bytes	Responsible Programmer
TZAGCSDB	4	480	1920	D. Voytoski ↓
TZCSMSDB	14	632	8848	
TZLGCSDB	5	496	2480	
TZLEMSDB	10	456	4560	
TZAMDSDB	5	152	760	
TZAGSSDB	2	120	240	
TZSIUSDB	6	480	2800	

Approval	Approval
<i>D. Voytoski</i>	<i>Garth E. Bagley</i>

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7.10 LOW-SPEED DATA TABLES

7.10.1 LOW-SPEED FORMAT HISTORY TABLES

TZLSFM**

A history table is maintained for each low-speed format that is displayed. Each table is identified by the internal format number in the last two characters of the data table name. The history tables are blocked by low-speed messages, and N message blocks constitute all the information necessary to update the required number of low-speed/SMEK display columns. When N messages have been logged, the table is considered initialized for that low-speed format. After initialization, each succeeding message replaces the oldest message in the appropriate history table. Therefore, the latest N messages are always available.

Each message contains only the engineering values applicable to the associated low-speed format. As the parameters are logged, their status indication are also saved. The parameter's location in the message determines the location of the respective status byte. The parameter's displacement into the logged message, divided by four, yields the displacement of the parameter's status indication. The status indication array is established at the end of each logged message.

TZLOGDIC

This table is a dictionary of the low-speed/SMEK messages processed and saved in each TZLSFM** table. The format of the dictionary is described in Figure 1 on the following page.

A description of each history table (TZLSFM**) is contained in the first section of the dictionary. Four bytes are allocated for each low-speed/SMEK format. The internal format number is used to determine the proper format entry. The first halfword of each entry contains the length in bytes of the saved parameters per displayed message. If the length is zero, this format is not displayed. The third byte represents the block number of the latest message in TZLSFM**. The fourth byte is a flag indicating "block cycling"; zero indicates that table is not full, and F_{16} indicates that more than "N"

messages have been logged. Therefore, the latest "N" messages are retained, and the oldest message is determined by the block number-flag indication.

Approval	Approval
<i>ES Pruitt</i>	<i>Garth E. English</i>

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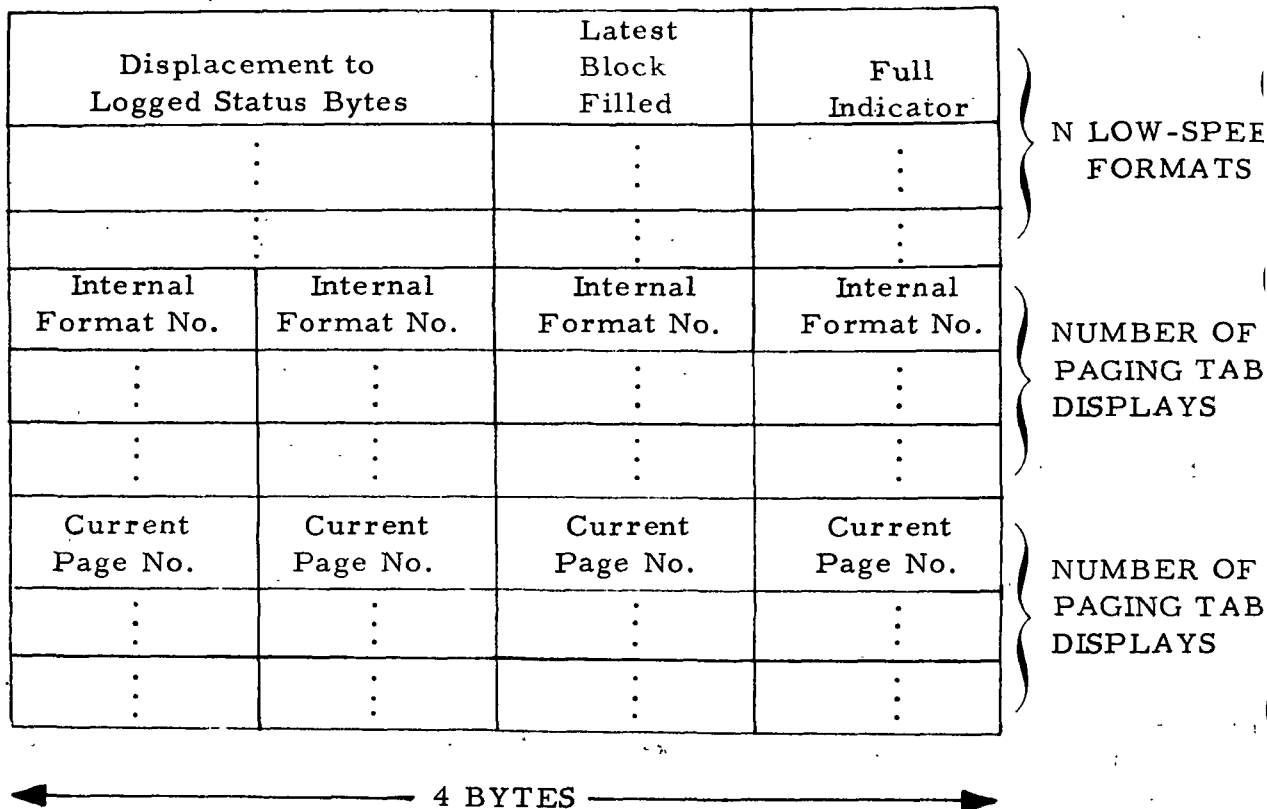
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Figure 1.

The second section of the dictionary contains the internal format number for the associated low-speed display. This dictionary section is ordered by display internal number (DIN)*. This structure provides a cross-reference of the low-speed format and MSK. A zero entry indicates a DIN for a non-existent mission display.

The third section contains the current page number for each low-speed display set, and it is ordered by DIN. The number three through seven indicates the last display page containing data.

Initialization of the dictionary is performed by invoking the TKLSDISP macro, which uses the "LS=" option in the TKQTveh macro. The form of the TKLSDISP macro is

```
TKLSDISP MSK = low-speed display number,
          LS  = low-speed external format number.
```

*See Telemetry D/TV Format Tables writeup.

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List of Low-Speed Format History Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	External Format No.	Responsible Programmer
TZLSFM03	15	720	10800	03	D. Prewit
TZLSFM04	15	720	10800	04	
TZLSFM05	15	880	13200	05	
TZLSFM06	15	400	6000	06	
TZLSFM07	15	680	10200	09	
TZLSFM08	15	1120	16800	20	
TZLSFM09	15	1160	17400	21	
TZLSFM10	15	1240	18600	22	
TZLSFM11	15	1080	16200	23	
TZLSFM18	15	1080	16200	60	
TZLSFM19	15	1280	19200	61	
TZLSFM20	15	1360	20400	62	
TZLSFM21	15	960	14400	63	
TZLSFM22	15	600	9000	64	
TZLSFM23	15	560	8400	67	
TZLSFM24	15	680	10200	70	
TZLSFM25	15	1280	19200	71	
TZLSFM26	15	240	3600	80	
TZLSFM27	15	240	3600	81	
TZLSFM28	15	240	3600	82	
TZLSFM29	15	240	3600	83	
TZLSFM30	15	240	3600	84	
TZLOGDIC	1	352	352	—	

Approval	Approval
<i>ED Prewit</i>	<i>Jack E. Bigley</i>

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7.10.2. LOW-SPEED MESSAGE RECEIPT TABLES

TZCSMLLS, TZLEMLLS, TZSLVLLS

These data tables are designed to provide historical information to their associated Low-Speed Logger displays. Each table is blocked by low-speed/SMEK messages, and N messages are saved. After N messages have been logged, each additional message replaces the oldest message in the table.

Only the following information is retained from the input message.

Byte 1	—Flags	Bit 1 Invalid Station code
		2 End of Header Reject
		3 Major Sync Reject
		4 Format Reject
		5 Time Reject
		6 Display
		7 Rebroadcast
		8 SMEK message
Byte 2	— External Format Number	
Byte 3	— External Station code	
Byte 4	— Internal Station code	
Byte 5	— Message Class	
Byte 6	— Mode of message	
Byte 7	— Number of Parity Errors	
Byte 8	— Number of Minor Sync Errors	
Bytes 9-16	— GMT of Low-Speed Assembly	
Bytes 17-24	— GMT of Message Receipt	

TZLGDICT

This data table is a dictionary of the three message logger tables (TZCSMLLS, TZLEMLLS, TZSLVLLS). Information contained in this table is block number of latest logged message, number of messages received, and page number presently being viewed.

Approval	Approval
<i>ESDremit</i>	<i>Gauth E. Bapley</i>

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List of Low-Speed Message Log Tables

Table Name	N No. of Blocks	Bytes/ Block	Total Bytes	External Formats Used	Lines- Pages	Responsible Programmer
TZCSMLLS	60	24	1440	3, 4, 5, 6, 9, 20 21, 22, 23, 80, 81, 82	20-3	D. Prewit
TZLEMLLS	60	24	1440	60, 61, 62, 63, 64, 67, 70, 71, 83, 84	20-3	D. Prewit
TZSLVLLS	60	24	1440	40, 42, 43, 51, 52, 53	20-3	D. Prewit
TZLGDICT	3	8	24			D. Prewit

Approval	Approval
<i>ED Prewit</i>	<i>Jack E. Bagley</i>

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7.11 DISPLAY FORMATS TABLES

All of the information necessary to format a High-Speed, Playback or Paging Tab TV display is contained in the three tables described below. Each table is divided into blocks, one block for each display (considering pages 1, 2 and 3 of a Paging Tab as a single display). Format control lists for special displays (Switch Selector, Guidance, etc.) may be found in the section describing the tables related to that particular processor. This section contains the following tables:

- a. TZDISPPN — Paging Tab Displays Format Control Lists Table (TABPG1, TABPG2, TABPGN).
- b. TZDISPTH — High-Speed Displays Format Control Lists Table (TABHS)
- c. TZDISPTP — High-Speed Playback Displays Format Control Lists Table (TABPD).

Approval	Approval
Patricia Sasso	Jay Arnold

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7.11 TZDISPTH

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Symbolic Name — TZDISPTHProgrammer — P. LawsTable Name — TABHS Format Control ListsInitialization of any Element Required — YesDimensions

Blocks — 43

Words/Blocks — 274

Total Words — 11,782

General Description and Usage

This data table contains the format pointers necessary to control the D/TV formatting of all data values appearing on TABHS displays. Each block of the table contains the format pointers describing one MSK. At the beginning of each block is control information related to that particular MSK. The control information consists of one halfword for each data type and logic requirement ever expected to appear on TABHS displays. If a particular data type is applicable to a display, its halfword control portion will contain the number of bytes displacement from the first of the control information into the block where its format pointers are located. Otherwise, that control portion is zero, and there will be no format pointers for that data type.

Approval	Approval
Patricia Smith	Jay Arnold



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0-1				↑ to AGC format pointers or 0
		2-3				↑ to CSM format pointers or 0
	2	0-1				↑ to S-IB format pointers or 0
		2-3				↑ to S-IU format pointers or 0
	3	0-1				↑ to display request format pointers or 0
		2-3				↑ to S-IIB format pointers or 0
	4	0-1				↑ to limit data format pointers or 0
		2-3				↑ to LM format pointers or 0
	5	0-1				↑ to LGC format pointers or 0
		2-3				↑ to AGS format pointers or 0
2-43	6	0-1				↑ to AEROMED format pointers or 0
		2-3				Spare
	7 - > (variable)					Format pointers for data types where applicable
						Format pointers for display request
						Same as above

*Type
 H — Fixed-point half word
 F — Fixed-point full word

E — Single-precision (floating-point)
 D — Double-precision (floating-point)
 X — Hexadecimal

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7.11 TZDISPTP
DATE 2/9/68 (EORP)
REV
PAGE 1 of 2Symbolic Name — TZDISPTPProgrammer — P. LawsTable Name — TABPD Format Control ListsInitialization of any Element Required — YesDimensions

Blocks — 34

Words/Blocks — 274

Total Words — 9316

General Description and Usage

This data table contains the format pointers necessary to control the D/TV formatting of all data values appearing on TABPD displays. Each block of the table contains the format pointers describing one MSK. At the beginning of each block is control information related to that particular MSK. The control information consists of one halfword for each data type and logic requirement ever expected to appear on TABPD displays. If a particular data type is applicable to a display, its halfword control portion will contain the number of bytes displacement from the first of the control information into the block where its format pointers are located. Otherwise, that control portion is zero, and there will be no format pointers for that data type.

Approval	Approval
Patricia Sauer	Jerry Arnold



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1		0-1			↑ to AGC format pointers or 0
			2-3			↑ to CSM format pointers or 0
	2		0-1			↑ to S-IB format pointers or 0
			2-3			↑ to S-IU format pointers or 0
	3		0-1			↑ to display request format pointers or 0
			2-3			↑ to limit data format pointers or 0
	4		0-1			↑ to LM format pointers or 0
			2-3			↑ to LGC format pointers or 0
	5		0-1			↑ to AGS format pointers or 0
			2-3			↑ to AEROMED format pointers or 0
2-34	6 -> (variable)					Format pointers for data types where applicable Format pointers for display request
						Same as above

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7.12 DIGITAL DISPLAY DRIVER TABLES

These tables contain all the information required to drive the DDD's associated with the input and intermediate telemetry data processing. They also contain a history of the current status of the DDD's. Currently there is one table for each vehicle input frame.

A DDD table consists of the following:

- a. A fullword containing the number of DDD's in the table
- b. The status section, which has a fixed length entry for each DDD. Each entry contains an indicator that shows if the DDD is on or off and the system index number.
- c. The logic section, which has a variable length entry for each DDD. Each entry contains a pointer to the corresponding status entry, the logic used to determine if the DDD should be on, and an address for every bit that is used with this logic.

Approval	Approval
<i>A. Comwell</i>	<i>Garth E. Bagley</i>

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List of DDD Tables

Z-table	No. of Blocks	Bytes/ Block	Total Bytes	Vehicle	Responsible Programmer
TZADDDTB	1		1200	AGC	J. Paris
TZCDDTB	2	2100	4200	CSM	E. Solomon
TZGDDDTB	1		1000	LGC	J. Taylor
TZIDDDTB	1		500	S-IB	M. Gamble
TZLDDDTB	1		2400	LM	J. Powell
TZMDDDTB	1		400	AMD	J. Powell
TZSDDDTB	1		912	AGS	J. Taylor
TZUDDDTB	1		2500	S-IU	R. Harrington

Approval	Approval
<i>H. A. Gamble</i>	<i>Keith E. Bagley</i>

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7.13 SYSTEMS PLOTS DATA TABLES

All of the plotted points and digitals for the Systems Plots displays are saved (in TV code form) in these data tables. There exists a separate table for each type of plot. Each table contains one block (two blocks for the 200-second plots) for each display of that plot-type. The tables currently included in this group are given below.

Type	200-sec.	10-min.
LM EECOM		X
LM GNC		X
CSM EECOM	X	X
CSM GNC	X	X

Approval	Approval
<i>J. Powell</i>	<i>Jay Arnold</i>

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7.13 TZDISPLE
DATE 2/9/68 (EORP)
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PAGE 1 of 2Symbolic Name — TZDISPLEProgrammer — J. PowellTable Name — LM EECOM Ten-minute System Plot TableInitialization of any Element Required — NoneDimensions

Blocks — 3

Bytes/Block — 1608

Total Bytes — 4824

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the LM EECOM ten-minute system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out; and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>J. Powell</i>	<i>Jerry Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
2	52-402	2-1398		X		Formatted points and digitals
						Same as block 1
3						Same as block 1

* Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7.13 TZDISPLG
DATE 2/9/68 (EORP)
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PAGE 1 of 2Symbolic Name — TZDISPLGProgrammer — J. PowellTable Name — LM GNC Ten-minute System Plot TableInitialization of any Element Required — NoneDimensions

Blocks — 2

Bytes/Block — 1608

Total Bytes — 3216

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the LM GNC ten-minute systems plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
J. Powell	Jay Arnold



Detailed Contents.

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
2	52-402	2-1398		X		Formatted points and digitals
						Same as block 1

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Symbolic Name — TZDISPMEProgrammer — R. SamuelsohnTable Name — CSM EECOM Ten-minute System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 8

Bytes/Blocks — 1608

Total Bytes — 12864

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM EECOM ten-minute system plots. It also contains all of the formatted data (in TV code form) which will be saved until the plot times out, and counters which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>R. Samuelsohn</i>	<i>Jay Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-402	2-1398		X		Formatted points and digitals
2	Same as block 1					
3						
4						
5						
6						
7						
8						

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7.13 TZDISPMG
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Symbolic Name — TZDISPMG

Programmer — R. Samuelsohn

Table Name — CSM GNC Ten-minute System Plot Table

Initialization of any Element Required — Yes

Dimensions

Blocks — 11

Bytes/Blocks — 1608

Total Bytes — 17688

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM GNC ten-minute system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>R. Samuelsohn</i>	<i>Jay Arnold</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted pointers
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-402	2-1398		X		Formatted points and digitals
2						Same as block 1
3						
4						
5						
6						
7						
8						
9						
10						
11						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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7.13 TZDISPSE
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REV
PAGE 1 of 2Symbolic Name — TZDISPSEProgrammer — R. SamuelsohnTable Name — CSM EECOM 200-second System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 8

Bytes/Block — 2208

Total Bytes — 17664

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM EECOM 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>R. Samuelsohn</i>	<i>Jay Arnold</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-2	1	1-4		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointers for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-1102	2-4198		X		Formatted points and digitals
3-4						Same as 1-2
5-6						
7-8						↓

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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PAGE 1 of 2Symbolic Name — TZDISPSGProgrammer — R. SamuelsohnTable Name — CSM GNC 200-second System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 22

Bytes/Blocks — 2208

Total Bytes — 48576

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM GNC 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>R. Samuelsohn</i>	<i>Jay Arnold</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-2	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-110	2-41	98	X		Formatted points and digitals
3-4						Same as block 1-2 
5-6						
7-8						
9-10						
11-12						
13-14						
15-16						
17-18						
19-20						
21-22						

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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7.14 REBROADCAST DATA TABLES

TZLSREB* - (A-F)

These data tables are used to save low-speed telemetry/SMEK messages for possible rebroadcast. Up to three messages may be saved for both CSM and SLV/LM. The saved messages contain a fullword indicating station routing code, eight bytes of message description, and the variable length message in Baudot Code (one six-bit unit to each byte).

TZLSFMTS

This data table is constructed in such a manner that the beginning of the table contains a directory of address constants of each appropriate rebroadcast format (tabular description of required output passed to the teletype formatter). This data table is generated using the TKLSFMT and TKXTTY macros and is used in a locate mode only.

Approval	Approval
<i>SF Vaytoski</i>	<i>Garth E. Bigley</i>

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List of Rebroadcast Data Tables

Array Name	Number Blocks	Bytes/Block	Total Bytes	Responsible Programmer
TZLSREBA	1	1000	1000	D. Voytoski ↓
TZLSREBB	1	1000	1000	
TZLSREBC	1	1000	1000	
TZLSREBD	1	1000	1000	
TZLSREBE	1	1000	1000	
TZLSREBF	1	1000	1000	
TZLSFMTS	2	2500	5000	

Approval	Approval
<i>as F Voytoski</i>	<i>Robert E. Bagley</i>



7.15 TASK RESOURCE TABLES

These tables, which are used as effective resource tables by the Telemetry tasks that need more permanent save area than the 80-byte resource table assigned to them, are described in their respective task writeups.

Approval	Approval
<i>F. L. Flowers</i>	<i>Jay Arnold</i>

TELEMETRY DATA TABLES FOR LMSP

7. TELEMETRY DATA TABLES FOR LMSP

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TZCCALIB, TZICALIB, TZLCALIB, TZLGICAL1, TZLGICAL2,
TZLGICAL3, TZLGICAL4, TZMCALIB, TZSCALIB, TZTCALIB,
TZUCALIB
- 7.18 Cross-Reference Tables
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TZCXREFS, TCGXREF1, TZGXREF2, TZGXREF3, TZGXREF4,
TZIXREFS, TZLSXREF, TZLXREFS, TZMXREFS, TZSXREFS,
TZTXREFS, TZUXREFS
- 7.19 Limit Tables
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- 7.20 High-Speed Vehicle Data Arrays
TZHSAGCL, TZHSAGCP, TZHSAGSL, TZHSAGSP, TZHSAMDCL,
TZHSAMDP, TZHSCSML, TZHSCSMP, TZHSLEML, TZHSLEMP,
TZHSLGCL, TZHSLGCP, TZHSSICL, TZHSSIIL, TZHSSIUL
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MISSION LMSP

7.16 CONTROL TABLES

Basic control information needed by the subsystem is saved in the control tables described below.

- a. TZCCMASK (CSM Category Mask Table) — The table accomplishes the same purpose for the CSM frame that TZLCMASK does for the LM.
- b. TZLCMASK (LM Category Mask Table) — This table controls the parameters to be limit sensed for each of the LM limit categories. A request for the limit sensing of a category (by PBI) causes interrogation of that category's control bit for each parameter in the frame.
- c. TZSTATUS (Telemetry Status Table) — Certain control information that is shared by two or more tasks is stored in this table. It may be read and updated by any task. The contents of this table are displayed (MSK's 2001 and 2002) by the Telemetry Supervisor.

Approval	Approval
<i>W. H. Norden</i>	<i>Geoff E. Bagley</i>

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7.16 TZCCMASK
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MISSION LMSP

Symbolic Name — TZCCMASK

Programmer — R. Harrington, R. Samuelsohn

Table Name — CSM Category Mask Table

General Description and Usage

TZCCMASK is structured to parallel (in a one-to-one correspondence) the CSM intermediate array. For each category a bit is designated in the word. It is set to one if the parameter falls in that category. Otherwise it is zero (in cases of a double-word parameter the second word in the table is set to zero). Each bit is used, along with the PBI's, to manipulate the limit sense table.

Approval	Approval
<i>[Signature]</i>	<i>Garth E. Begley</i>

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MISSION LMSP

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	All		0			Category A — SCS rates
			1			B — SCS att. error
			2			C — OSS
			3			D — ISS main
			4			E — CM/SM sep.
			5			F — SPS burn
			6			G — Low-bit rate
			7-14			Spare
			15			All CSM GNC categories
			16			Category J — Launch
			17			K — High-bit rate
			18			L — Main EECOM sum.
			19			M — ECS/Cyro. cont. sum.
			20			N — EPS cont. sum.
			21			O — C/I cont. sum.
			22			P — Calc.
			23			T — Orbit
			24			U — Rates
			25			V — FC1
			26			W — FC2
			27			X — FC3
			28			Y — Structures
			29			Z — Entry Phase
			30			Spare
			31			All CSM EECOM categories

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexidecimal

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 MISSION LMSP

Symbolic Name — TZLCMASK

Programmer — R. Harrington, R. Samuelsohn

Table Name — LM Category Mask Table

General Description and Usage

TZLCMASK is structured to parallel (in a one-to-one correspondence) the LM intermediate array. For each category a bit is designated in the word. It is set to one if the parameter falls in that category. Otherwise it is zero (in cases of doubleword parameters, the second word in the MASK Table is set to zero). Each bit is used along with PBI's to manipulate the Limit Sense Table.

Approval	Approval
<i>R. Harrington</i>	<i>Robert E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
	All		0			Category W — Launch
			1			X — Coast
			2			Y — Abort
			3			All LM GNC catagories
			4			Category V — LBR
			5-26			Spare
			27			All LM EECOM categories
			28			Category B — Staged
			29			C — LBR
			30			D — S-band
			31			E — ACS batt

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexidecimal

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7.16 TZSTATUS
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MISSION LMSPSymbolic Name — TZSTATUSProgrammer — R. Harrington, R. SamuelsohnTable Name — Telemetry Status TableGeneral Description and Usage

TZSTATUS indicates the present status of the system and contains items that are used by two or more tasks on the system.

Approval	Approval
<i>Allen Gordon</i>	<i>Garth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Name	Type*	Description and Range
		0-7		GMTLA	D	CSM GMTLO
		8-15		GMTLB	D	LM GMTLO
		16-23		GMTLS	D	Effective GMTLO for SLV
		24-31		DLGCT	D	Δ LGC time - K-factor
		32-39		DAGCT	D	Δ AGC time - K-factor
		40-47		DAMDT	D	Δ AMD time - K-factor
		48-55		CMCGT	D	Corrected CMC GET
		56-63		OLIFT	D	ESOS time liftoff
		64-71		OTWRJ	D	ESOS time tower jet
		72-79		OS4CO	D	ESOS time S-IVB CLO
		80-87		OSLAS	D	ESOS time S-IVB CSM separation
		88-95		OLES	D	ESOS time LES abort
		96-107		VALVH	X	Vehicle validity array
		108	0-1	ELIFT	X	ESOS positive liftoff
			2-3	ETWRT	X	ESOS positive tower jet
			4-5	ES4CO	X	ESOS positive S-IVB CLO
			6-7	ESLAS	X	ESOS positive S-IVB CSM separation
		109	0-1	ELES	X	ESOS positive LES abort
		110-111				Spare
		112	0-1	ROSCS	X	SLV rebroadcast switch
			2-3	LMLIM	X	LM limit-sense switch
			4-5	IULIM	X	IU/S-IVB limit-sense switch
			6-7	S2LIM	X	SII limit-sense switch
		113	0-1	SILIM	X	SIC limit-sense switch
			2-3	ROSCC	X	CSM rebroadcast control switch
			4-5	CMLIM	X	CSM limit-sense switch
			6-7			Spare
		116		CCATS	F	CSM category save area
		120		CCACC	F	CSM category accumulator
		124		LCATS	F	LM category save area
		128		LCACC	F	LM category accumulator
		132		LSMSG	H	Low-speed message count for report process
		136				Spare

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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Block	Word	Byte	Bit	Name	Type*	Description and Range
		140		SMCNT	F	High-speed source module dictionary
		144		SMCN1	F	High-speed source module (1)
		148		SMCN2	F	High-speed source module (2)
		152		SMCN3	F	High-speed source module (3)
		156		LSTAT	F	High-speed live active table control
		160		AGLCT	F	AGC high-speed input status word (live)
		164		CMLCT	F	CSM high-speed input status word (live)
		168		LGLCT	F	LGC high-speed input status word (live)
		172		LMLCT	F	LM high-speed input status word (live)
		176		AMLCT	F	AMD high-speed input status word (live)
		180		ASLCT	F	AGS high-speed input status word (live)
		184		IULCT	F	IU/S-IV high-speed input status word (live)
		188		SILCT	F	SIC high-speed input status word (live)
		192		S2LCT	F	SII high-speed input status word (live)
		196		PSTAT	F	H/S P/D active table control
		200		AGPCT	F	AGC high-speed input status word (P/D)
		204		CMPCT	F	CSM high-speed input status word (P/D)
		208		LMPCT	F	LM high-speed input status word (P/D)
		212		AMPCT	F	AMD high-speed input status word (P/D)
		216		ASPCT	F	AGS high-speed input status word (P/D)

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Block	Word	Byte	Bit	Name	Type*	Description and Range
		220		IUPCT	F	IU/S-IV high-speed input status word (P/D)
		224		SIPCT	F	SIC high-speed input status word (P/D)
		228		S2PCT	F	SII high-speed input status word (P/D)
		232		SMKA1	F	SMEK panel A, word 1 (GNC)
		236		SMKA2	F	SMEK panel A, word 2 (GNC)
		240		SMKB1	F	SMEK panel B, word 1 (EEC)
		244		SMKB2	F	SMEK panel B, word 2 (EEC)
		248		SMKC1	F	SMEK panel C, word 1 (BSE)
		252		SMKC2	F	SMEK panel C, word 2 (BSE)
		256		SMKD1	F	SMEK panel D, word 1 (LM/GNC)
		260		SMKD2	F	SMEK panel D, word 2 (LM/GNC)
		264		SMKE1	F	SMEK panel E, word 1 (LM/EEC)
		268		SMKE2	F	SMEK panel E, word 2 (LM/EEC)
		272		SMKF1	F	SMEK panel F, word 1 (AMD)
		276		SMKF2	F	SMEK panel F, word 2 (AMD)
		280		REBSA	F	SLV REB save data pointer, word 1
		284		REBSB	F	SLV REB save data pointer, word 2
		288		REBSC	F	SLV REB save data pointer, word 3
		292		REBCA	F	CSM REB save data pointer, word 1
		296		REBCB	F	CSM REB save data pointer, word 2
		300		REBCC	F	CSM REB save data pointer, word 3
		304		TS4IG	H	TMEVENT - S-IVB ignition
		306		TS4CO	H	TMEVENT - S-IVB cutoff
		307		PHASE	X	Mission phase, 0-255

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Block	Word	Byte	Bit	Name	Type*	Description and Range
			0	SHDSI	X	SIB shutdown PBI (1-shutdown)
			1	DSPSW	X	TMSTATUS Display Switch (1=5 sec.)
		308	2	CSMES	X	CSM event source/playback (PBI)
			3	LEMES	X	LM event source/playback (PBI)
			4	LNCHA	X	Launch A - Flag
			5	LNCHB	X	Launch B - Flag
			6-7		X	Spare
			0	PLSSV	X	PLSS in volt mode
			1	PLSSC	X	PLSS in current mode
		309	2	LHAGS	X	AGS local horizontal
			3	LHLGC	X	LGC local horizontal
			4	GBIAS	X	General bias comp.
			5	DPSQC	X	DPS quantity control
			6	EMUC5	X	EMU computation start
			7	SLUSS	X	SLV scale selection
			0	LBAT1	X	LM battery comp. PBI's
			1	LBAT2	X	LM battery comp. PBI's
			2	LBAT3	X	LM battery comp. PBI's
		310	3	LBAT4	X	LM battery comp. PBI's
			4	LBAT5	X	LM battery comp. PBI's
			5	LBAT6	X	LM battery comp. PBI's
			6	LAPSC	LM	APS calc. start
			7			Spare
		311				Spare
		312		HICSI	H	High-speed input char. count SIC
		314		HICS1	H	High-speed input char. count SIC
		316		HICIU	H	High-speed input char. count IU/S-IVB
		318		HICCM	H	High-speed input char. count CSM
		320		HICAG	H	High-speed input char. count AGC
		322		HICAC	H	High-speed input char. count AGC
		324		HICLM	H	High-speed input char. count LM
		326		HICLG	H	High-speed input char. count LGC

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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Block	Word	Byte	Bit	Name	Type*	Description and Range
		328		HICLC	H	High-speed input char. count LGC
		330		HICAS	H	High-speed input char. count ACS
		332		HICAM	H	High-speed input char. count AMD
		334		HICST	H	High-speed input char. count SII
		336		HICS2	H	High-speed input char. count SIT
		338		RSDPN	H	Line FMT/SF sync. array (11H)
		339				Spare
		340		AUPLP	F	AGC down link ID's
		344		AUPLR	F	AGC down link ID's
		348		AUPLC	F	AGC down link ID's
		352		AUPLU	F	AGC down link ID's
		356		GUPLP	F	LGC down link ID's
		360		GUPLR	F	LGC down link ID's
		364		GUPLG	F	LGC down link ID's
		368		GUPLU	F	LGC down link ID's
		372-411				Spare

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7.17 CALIBRATION TABLES

The telemetry calibration tables contain the coefficients scale factors and data point coordinates required to calibrate the PCM data in the INPUT STREAM. The curve code from the cross-reference table dictates what and how much can be used in the calibration table for a particular parameter. A curve code (which can range from one to five) indicates that coefficients are provided to calibrate the parameter in a polynomial of the first through fifth degree. (NOTE: a fifth-degree polynomial requires six coefficients.) A curve code of six indicates a simple scale factor is provided for calibration. A curve code of 12 states that raw points in X- and Y- coordinate form are provided, where the first word of such a case is a count of the number of points involved. For a description of all possible curve codes, see Memo TLQCAL, by J. Minnoch, dated November 8, 1966.

Approval	Approval
<i>[Signature]</i>	<i>Garth E. Bagley</i>



List of Calibration Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	Vehicle	Responsible Programmer
TZAGCAL1	1	2800	2800	AGC	J. Taylor
TZAGCAL2	1	2800	2800	AGC	
TZAGCAL3	1	2800	2800	AGC	
TZAGCAL4	1	2800	2800	AGC	
TZAGCAL5	1	2800	2800	AGC	
TZCCALIB	4	1750	7000	CSM	F. White
TZICALIB	1	500	500	SIC	M. Gamble
TZLCALIB	1	3500	3500	LM	P. Laws
TZLGICAL1	1	2500	2500	LGC	J. Taylor
TZLGICAL2	1	2500	2500	LGC	
TZLGICAL3	1	2500	2500	LGC	
TZLGICAL4	1	2500	2500	LGC	
TZMCALIB	1	608	608	AMD	
TZSCALIB	1	1000	1000	AGS	F. White
TZTCALIB	1	1200	1200	SII	J. Paris
TZUCALIB	4	1250	5000	SIU	R. Harrington

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7.18 CROSS-REFERENCE TABLES

The cross-reference tables used by telemetry are constructed to provide a convenient means of calibrating and storing the input data in a real time operation. The tables, however, are not generated in real time.

Each cross-reference table is constructed by parameter in the order of the parameters in the "INPUT STREAM". There are three fullword entries for each parameter. The first halfword provides a bit count of the number of bits the parameter occupies in the INPUT STREAM. The second halfword is a relative position in some intermediate array where the calibrated parameter will be stored. The third halfword provides a curve code that directs the real time calibration program in the manner of usage of the coefficients or scale factors provided. The fourth halfword is a relative position in a calibration table where the coefficients or scale factors or curve points can be found for this parameter. The last word contains coded information defining the main and subcommutated line formats, in which the parameter is supposed to be present.

Approval	Approval
<i>J Van Norden</i>	<i>Garth E. Bagley</i>

List of Cross-Reference Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	Vehicle	Responsible Programmer
TZAXREF1	1	2800	2800	AGC	J. Taylor
TZAXREF2	1	2800	2800	AGC	↓
TZAXREF3	1	2900	2800	AGC	
TZAXREF4	1	2900	2800	AGC	
TZAXREF5	1	2800	2800	AGC	
TZCXREFS	4	1750	7000	CSM	F. White
TZGXREF1	1	2500	2500	LGC	J. Taylor
TZGXREF2	1	500	2500	LGC	↓
TZGXREF3	1	2500	2500	LGC	
TZGXREF4	1	2500	2500	LGC	
TZIXREFS	1	500	500	SIC	
TZLXREFS	1	3500	3500	LM	P. Laws
TZMXREFS	1	608	608	AMD	J. Taylor
TZSXREFS	1	1000	1000	AGS	F. White
TZTXREFS	1	1200	1200	SII	J. Paris
TZUXREFS	4	1250	5000	S-IU	R. Harrington

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7.20 HIGH-SPEED VEHICLE DATA ARRAYS

These data tables contain the most recent values for all high-speed telemetry parameters and the special computations results derived from these parameters. Each array may also contain information that must be saved from one processing cycle to the next. These tables are often called "intermediate data arrays".

Each array is mapped by a QTDATA macro, which describes the relative location, length and attribute type of each parameter in the array (see Data Structure Description and Access, Section 5.1.4). The latest version of the mapping macro is kept in the mission macro library. Thus a parameter may be added to or deleted from the system by modifying the mapping macro and re-assembling each load module or table referencing the array. The length of each array is defined in an EQU statement by the mapping macro and is named vDLNG (where v is the single character vehicle code). The status (dead, off-scale, out-of-limits, etc.) of each parameter is kept in a block at the end of the array. One byte of storage is allocated for the status of each parameter. The status bytes begin at a displacement of vDLNG into the array and occupy exactly vDLNG/4 bytes. Therefore, the status of any parameter in the array may be referenced by specifying a displacement of

$$vDLNG + (\text{internal parameter name})/4.$$

It should be noted that the live array and the playback array for a vehicle have exactly the same format; i. e., a given parameter will have the same displacement in both arrays.

Naming of the arrays was done according to the following convention:

TZHSveht

where veh = three-character vehicle code

t = $\begin{cases} \text{L for live data} \\ \text{P for playback data.} \end{cases}$

Figure 1 describes the arrangement of all intermediate data arrays. The lists below describe the specific information found in the Array Header and Parameter Status Indicators.

Approval	Approval
<i>Alan Norden</i>	<i>Garth E. Bagley</i>

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Array Header

0	7 8	15 16	23 24	31
Control Bits	Time Format	Vehicle	Station	
Data Type	Spare	Spare	Spare	

Control Bits:

A	B	M	B	C	O	S	O
---	---	---	---	---	---	---	---

A — Active
 B — Burst protect
 M — Missing
 B — Burst protect
 C — CCATS validity - bit error
 S — Sub-frame sync. error

Data Type: 0 = Live
 4 = Playback

Parameter Status Indicator

1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	H

A — Missing (special computations only)
 B — Off-scale low
 C — Off-scale high
 D — Dead (not in external-line format)
 E — Static (sub-frame sync error)
 F — Limit-sense alarm (secondary)
 G — Parity error (low-speed only)
 H — Limit-sense alarm (primary)



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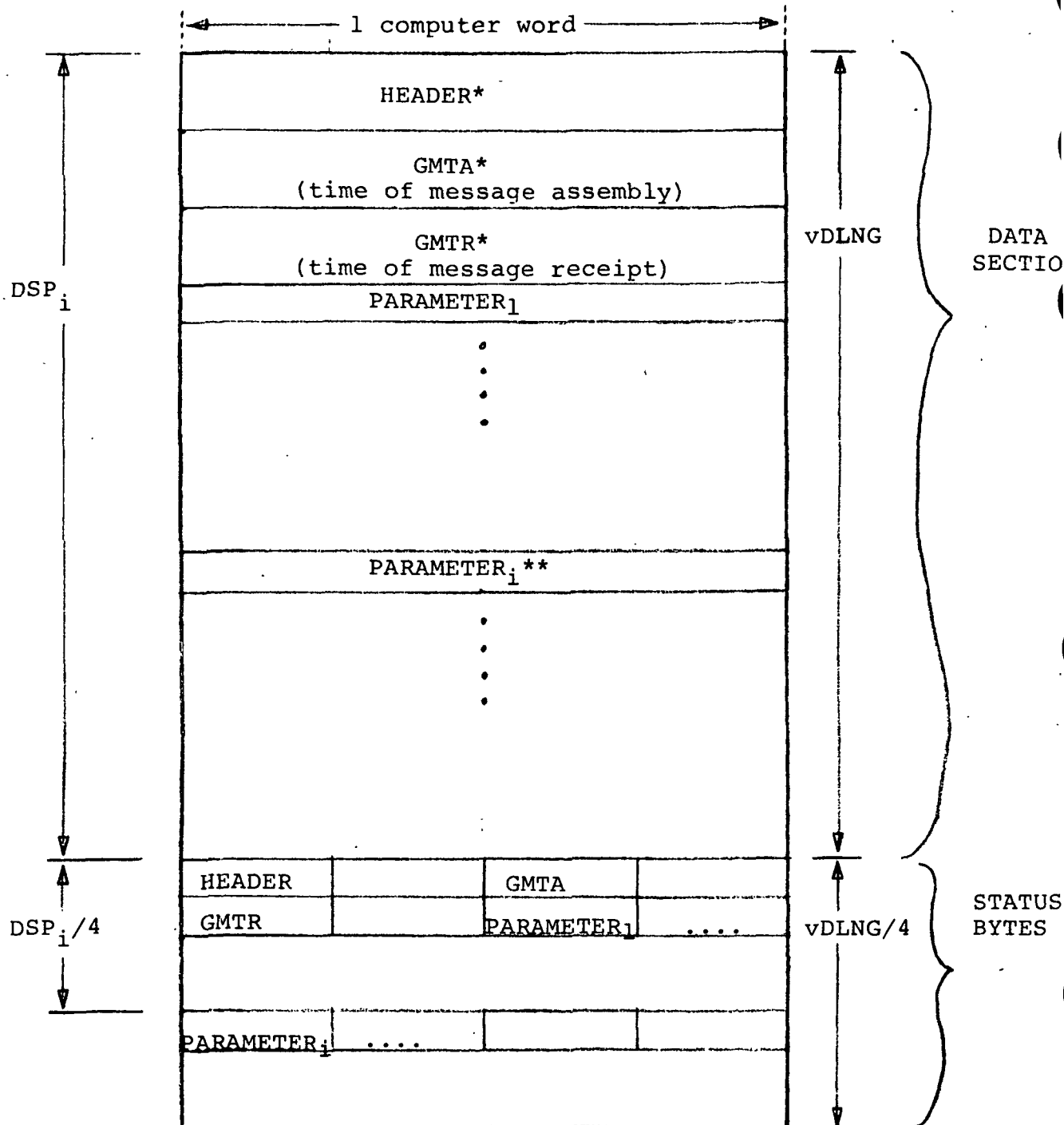
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Table 1. High-Speed Vehicle Data Arrays

Array Name	Number Blocks	Bytes/Block	Total Bytes	vDLNG	Responsible Programmer
TZHSAGCL	1	3400	3400	2720	J. Taylor
TZHSAGCP	1	3400	3400	2720	J. Taylor
TZHSAGSL	1	960	960	608	F. White
TZHSAGSP	1	960	960	608	F. White
TZHSAMDL	1	760	760	608	J. Taylor
TZHSAMDP	1	760	760	608	J. Taylor
TZHSCSML	1	3400	3400	2528	F. White
TZHSCSMP	1	3400	3400	2528	F. White
TZHSLEML	1	2720	2720	2176	P. Laws
TZHSLEMP	1	2720	2720	2176	P. Laws
TZHSLGCL	1	2720	2720	2176	J. Taylor
TZHSLGCP	1	2720	2720	2176	J. Taylor
TZHSSICL	1	320	320	256	M. Gamble
TZHSSIIL	1	440	440	352	J. Paris
TZHSSIUL	1	3000	3000	2080	R. Harrington



* - This quantity occupies a doubleword

** - Parameters may occupy single or doubleword

Figure 1. High-Speed Intermediate Data Array

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7.21 GUIDANCE TABLES

This group of data tables contains data used by the guidance task for the purpose of displaying guidance parameters in digital and plot forms. The tables included in this section are described below.

- a. TZGDNDSP (Guidance Format Control List Table) — TZGDNDSP contains all the information necessary to control the D/TV formatting of digitals and plots on the guidance displays.
- b. TZGDNLXG (Guidance Table of Logged Data) — The savedata table contains a history of each plotted parameter.
- c. TZGDNREF (Guidance Cross-reference Table) — This table contains a list of all parameters needed by the guidance processor.
- d. TZGDNSAV (Guidance Savedata Table) — This table contains control information such as elapsed time and stage of each plot, record of events, non-telemetry parameters, etc.

Approval	Approval
<i>D. Van Orden</i>	<i>Garth E. Bagley</i>

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Blocks — 1

Total Bytes — 1000

General Description and Usage

The purpose of this table is to aid the guidance processor in accessing every parameter used on the guidance displays. The parameters are obtained from appropriate data arrays (telemetry intermediate arrays or launch arrays) according to codes set up in this table. If necessary, computations are performed, and the results are stored in the guidance processor's own data array.

Accessing the various parameters is controlled by a macro, which generates various bit combinations, each unique to a specific type of parameter. From the bit combination, the guidance processor determines what parameter to access, where it is found, and whether or not to perform a computation.

Approval	Approval
<i>A. Van Norder</i>	<i>Garth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1-n* *n = max. 250 words					One word generated for each parameter referenced on any guidance display as described in Table 1.

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Table 1. Bit Combinations

TYPE OF PARAMETER	BYTE 1	BYTE 2	BYTES 3 and 4
Computation	0001 0000	Displacement into guidance data array	Displacement into table of computation addresses
Launch	0010 0000	Displacement into guidance data array	Displacement into table of launch computation addresses
Telemetry		Displacement into guidance data array	Displacement of parameter into intermediate data array
LM	001* 0000		
IU	001* 0001		
LGC	001* 0011		
AGS	001* 0100		
AGC	001* 0101		
CSM	001* 0111		
Orbit		Displacement into guidance data array	Displacement of parameter into TZGDNSAV

* 1 if parameter is to be plotted

0 if parameter is not plotted

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Data Table Formats

Symbolic Name — TZGDNSAVProgrammer — P. LawsTable Name — Guidance Save Data TableInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 41

Total Words — 41

General Description and Usage

This table is used to record and save information used by the Guidance Processor in driving the five guidance displays. The information includes the elapsed time and ullage of each plot as well as the occurrence or non-occurrence of certain mission events.

Approval	Approval
<i>A. Van Vorden</i>	<i>Garth E. Bagley</i>

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Block	Word	Byte	Type*	Units	Description and Range
1	1				Vehicle ID from orbit/traj.
	2-3				X-velocity vector from orbit/traj.
	4-5				Y-velocity vector from orbit/traj.
	6-7				Z-velocity vector from orbit/traj.
	8-9				Total velocity vector from orbit/traj.
	10-11				Elapsed time for plot MSK 223
	12-13				224
	14-15				227
	16-17				253
	18-19				254
	20				Stage for MSK 223
	21				224
	22				227
	23				253
	24				254
	25				Record of past events
	26-27				GET of S-IVB cutoff
	28-29				GMT of liftoff
	30-31				GMT of SPS cutoff
	32				Number of logged points - MSK 223
	33				Number of logged points - MSK 224
	34-35				GMT
	36				Address of GETMAIN area
	37				Address of TLM TVGUIDE
	38-39				GET of APS and DPS BURN ignition
	40-41				GET of APS and DPS BURN cutoff

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal

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7.22 SWITCH SELECTOR TABLES

The three data tables needed to process and display switch selector commands are described below.

- a. TZDISPSS (Switch Selector Display Formats Table) — This table contains the format control list information necessary to format all Switch Selector displays and the SLV GN/D No. 7 display.
- b. TZUSSDSP (Switch Selector Data Display Table) — Actual event times and their special characters are saved in this table as they occur. Five samples of the LVDC Orbital Error Words 1, 2, and 3 are also saved.
- c. TZUSSMAC (Switch Selector Command Codes Table) — This table contains a list of all valid command-stage codes that are ordered by time and divided into time segments.

Approval	Approval
<i>Stan Norden</i>	<i>Garth E. Bagley</i>

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MISSION LMSPSymbolic Name — TZDISPSSProgrammer — F. FlowersTable Name — Telemetry Switch Selector Display Formats TableInitialization of any Element Required — YesDimensions

Blocks — 10
Bytes/Blocks — 3276
Total Bytes — 32760

General Description and Usage

This data table contains all the format pointer information necessary for the D/TV formatter to display switch selector data and GN/D No. 7 (MSK 1410). Five TKDISP statements are generated by the TKSSW macro from each of the Switch Selector Definition cards supplied by NASA. One statement is generated for each of the following: (1) BCD command name, (2) nominal time, (3) a test to determine if the event has occurred, (4) actual time of event, (5) special character. A total of 75 commands may be shown on each display with a maximum of five displays.

Approval	Approval
<i>W. H. Norden</i>	<i>Harold E. Bayley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1		All			None	Format pointer information for SSW page 1 display, text data only (BCD name and nominal time). Continued in block 2
2		0-283 284-1831				Text information format pointers continued Format pointers for dynamic data (actual event times and special characters) for page 1
3-4		All				SSW Page 2 format pointers. Same format as page 1
5-6		All				SSW Page 3 format pointers. Same format as page 1
7-8		All				SSW Page 4 format pointers. Same format as page 1
9		0-563 564-1831				Format pointers for the SLV GN/D No. 7 display (MSK 1410) Not used

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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MISSION LMSPSymbolic Name — TZUSSDSPProgrammer — F. FlowersTable Name — Switch Selector Data Display TableInitialization of any Element Required — NoDimensions

Blocks — 1

Bytes/Blocks — 3000

Total Bytes — 3000

General Description and Usage

This data table contains all the information necessary to update a Switch Selector TV display or the SLV GN/D No. 7 display (MSK 1410). Actual event times are saved in this table when they are received. A flag is also set to indicate to the TV formatter that the event has occurred. The five latest detailed error messages are saved (for MSK 1410) in a circular fashion (i. e., the first message is replaced by the sixth, etc.). A part of the table is reserved for storing the special character to be displayed adjacent to each actual time. Loading switch selector inputs by PBI does not change this table.

Approval	Approval
<i>A. Van Norder</i>	<i>Garth E. Bagley</i>

Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	0-1	All	All	D	STU	MSG 1 - Time from Error Word 1
	2			X		- Orbital Error Word 1
	3			X		- Orbital Error Word 2
	4			X		- Orbital Error Word 3
	5			X		Flags and pointer
	6-7			D	STU	MSG 2 - Time from Error Word 1
	8			X		- Orbital Error Word 1
	9			X		- Orbital Error Word 2
	10			X		- Orbital Error Word 3
	11			X		Orbital Mode Word
	12-13			D	STU	MSG 3 - Time from Error Word 1
	14			X		- Orbital Error Word 1
	15			X		- Orbital Error Word 2
	16			X		- Orbital Error Word 3
	17			X		Orbital Status Word
	18-19			D	STU	MSG 4 - Time from Error Word 1
	20			X		- Orbital Error Word 1
	21			X		- Orbital Error Word 2
	22			X		- Orbital Error Word 3
	23			X		Not used
	24-25			D	STU	MSG 5 - Time from Error Word 1
	26			X		- Orbital Error Word 1
	27			X		- Orbital Error Word 2
	28			X		- Orbital Error Word 3
	29-46			BITS	None	Flag bits
	47-183			X		Special display characters
	184-728			E	secs.	Actual event times
	729-749					Not used

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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Symbolic Name — TZUSSMACProgrammer — F. FlowersTable Name — Telemetry Switch Selector Command Codes TableInitialization of any Element Required — YesDimensions

Blocks — 1

Bytes/Blocks — 2200

Total Bytes — 2200

General Description and Usage

This data table contains all of the acceptable Switch Selector Codes for a mission phase ordered by time. Each entry is composed of an eight-bit command code concatenated with a two-bit stage code and contained in a halfword. This table is compared with each Switch Selector input to determine a valid event occurrence. The commands are ordered by ascending expected time of occurrence with another portion of the table defining the time segments. A third part of the table contains a list of commands that drive DDD's.

TZUSSMAC may be replaced any time during a mission by use of the "LOAD SWITCH SELECTOR" PBI on the Telemetry Computer Controller console.

Approval	Approval
<i>J. Van Norden</i>	<i>Guth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	0	All	All	F	None	Total number of commands
	1	↓	↓	↓	↓	Relative address of command table
	2	↓	↓	↓	↓	Not used
	3	↓	↓	↓	↓	Relative address of the time address table
	4	↓	↓	↓	↓	Total number of time segments
	5	↓	↓	↓	↓	Rel. address of time segment table
	6	↓	↓	↓	↓	Total number of DDD's
	7	↓	↓	↓	↓	Rel. address of DDD table
	8	↓	↓	↓	↓	Previous command
	9	↓	↓	↓	↓	Matched command - Word 1
	10	↓	↓	↓	↓	Matched Word 2
	11	↓	↓	↓	↓	Not used
	12	↓	↓	↓	↓	Input parameters for one frame
	41-229	↓	↓	F	↓	Command table
	230-418	↓	↓	H	↓	Time address table
	419-515	↓	↓	H	↓	Time segments table
	516-546	↓	↓	F	↓	DDD - Driven Command Table
	547-549	↓	↓	H	↓	Not used

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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7.23 MED DATA TABLES

The MED tables contain initial values as stated in Section 7 of TR165/TR170. These values can be changed via the manual entry device. Their use is varied: as constants, in overriding outputs, or in determining when to start or perform a computation.

The MED tables are also used by the computation programs to store cumulative data values, flags and elapsed time.

Approval	Approval
<i>Alan Horden</i>	<i>Harold E. Bagley</i>

List of Manual Entry Device Data Tables

Array Name	Number of Blocks	Bytes/ Block	Total Bytes	Responsible Programmer
TZMEDAGS	1	100	100	P. Laws ↓
TZMEDCSM	1	800	800	
TZMEDLEM	1	600	600	
TZMEDSIU	1	140	140	

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Data Table Formats

Symbolic Name - TZMEDAGSProgrammer - P. LawsTable Name - AGS MED Constants TableInitialization of any Element Required - NoDimensions

Blocks - 1

Words/Blocks - 14

Total Words - 14

General Description and Usage

This table contains constants used in AGS computations whose initial values may be changed through the use of a manual entry device. This table is used by the Telemetry MED Processor when changing the values of the constants and by the Display Request Processor when updating those constants appearing on the MED displays.

Approval	Approval
<i>R Van Norden</i>	<i>Garth E Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-2 3-14				Constants for comp. - 6.4.86 Constants for comp. - 6.4.86

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Data Table Formats

Symbolic Name — TZMEDCSMProgrammer — P. LawsTable Name — CSM MED Constants TableInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 200

Total Words — 200

General Description and Usage

This table contains certain constants used in CSM computations whose initial values may be changed through the use of a manual entry device. This table is used by the Telemetry MED Processor when changing the values of the constants and by the Display Request Processor when updating those constants appearing on the MED displays.

Approval	Approval
<i>A Van Norden</i>	<i>Harth E Bagley</i>



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-21 22-38 39-78 79-82 83 84-171 172-178 179-194				Constants for comp. - 7.4.3 - 6.4.19 - 6.4.29 - 6.4.33 - 6.4.34 - 6.4.36 - 6.4.30 - 6.4.31

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Data Table Formats

Symbolic Name — TZMEDLEMProgrammer — P. LawsTable Name — LM MED Constants TableInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 200

Total Words — 200

General Description and Usage

This table contains certain constants used in LM computations whose initial values may be changed through the use of a manual entry device. This table is used by the Telemetry MED Processor when changing the values of the constants and by the Display Request Processor when updating those constants appearing on the MED displays.

Approval	Approval
<i>A Van Norden</i>	<i>Garth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-2 3-9 10-13 14-19 20-21 22-31 32-37 38-39 40-42 43-47 48-57 58-83 84-189				Constants for comp. ↓ - 6.4.50 - 6.4.55 - 6.4.58 - 6.4.59 - 6.4.46 - 6.4.47 - 6.4.62 - 6.4.66 - 6.4.93 Playback constants for comp. - 6.4.44 Constants for comp. - 6.4.54 Work area for LM comps.

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Data Table Formats

Symbolic Name — TZMEDNPSProgrammer — L. A. NaiserTable Name — Nuclear Particle Detection System (NPDS) MED TableInitialization of any Element Required — NoDimensions

Blocks — 1
Words/Blocks — 46 doublewords
Total Words — 46 doublewords

General Description and Usage

The table contains all MED inputs for the 6.4.84, NPDS. The table is also used to pass the computed values to the CSM computations.

Approval	Approval
<i>L. A. Naiser</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-16				CSM3202M - CSM3217M
1	17				Accumulated flux 8
1	18-24				Accumulated flux 1-7
1	25-32				Accumulated dose rates
1	33-40				Count rates
1	41				Flux 8
1	42-43				Accumulated flux 8
1	44-57				Accumulated flux 1-7
1	58-64				Flux 1-7
1	65-72				Dose 1-8
1	73-85				Status bytes

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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Data Table Formats

Symbolic Name — TZMEDSIUProgrammer — P. LawsTable Name — SIU MED Constants TableInitialization of any Element Required — NoDimensions

Blocks — 1

Words/Blocks — 34

Total Words — 34

General Description and Usage

This table contains constants used in SIU computations whose initial values may be changed through the use of a manual entry device. This table is used by the Telemetry MED Processor when changing the values of the constants and by the Display Request Processor when updating those constants appearing on the MED displays.

Approval	Approval
<i>A. Van Norden</i>	<i>Barth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-13 14-15 16-28 29 30-34				Constants for comp. - 6.4.42  - 6.4.43 - 6.4.27 - 6.4.20 - 6.4.21

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Data Table Formats

Symbolic Name — TZMEDSTPProgrammer — L. A. NaiserTable Name — Stripchart MED tableInitialization of any Element Required — YesDimensions

Blocks — 1

Words/Blocks — 70

Total Words — 70

General Description and Usage

This table is used to store the MED's used in special computations required for the stripchart recorders and/or the guidance insertion injection digitals. It also contains special computation results and the output buffer for the stripchart analog pens.

Approval	Approval
<i>Lou Ann Naiser</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1				AGC4001M
	2				AGC4002M
	3-4				SIU4003M
	5				XXX4004M
	6				Control for TKDISPS
	7				AGC9501C
	8				AGC9502C
	9				AGC9503C
	10				Not used
	11-12				TB6P
	13-14				GETIG
	15-16				SIVP
	17-18				SIVA
	19-20				PHIAPL
	21-22				PHISAT
	23				Selected source ID TV code
	24				Not used
	25-26				MED GMTLDP
	27-28				AZ ₀ (flight azimuth)
	29				PBI counter for stripcharts
	30				Not used
	31-32				GET
	33				Time to free fall in seconds
	34-42				Status bytes
	43-50				Not used
	51-70				Output buffer for stripcharts

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



7.24 SMEK TASK CONTROL TABLES FOR LMSP

TZLSLBxx

These tables contain cross-reference information necessary to extract data from intermediate data arrays for particular SMEK formats. There is one table for each internal format, each table containing one doubleword entry for each parameter in that format. Each entry (see below) contains cross-reference information in each halfword: (1) the parameter's displacement into the intermediate data array in bytes, (2) the parameter's displacement into the log block (TZLSFMxx) in bytes, (3) a vehicle code, and (4) a code indicating whether the parameter is a fullword or doubleword. Each table begins with two fullword entries indicating its length and format. Each table ends with a doubleword entry in which the word indicator is set to 8. These tables are applicable to LMSP only.

TZLSLBxx Entries for Each Parameter

Disp. into IDA	Disp. into Log Block
Vehicle Code	Word Indicator

← Fullword →

Approval	Approval
<i>J Van Norden</i>	<i>Garth E Bagley</i>

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List of SMEK Task Control Tables

Table Name	Ext. Fmt. No.	Number of Blocks	Bytes/ Block	Total Bytes	Responsible Programmer
TZLSLB03	03	1	896	896	F. White
04	04		704	704	
05	05		1024	1024	
06	06		384	384	
07	09		320	320	
08	20		1856	1856	
09	21		1856	1856	
10	22		1728	1728	
11	23		1664	1664	
18	60		1728	1728	
19	61		1792	1792	
20	62		1728	1728	
21	63		1472	1472	
22	64		896	896	
23	67		320	320	
24	70		1152	1152	
25	71		1856	1856	
26	80		320	320	
27	81		320	320	
28	82		448	448	
29	83		448	448	
30	84		448	448	
31	79		256	256	
32	24		1792	1792	

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7.25 LOW-SPEED DATA TABLES

7.25.1 LOW-SPEED FORMAT HISTORY TABLES

TZLSFM**

A history table is maintained for each low-speed format that is displayed. Each table is identified by the internal format number in the last two characters of the data table name. The history tables are blocked by low-speed messages, and N message blocks constitute all the information necessary to update the required number of low-speed/SMEK display columns. When N messages have been logged, the table is considered initialized for that low-speed format. After initialization, each succeeding message replaces the oldest message in the appropriate history table. Therefore, the latest N messages are always available.

Each message contains only the engineering values applicable to the associated low-speed format. As the parameters are logged, their status indication are also saved. The parameter's location in the message determines the location of the respective status byte. The parameter's displacement into the logged message, divided by four, yields the displacement of the parameter's status indication. The status indication array is established at the end of each logged message.

TZLOGDIC

This table is a dictionary of the low-speed/SMEK messages processed and saved in each TZLSFM** table. The format of the dictionary is described in Figure 1 on the following page.

A description of each history table (TZLSFM**) is contained in the first section of the dictionary. Four bytes are allocated for each low-speed/SMEK format. The internal format number is used to determine the proper format entry. The first halfword of each entry contains the length in bytes of the saved parameters per displayed message. If the length is zero, this format is not displayed. The third byte represents the block number of the latest message in TZLSFM**. The fourth byte is a flag indicating "block cycling"; zero indicates that table is not full, and F_{16} indicates that more than "N" messages have been logged. Therefore, the latest "N" messages are retained, and the oldest message is determined by the block number-flag indication.

Approval	Approval
<i>A Van Noden</i>	<i>Garth E. Bagley</i>

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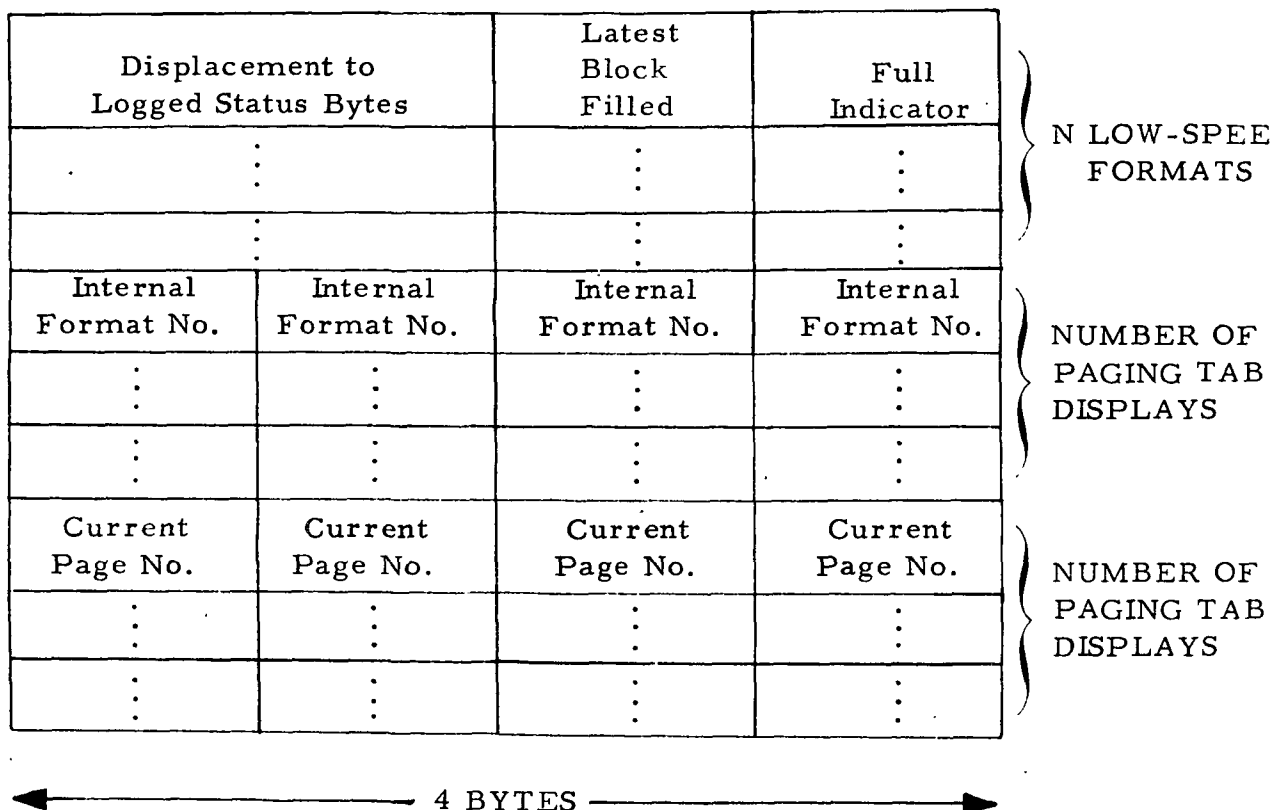
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Figure 1.

The second section of the dictionary contains the internal format number for the associated low-speed display. This dictionary section is ordered by display internal number (DIN)*. This structure provides a cross-reference of the low-speed format and MSK. A zero entry indicates a DIN for a non-existent mission display.

The third section contains the current page number for each low-speed display set, and it is ordered by DIN. The number three through seven indicates the last display page containing data.

Initialization of the dictionary is performed by invoking the TKLSDISP macro, which uses the "LS=" option in the TKQTVeh macro. The form of the TKLSDISP macro is

```
TKLSDISP MSK = low-speed display number,
          LS  = low-speed external format number.
```

*See Telemetry D/TV Format Tables writeup.

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List of Low-Speed Format History Tables

Table Name	No. of Blocks	Bytes/Block	Total Bytes	External Format No.	Responsible Programmer
TZLSFM03	15	560	8400	03	F. Flowers ↓
TZLSFM04	15	440	6600	04	
TZLSFM05	15	640	9600	05	
TZLSFM06	15	240	3600	06	
TZLSFM07	15	200	3000	09	
TZLSFM08	15	1160	17400	20	
TZLSFM09	15	1160	17400	21	
TZLSFM10	15	1080	16200	22	
TZLSFM11	15	1040	15600	23	
TZLSFM18	15	1080	16200	60	
TZLSFM19	15	1120	16800	61	
TZLSFM20	15	1080	16200	62	
TZLSFM21	15	920	13800	63	
TZLSFM22	15	560	8400	64	
TZLSFM23	15	200	3000	67	
TZLSFM24	15	720	10000	70	
TZLSFM25	15	1160	17400	71	
TZLSFM26	15	200	3000	80	
TZLSFM27	15	200	3000	81	
TZLSFM28	15	280	4200	82	
TZLSFM29	15	280	4200	83	
TZLSFM30	15	280	4200	84	
TZLSFM31	15	160	2400	79	
TZLSFM32	15	1172	16800	24	
TZLOGDIC	1	352	352	—	

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7.25.2 LOW-SPEED MESSAGE RECEIPT TABLES

TZCSMLLS, TZLEMLLS, TZSLVLLS

These data tables are designed to provide historical information to their associated Low-Speed Logger displays. Each table is blocked by low-speed/SMEK messages, and N messages are saved. After N messages have been logged, each additional message replaces the oldest message in the table.

Only the following information is retained from the input message.

Byte 1	—Flags	Bit 1 Invalid Station code
		2 End of Header Reject
		3 Major Sync Reject
		4 Format Reject
		5 Time Reject
		6 Display
		7 Rebroadcast
		8 SMEK message
Byte 2	— External Format Number	
Byte 3	— External Station code	
Byte 4	— Internal Station code	
Byte 5	— Message Class	
Byte 6	— Mode of message	
Byte 7	— Number of Parity Errors	
Byte 8	— Number of Minor Sync Errors	
Bytes 9-16	— GMT of Low-Speed Assembly	
Bytes 17-24	— GMT of Message Receipt	

TZLGDICT

This data table is a dictionary of the three message logger tables (TZCSMLLS, TZLEMLLS, TZSLVLLS). Information contained in this table is block number of latest logged message, number of messages received, and page number presently being viewed.

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List of Low-Speed Message Log Tables

Table Name	N No. of Blocks	Bytes/ Block	Total Bytes	External Formats Used	Lines- Pages	Responsible Programmer
TZCSMLLS	60	24	1440	3, 4, 5, 6, 9, 20 21, 22, 23, 24, 80, 81, 82	20-3	F. White
TZLEMLLS	60	24	1440	60, 61, 62, 63, 64, 67, 70, 71, 79, 83, 84	20-3	F. White
TZSLVLLS	60	24	1440	40, 42, 43, 51, 52, 53	20-3	F. White
TZLGDICT	3	8	24			F. White

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7.26 DISPLAY FORMATS TABLES

All of the information necessary to format a High-Speed, Playback or Paging Tab TV display is contained in the three tables described below. Each table is divided into blocks, one block for each display (considering pages 1, 2 and 3 of a Paging Tab as a single display). Format control lists for special displays (Switch Selector, Guidance, etc.) may be found in the section describing the tables related to that particular processor. This section contains the following tables:

- a. TZDISPPN — Paging Tab Displays Format Control Lists Table (TABPG1, TABPG2, TABPGN).
- b. TZDISPTH — High-Speed Displays Format Control Lists Table (TABHS)
- c. TZDISPTP — High-Speed Playback Displays Format Control Lists Table (TABPD).

Approval	Approval
<i>A. Van Norden</i>	<i>Garth E. Bagley</i>

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Symbolic Name — TZDISPTHProgrammer — P. LawsTable Name — TABHS Format Control ListsInitialization of any Element Required — YesDimensions

Blocks — 64

Words/Blocks — 1200

Total Words — 76,800

General Description and Usage

This data table contains the format pointers necessary to control the D/TV formatting of all data values appearing on TABHS displays. Each block of the table contains the format pointers describing one MSK. At the beginning of each block is control information related to that particular MSK. The control information consists of one halfword for each data type and logic requirement ever expected to appear on TABHS displays. If a particular data type is applicable to a display, its halfword control portion will contain the number of bytes displacement from the first of the control information into the block where its format pointers are located. Otherwise, that control portion is zero, and there will be no format pointers for that data type.

Approval	Approval
<i>D. Van Norder</i>	<i>Garth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	0-1				† to AGC format pointers or 0
		2-3				† to CSM format pointers or 0
	2	0-1				† to S-IB format pointers or 0
		2-3				† to S-IU format pointers or 0
	3	0-1				† to display request format pointers or 0
		2-3				† to S-IIB format pointers or 0
	4	0-1				† to limit data format pointers or 0
		2-3				† to LM format pointers or 0
	5	0-1				† to LGC format pointers or 0
		2-3				† to AGS format pointers or 0
2-43	6	0-1				† to AEROMED format pointers or 0
		2-3				Spare
	7 - > (variable)					Format pointers for data types where applicable
						Format pointers for display request
						Same as above

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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Symbolic Name — TZDISPTPProgrammer — P. LawsTable Name — TABPD Format Control ListsInitialization of any Element Required — YesDimensions

Blocks — 46

Words/Blocks — 1200

Total Words — 55,200

General Description and Usage

This data table contains the format pointers necessary to control the D/TV formatting of all data values appearing on TABPD displays. Each block of the table contains the format pointers describing one MSK. At the beginning of each block is control information related to that particular MSK. The control information consists of one halfword for each data type and logic requirement ever expected to appear on TABPD displays. If a particular data type is applicable to a display, its halfword control portion will contain the number of bytes displacement from the first of the control information into the block where its format pointers are located. Otherwise, that control portion is zero, and there will be no format pointers for that data type.

Approval	Approval
<i>A. Van Norden</i>	<i>Gareth E. Bagley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1		0-1			↑ to AGC format pointers or 0
			2-3			↑ to CSM format pointers or 0
	2		0-1			↑ to S-IB format pointers or 0
			2-3			↑ to S-IU format pointers or 0
	3		0-1			↑ to display request format pointers or 0
			2-3			↑ to limit data format pointers or 0
	4		0-1			↑ to LM format pointers or 0
			2-3			↑ to LGC format pointers or 0
	5		0-1			↑ to AGS format pointers or 0
			2-3			↑ to AEROMED format pointers or 0
6 -> (variable)			Format pointers for data types where applicable			
			Format pointers for display request			
2-34						Same as above

* Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal



7.27 DIGITAL DISPLAY DRIVER TABLES

These tables contain all the information required to drive the DDD's associated with the input and intermediate telemetry data processing. They also contain a history of the current status of the DDD's. Currently there is one table for each vehicle input frame.

A DDD table consists of the following:

- a. A fullword containing the number of DDD's in the table
- b. The status section, which has a fixed length entry for each DDD. Each entry contains an indicator that shows if the DDD is on or off and the system index number.
- c. The logic section, which has a variable length entry for each DDD. Each entry contains a pointer to the corresponding status entry, the logic used to determine if the DDD should be on, and an address for every bit that is used with this logic.

Approval	Approval
<i>A Van Norden</i>	<i>Garth E. Bagley</i>

List of DDD Tables

Z-Table	No. of Blocks	Bytes/ Block	Total Bytes,	Vehicle	Responsible Programmer
TZADDDTB	1	1600	1600	AGC	J. Taylor
TZCDDDTB	2	2100	4200	CSM	J. Taylor
TZGDDDTB	1	2700	2700	LGC	J. Taylor
TZIDDDTB	1		100	S-IC	M. Gamble
TZLDDDTB	1		2400	LM	P. Laws
TZMDDDTB	1		400	AMD	J. Taylor
TZSDDDTB	1		912	AGS	J. Taylor
TZTDDDTB	1	600	600	SII	J. Paris
TZUDDDTB	1		2500	S-IU	R. Harrington

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7.28 SYSTEMS PLOTS DATA TABLES

All of the plotted points and digitals for the Systems Plots displays are saved (in TV code form) in these data tables. There exists a separate table for each type of plot. Each table contains one block (two blocks for the 200-second plots) for each display of that plot-type. The tables currently included in this group are given below.

Type	200-sec.	10-min.
LM EECOM		X
LM GNC		X
LM PLSS	X	
SIU Booster	X	
CSM EECOM	X	
CSM GNC	X	

Approval	Approval
<i>A Van Orden</i>	<i>Garth C. Bagley</i>

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7.28 TZDISPLE
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MISSION LMSPSymbolic Name — TZDISPLEProgrammer — J. Powell, M. GambleTable Name — LM EECOM Ten-Minute System Plot TableInitialization of any Element Required — NoneDimensions

Blocks — 2

Bytes/Block — 1608

Total Bytes — 3216

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the LM EECOM ten-minute system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>J. Van Norden</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
2	52-402	2-1398		X		Formatted points and digitals
						Same as block 1

*Type

H - Fixed-point half word
F - Fixed-point full wordE - Single-precision (floating-point)
D - Double-precision (floating-point)
X - Hexadecimal

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MISSION LMSPSymbolic Name — TZDISPLGProgrammer — J. Powell, M. GambleTable Name — LM GNC Ten-Minute System Plot TableInitialization of any Element Required — NoneDimensions

Blocks — 4

Bytes/Block — 1608

Total Bytes — 6432

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the LM GNC ten-minute systems plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>J. Van Norder</i>	<i>Garth E. Bayley</i>



Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-402	2-1398		X		Formatted points and digitals
2						Same as block 1
3						
4						↓

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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MISSION LMSP

Symbolic Name — TZDISPMEProgrammer — J. Powell, M. GambleTable Name — CSM EECOM Ten-Minute System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 8

Bytes/Blocks — 1608

Total Bytes — 12864

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM EECOM ten-minute system plots. It also contains all of the formatted data (in TV code form) which will be saved until the plot times out, and counters which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>Alan Norden</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-402	2-1398		X		Formatted points and digitals
2	Same as block 1					
3						
4						
5						
6						
7						
8						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Symbolic Name — TZDISPMGProgrammer — J. Powell, M. GambleTable Name — CSM GNC Ten-Minute System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 11

Bytes/Blocks — 1608

Total Bytes — 17688

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM GNC ten-minute system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>A. Van Norden</i>	<i>Gaith E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted pointers
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-402	2-1398		X		Formatted points and digitals
2						Same as block 1
3						
4						
5						
6						
7						
8						
9						
10						
11						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal



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Data Table Formats

Symbolic Name — TZDISPSBProgrammer — M. GambleTable Name — SIU Booster 200-Second System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 2

Words/Blocks — 2208

Total Words — 4416

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the SIU 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>A Van Norden</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1-2	1	1-2	H		Length of plotted data
	2	1-4	F		Length of all formatted data
	3-4	1-4	D		Start plot time
	5-7	1-4	X		Format pointers for GET
	8-31	1-4	X		Format pointers for plotted points
	32-44	1-4	X		Format pointers for digitals
	45	1-4	X		Format pointer for display termination
	46	1-4	X		TVGUIDE word
	47-48	1-5	X		Load buffer command
	48-52	2-21	X		Formatted GET
	52-1102	2-4198	X		Formatted points and digitals

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

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MISSION LMSP

Symbolic Name — TZDISPSE

Programmer — J. Powell, M. Gamble

Table Name — CSM EECOM 200-Second System Plot Table

Initialization of any Element Required — Yes

Dimensions

Blocks — 8

Bytes/Block — 2208

Total Bytes — 17664

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM EECOM 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>A Van Norden</i>	<i>David E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-2	1	1-4		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointers for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-1102	2-4198		X		Formatted points and digitals
3-4						Same as 1-2
5-6						
7-8						↓

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Symbolic Name — TZDISPSG

Programmer — R. Samuelsohn

Table Name — CSM GNC 200-Second System Plot Table

Initialization of any Element Required — Yes

Dimensions

Blocks — 22

Bytes/Blocks — 2208

Total Bytes — 48576

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the CSM GNC 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>A. Van Norden</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Bit	Type*	Units	Description and Range
1-2	1	1-2		H		Length of plotted data
	2	1-4		F		Length of all formatted data
	3-4	1-4		D		Start plot time
	5-7	1-4		X		Format pointers for GET
	8-31	1-4		X		Format pointers for plotted points
	32-44	1-4		X		Format pointers for digitals
	45	1-4		X		Format pointer for display termination
	46	1-4		X		TVGUIDE word
	47-48	1-5		X		Load buffer command
	48-52	2-21		X		Formatted GET
	52-110	22-41	98	X		Formatted points and digitals
3-4						Same as block 1-2 ↓
5-6						
7-8						
9-10						
11-12						
13-14						
15-16						
17-18						
19-20						
21-22						

*Type

H — Fixed-point half word
F — Fixed-point full wordE — Single-precision (floating-point)
D — Double-precision (floating-point)
X — Hexadecimal

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Data Table Formats

Symbolic Name — TZDISPSPProgrammer — M. GambleTable Name — LM PLSS 200-Second System Plot TableInitialization of any Element Required — YesDimensions

Blocks — 4

Words/Blocks — 2708

Total Words — 8832

General Description and Usage

This table contains the information necessary to control the D/TV formatting of plotted points and digitals on each of the LM PLSS 200-second system plots. It also contains all of the formatted data (in TV code form), which will be saved until the plot times out, and counters, which indicate the amount of plotted data and the total amount of all formatted data.

Approval	Approval
<i>A Van Norden</i>	<i>Garth E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1-2	1	1-2	H		Length of plotted data
	2	1-4	F		Length of all formatted data
	3-4	1-4	D		Start plot time
	5-7	1-4	X		Format pointers for GET
	8-31	1-4	X		Format pointers for plotted points
	32-44	1-4	X		Format pointers for digitals
	45	1-4	X		Format pointer for display termination
	46	1-4	X		TVGUIDE word
	47-48	1-5	X		Load buffer command
	48-52	2-21	X		Formatted GET
	52-1102	2-4198	X		Formatted points and digitals
3-4					Same as block 1-2

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

X - Hexadecimal



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7.29 REBROADCAST DATA TABLES

TZLSREB* - (A-F)

These data tables are used to save low-speed telemetry/SMEK messages for possible rebroadcast. Up to three messages may be saved for both CSM and SLV/LM. The saved messages contain a fullword indicating station routing code, eight bytes of message description, and the variable length message in Baudot Code (one six-bit unit to each byte).

TZLSFMTS

This data table is constructed in such a manner that the beginning of the table contains a directory of address constants of each appropriate rebroadcast format (tabular description of required output passed to the teletype formatter). This data table is generated using the TKLSFMT and TKXTTY macros and is used in a locate mode only.

Approval	Approval
<i>A. Van Orden</i>	<i>Garth E. Bagley</i>

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List of Rebroadcast Data Tables

Array Name	Number Blocks	Bytes/Block	Total Bytes	Responsible Programmer
TZLSREBA	1	1000	1000	R. Samuelsohm ↓
TZLSREBB	1	1000	1000	
TZLSREBC	1	1000	1000	
TZLSREBD	1	1000	1000	
TZLSREBE	1	1000	1000	
TZLSREBF	1	1000	1000	
TZLSFMTS	2	2500	5000	

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7.30 TASK RESOURCE TABLES

These tables, which are used as effective resource tables by the Telemetry tasks that need more permanent save area than the 80-byte resource table assigned to them, are described in their respective task writeups.

Approval	Approval
<i>A Van Norden</i>	<i>Garth E. Bagley</i>

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7.31 SCRATCH PAD DISPLAY TABLE

These tables contain the display control information, as well as the parameter name - displacement cross reference.



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Data Table Formats

Symbolic Name — TZxNAMEX*Programmer — S. Van NordenTable Name — Scratch Pad Parameter Description TableInitialization of any Element Required — AllDimensions

Blocks — Up to 6

Words/Blocks — 1250

Total Words — Up to 3750

General Description and Usage

This table describes scratchpad parameters.

* x = One letter TM vehicle code

Approval	Approval
<i>A. Van Norden</i>	<i>Gaith E. Bagley</i>

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Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-2	1-14		bytes	EBCDIC blank
	2	15-16			-zero
	3				Length of data array
	4-5	1-12			EBCDIC external name
	5	13			Parameter type code
	5	14			Second letter of internal name or 'R'
					for real time text
	6				Displacement of parameter
	.				
	.				
	.				
	.				
	.				
	n	1-12			EBCDIC blank
	n+1	13-16			Hex 'FFFFFFFF' (End)

*Type

H — Fixed-point half word

F — Fixed-point full word

E — Single-precision (floating-point)

D — Double-precision (floating-point)

X — Hexadecimal

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - AS-200 Systems Integration

7.31 TZ2005TH
DATE 9/30/68
REV
PAGE 1 of 2
MISSION LMSP

Data Table Formats

Symbolic Name — TZ2005THProgrammer — S. Van NordenTable Name — The Scratch Pad DisplayInitialization of any Element Required — Complete TableDimensions

Blocks — 2

Words/Blocks — 400

Total Words — 800

General Description and Usage

This data table is modified by TMMEDDSP to produce the Scratch Pad Display.

Approval	Approval
<i>S. Van Norden</i>	<i>Garth E. Begley</i>



Detailed Contents

Block	Word	Byte	Type*	Units	Description and Range
1	1-6				Control section, set to 0 except for DISPREQ
	7				MSK
	8-19				12 NOP's
	20-194				25-12 letter text blanks
	195				GOTO next slot
	196				Standard display termination
	197				End
	198				Set buffer add at 119
	199				Set buffer transfer to 500
	200				Set buffer add at 500
	201				NOP, 250
	202				Standard display termination
	203				End
	204				Set buffer transfer at 500
	205				Set regeneration timer
	206				End
	207-431				25 copies of standard disp. initiate At 220+n DEC, 6.6 Set buffer transfer to 0 GOTO wrap 1
	432-467				12 copies of set buffer add at 7+n Set buffer transfer to 0 End
	468-469				Indexes in above set to 0
	470				Page no. set to 0
	471				Flag that denotes whether the ten pages have been initialized

*Type

H - Fixed-point half word

F - Fixed-point full word

E - Single-precision (floating-point)

D - Double-precision (floating-point)

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IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - Apollo Systems Integration

8. CMMCMNAV-66

DATE 4/12/68

REV

PAGE 1 of 1

On-line Printout Specification

Missions — EORP, LMSP

Load Module — CMMCMNAV

Console Identification Code — 66

Specification Writeup Date — 4/2/68

Text of Printout —

DCS NAVIGATION VECTOR LOAD=NNNN COORDINATE SYSTEM=AA
 GETGEN HH/MM/SS STAID AAAANN GETSV HHH/MM/SS.CC
 X +NN.NNNNNNNNN Y +NN.NNNNNNNNN Z +NN.NNNNNNNNN
 XD +NN.NNNNNNNNN YD +NN.NNNNNNNNN ZD +NN.NNNNNNNNN

Notes —

This printout complies with NASA requirements which requested that DCS navigation vectors be written on line.

Recovery Procedure — NA

Initiator	Subsystem Approval	Systems Integration
<i>Patricia Wood</i>	<i>E. A. Suarez</i>	<i>James L. Campbell</i>

The following statement summarizes all current on-line printing standards.

"All on-line printing should be effected via DFL and should contain the GMT, Console ID Code, and load module name in parentheses followed by the message text. If printing is done through a message write, the requesting load module name should be printed with the parentheses exchanged

DD/HH/MM/SS. CCb**AA**b [)NNNNNN((NNNNNN)] b Text of Printout..."

AA = Console ID Code

GN General message to be announced to all positions.

bb Blank. Not to be announced. The message is used for post-run evaluation.

OP Computer Operation/Printer Controller

CS Complex Supervisor

MO Computer M&O/SSU

SE Select

DY Computer Dynamics

TM Computer Telemetry

CC Computer Command

NNNNNN = Load Module - Symbolic Name

b = Blank space

NOTES should detail any non-obvious information used in the text, such as meanings of numerical error codes or the purpose of the print.

RECOVERY PROCEDURE should outline ways to overcome the error situation, or detail data which should be gathered to analyze the problem.

IBM RTCC APOLLO PROGRAMMING SYSTEMS

BOOK: MISSION SYSTEMS - Apollo Systems Integration

On-line Printout Specification

Missions — EORP, LMSPLoad Module — CMMSVNAVConsole Identification Code — 66Specification Writeup Date — 4/2/68Text of Printout —

DCS NAVIGATION VECTOR LOAD=NNNN COORDINATE SYSTEM=EC

GETGEN HH/MM/SS STAID AAAANN GETSV HH/MM/SS.CC

X +NN.NNNNNNNNN Y +NN.NNNNNNNNN Z +NN.NNNNNNNNNXD +NN.NNNNNNNNN YD +NN.NNNNNNNNN ZD +NN.NNNNNNNNNNotes —

This printout complies with NASA requirements which requested that
DCS navigation vectors be written out on line.

Recovery Procedure — NA

Initiator	Subsystem Approval	Systems Integration
<i>J. Patricia Wood</i>	<i>E. H. Jones</i>	<i>Eugene J. Campbell</i>

The following statement summarizes all current on-line printing standards.

"All on-line printing should be effected via DFL and should contain the GMT, Console ID Code, and load module name in parentheses followed by the message text. If printing is done through a message write, the requesting load module name should be printed with the parentheses exchanged

DD/HH/MM/SS. CCb**AA**b $\left[\begin{array}{l})NNNNNN(\\ (NNNNNN) \end{array} \right]$ b Text of Printout..."

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