Attachment 1

1241637 D

Basic Issue Date: 23 Dec. 1976
Rev A Date: 24 Mar 1977
Rev B Date: 2 May 1977
Rev C Date: 1 July 1977
Rev D Date: 31 Oct 1977

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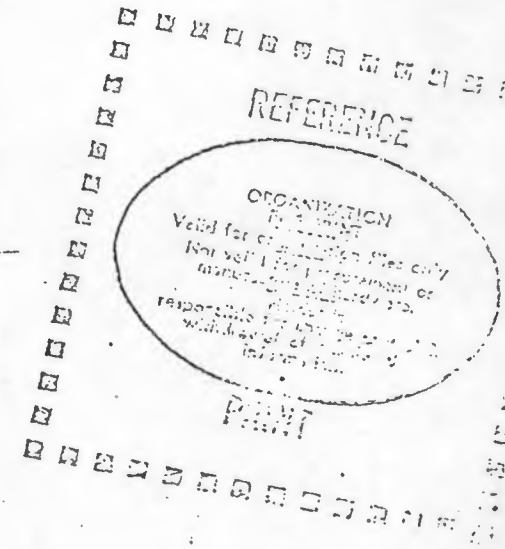
TELEMETER INSTRUMENTATION SCHEDULE

LMSC NO. 1241637

SATELLITE VEHICLE SYSTEM

MODEL 22205 SERIAL NO. 6351

(only ALT)



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*When used with the Vehicle Schematic, all page numbers are preceeded with 1.2.

INTRODUCTION

This Telemetry Instrumentation Schedule contains a listing and channel assignment of all data processed by the Satellite Vehicle System (SVS) data system. A brief description of the telemetry format is included. However, for detail description and performance requirements of the data system and of the data system/science sensor interfaces the users should refer to the Telemetry and Sensor Interface Unit (TSU) Specification 1429023 and to the applicable Government Furnished Equipment/SVS Interface Control Document.

GENERAL INFORMATION

LOCK TELEMETER

he block diagram of the Block Telemeter is shown in figure one. There are seven ndependent, asynchronous inputs to the Block Telemeter. Each of the inputs is con- ected to an individual Sensor Data Assembler module which consists of a memory apable of storing four blocks of data, and associated read/write control logic. Each lock of data stored in memory includes an eight bit ID word, a forty bit time word nd up to 944 data bits. The blocks are selected asynchronously based on full ata block availability and priority for outputting as a time multiplexed pulse-code odulated (PCM)signal . Sensor Block assignments along with their input and output data haracteristics are listed in Table 1.

The formatting of the block sequence is accomplished by the Block Telemeter Control function. The output bit rate is 25000 bits per second, and there are 1024 bits per block. Therefore, a new output block occurs every 40.96 milliseconds. Every twenty-fifth block (every 1.024 secs) the Block Telemeter Control outputs an LRS (low rate sampled data) block. This block is formatted and output in real time. There is no intermediate data storage for the LRS data block.

By definition, a block frame consists of the LRS block and the succeeding 24 data blocks. When the LRS is not being output, an available data block is read out, and if more than one data block is available the blocks are sequentially selected based on their priority ranking (See Table 1). During periods when none of the sensor data blocks are available the command memory data of the Command Processor and Central Timing Unit (CTU) is used as fill. By real-time commands the engineering and status blocks (ascent, orbit, and orbit adjust blocks) and the CTU memory data can be selected to output.

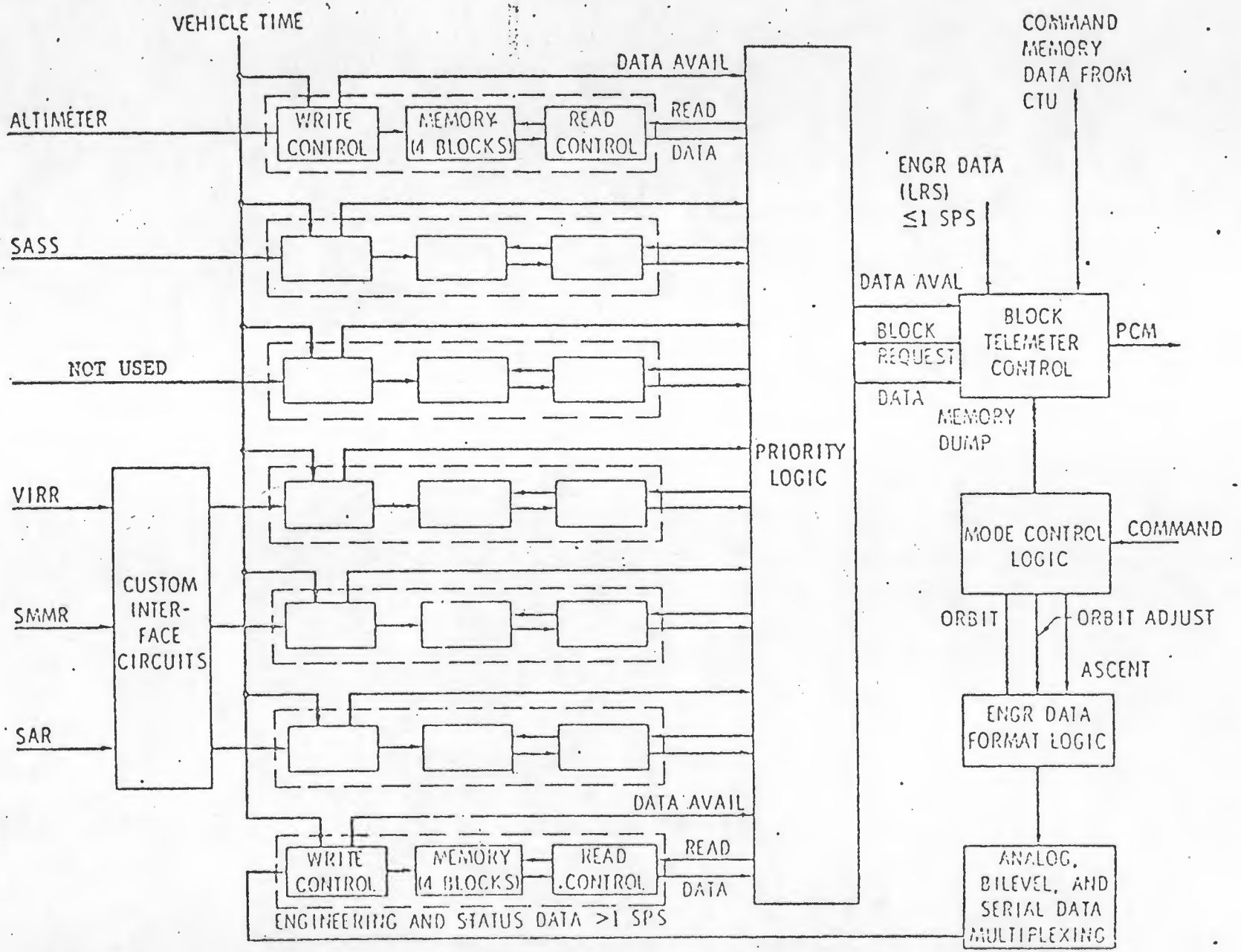
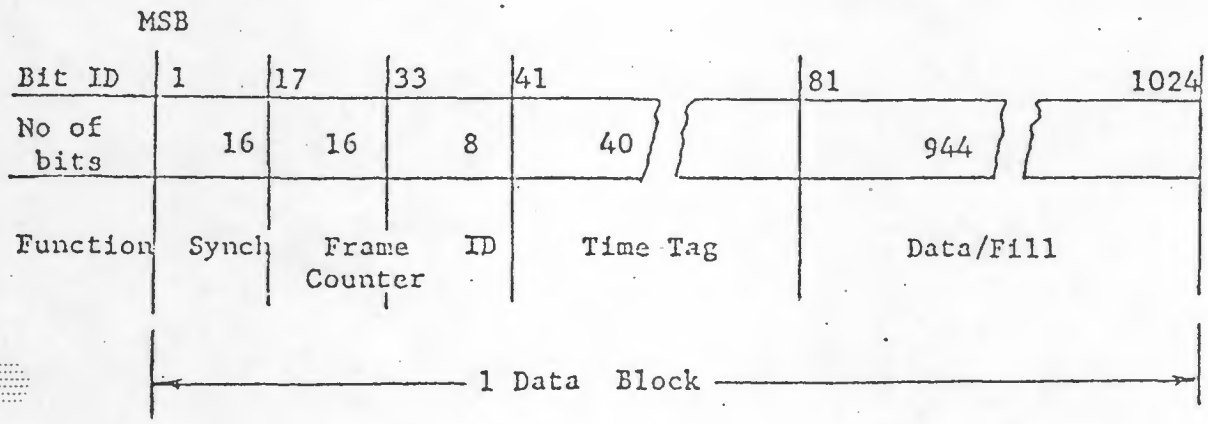


FIGURE 1 BLOCK TELEMETRY DIAGRAM

Table 1 shows the source data cycle (SDC) length for each of the input sources.

TLM Format

Each block as shown below is a 1024 bit frame length and each has the following characteristics:



a. Synchronizing Word (16 bits). The synchronizing word is 111 010 111 001 000 0

b. Frame Counter (16 bits). The 16-bit binary frame counter increments one count for each output block sequence. The counter will start at a random number with power turn on.

c. Identification (ID) Word (8 bits). The ID word identifies the data source and assigns the block identification number for the particular data block as shown below.

		ID WORD (bits 33 through 40)							
Data Source	bits	1	2	3	4	5	6	7	8
MEMORY DUMP		0	0	1					
ENGR		0	1	0					
SAR		0	1	1					
VIRR		1	0	0					
SASS		1	0	1					
SMMR		1	1	0					
ALT		1	1	1					
		Source ID			Block Number				Odd parity bit

C

TABLE I

INPUT SOURCE	PRIORITY	DATA CHARACTERISTICS	AVERAGE OUTPUT RATE (BLOCKS/SEC)	DATA BLOCKS/MAJOR FRAME	SOURCE NO. OF BITS/WORD
LRS	1*	BURST - 1 BLOCK, 1.024 SEC	0.9766	8	8
ALT	4	BURST - 850 BITS, 0.098 SEC	10.204	46	10
VIRR	5	BURST - 5 BLOCKS, 1.25 SEC	4.000	5	8**
SMMR	6	CONTINUOUS - 2000 BITS/SEC	2.1973	72	16
SAR	8	CONTINUOUS - 494 BITS/SEC	0.6432	4	8
SASS	9	BURST - 820 BITS, 1.89 SEC	0.5291	8	10
				-	-
MEMORY DUMP (FILL DATA)	10	CONTINUOUS - 512 BITS/BLOCK	-	48	32
ENGINEERING COMMANDABLE MODES					
ORBIT	7	CONTINUOUS - 2 BLOCKS, 0.983 SEC	2.0345	1	8
ORBIT ADJUST	3	CONTINUOUS - 4 BLOCKS, 0.983 SEC	4.0690	1	8
ASCENT	3	CONTINUOUS - 8 BLOCKS, 0.983 SEC	8.1380	1	8
MEMORY DUMP	2	768 MEMORY WORDS IN 48 SEQUENTIAL BLOCKS ***	-		

D

* LRS DATA BLOCK OCCURS EVERY 25TH BLOCK

** VIRR ANALOG DATA DIGITIZED BY TSU INTO 8 BIT WORD

*** EXCEPT FOR LRS DATA BLOCK INTERRUPTION

D

VI

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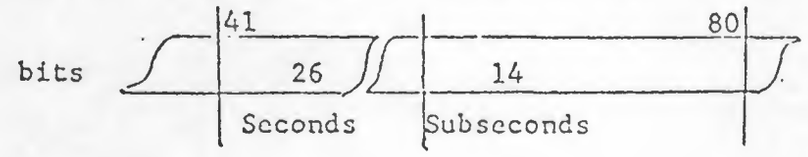
Time Tag (40 bits). The 40-bit time-tag code is referenced to the start of the event, the time-tag is organized as follows:



The Time Tag code in the LRS block represents real time and is the one which must be used for determining GMT timing corrections.

e. Data/Fill (944 bits). The remaining 944 bits of the telemetry block accommodate the input data. Any unused portion of the 944 data bits are assigned filler bits.

f. Telemetry Block Assignments and Format. The following telemetry blocks are assigned:

Engineering Blocks (Reference Figure 2)

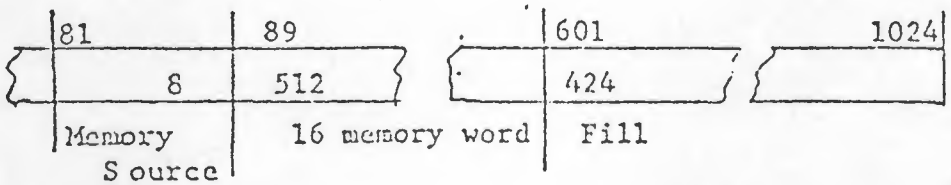
- o Low Rate Sampled (LRS) Block - The LRSBlock contains all engineering and status data with sampling rate $\leq$ one sample per second.
- o Ascent (ASC) Block - The ascent block contains engineering and status data with sampling rates exceeding one sample per second. This block contains all engineering and status data including those contained in the Orbit and Orbit Adjust Blocks.
- o Orbit (ORB)Block - The Orbit Block contains engineering and status data with sampling rates exceeding one sample per second and contains all engineering status data during the orbit mode.
- o Orbit Adjust (O/A) Block - The orbit adjust Block contains engineering and status data exceeding one sample per second and contains all engineering data during the orbit adjust mode.

MEMORY DUMP BLOCK

Each memory dump data block contains 16, 32-bit memory words, and since the total memory capacity of each redundant CTU section is 768, 32-bit words,

a total of 48 blocks are required to read out the contents of each memory.

NOTE: Each memory is sectioned into three 256 word banks (Bank A, Bank B, and Bank C). Upon command, the memory is read out sequentially starting at address 0 at approximately 25 kb/s rate. The 48 memory dump blocks will be contiguously dumped except for the LRS data block interruptions.



ID (bits 33 through 40)
00100000
00100011
00100101
00100110
00101001
00111110 Odd parity

memory block counter
16 blocks per memory bank

Memory Source	CTU Sect/Mem bank
100x0001	A / A (256 words)
100x0010	A / B
100x0100	A / C
010x0001	B / A
010x0010	B / B
010x0100	B / C (256 words)

1 = Standby
0 = Active

Sensor Blocks (Reference Figures 3 a, b, and c)

The sensor data blocks contain the sensor's science, engineering, and status data. The sensors, with the exception of the VIRR, provide to the data system serially digitized encoder signals. The data system gates the data into series of 8-bit words which are formatted into the data/fill portion of the applicable 1024-bit sensor data block. The VIRR sensor outputs one channel each of infrared and visible analog data signals which are digitized by the data system into 8 bit words and then formatted into the VIRR data block.

DATA BLOCK PRIORITY

The priority assigned to the data blocks are listed in Table 1.

LRS BLOCK

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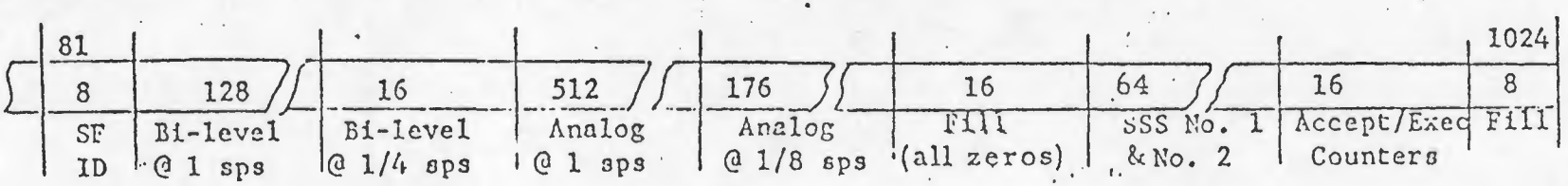
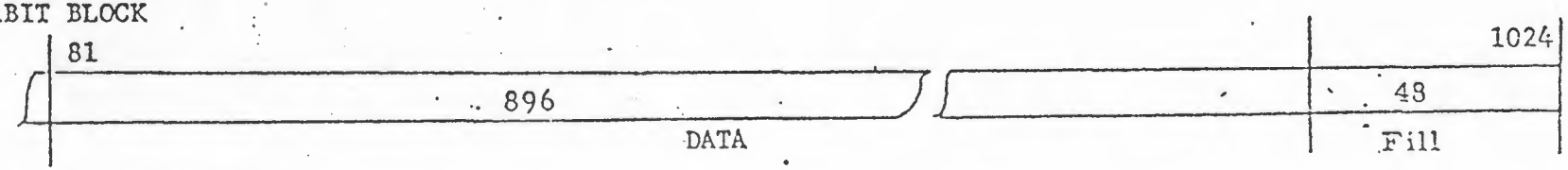
D



ID = 01000011

ORBIT BLOCK

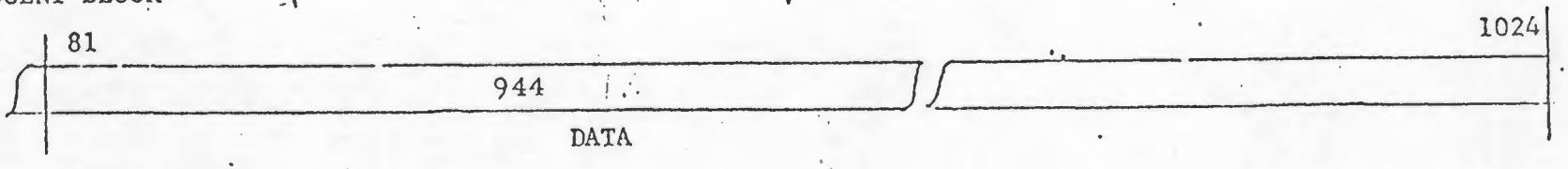
D



ID = 01001001

ASCENT BLOCK

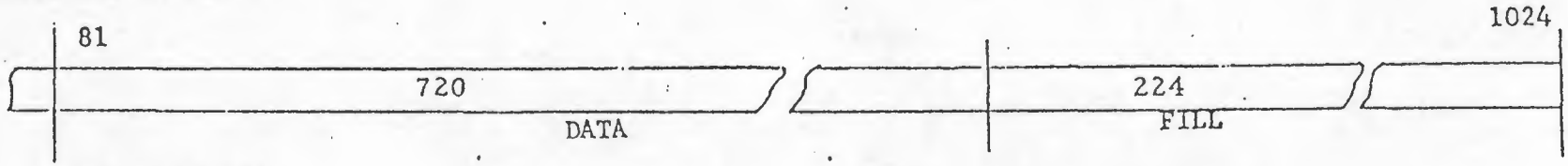
D



ID =01011101

ORBIT ADJUST BLOCK

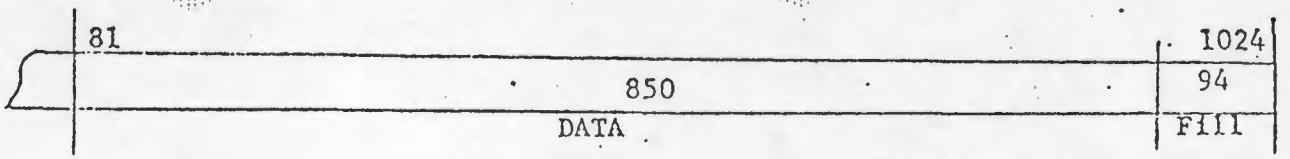
D



ID = 01010001

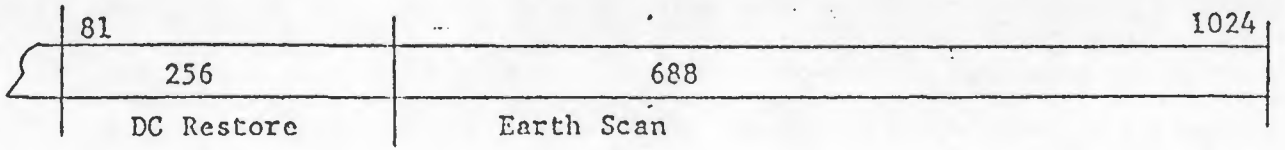
FIGURE 2 ENGINEERING DATA BLOCK FORMAT

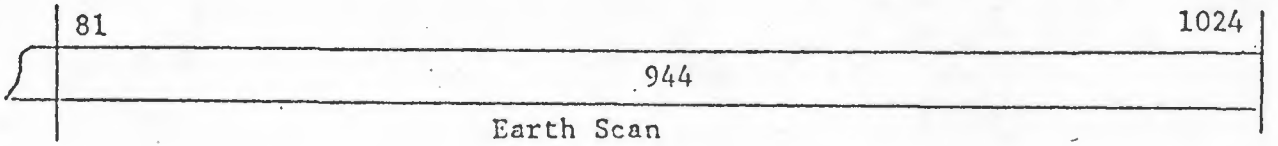
ALTIMETER BLOCK



ID = 11100000

VIRR BLOCKS

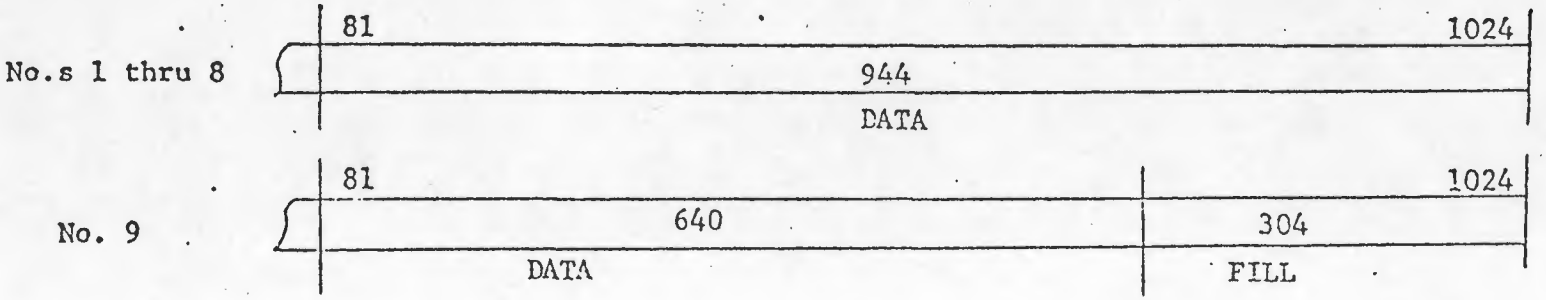




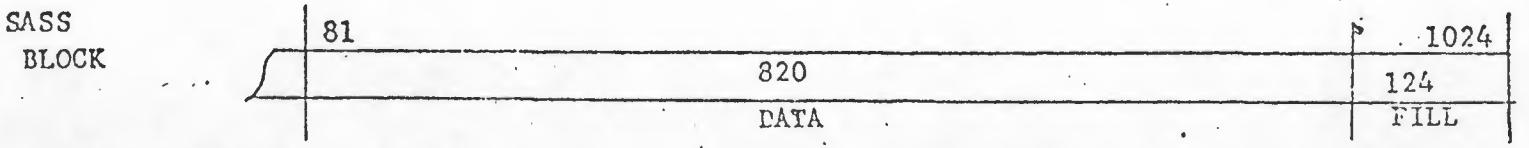
Block No	ID
1	10000000
2	10000011
3	10000101
4	10000110
5	10001001

FIGURE 3.a ALTIMETER and VIRR Block Format

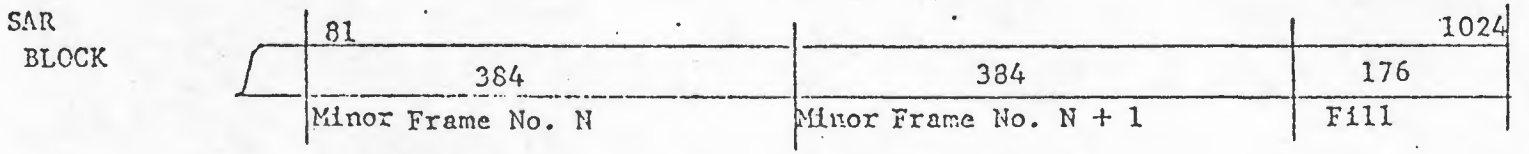
SMMR BLOCKS



Block No.	ID	Block No.	ID
1	11000001	6	11001011
2	11000010	7	11001101
3	11000100	8	11001110
4	11000111	9	11010000
5	11001000		



ID = 10100001



ID = 01100001

FIGURE 3 b SMMR, SASS, and SAR Block Format

Meas. Desig.	Meas. Title	Data Posn. Desig.	Bits/ Meas.
MH000	Frame Sync.	1(1)	16
SP001	Frame Counter	2(17)	16
SP002	Block ID/Cntr.	3(33)	8
MH003	Time-Sec. (MSB)	4(41)	10
MH004	Time-Sec. (LSB)	5(51)	16
MH005	Time-Sub sec.	6(67)	14
SP006	Mem. Source/State	7(81)	8
SP007-38*			

*Measurement Designations SP007 thru SP038 are 32-16 bit words repeated 48 times to gather a full Memory Load of 768-32 bit words.

Figure 3C Memory Dump Block Format

MEAS DESIG. - Measurement Designation

This is always composed of two letters followed by a three digit number. The letters identify the subsystem or sensor system from which the data originates. The code for identifying the subsystem and sensor system is summarized below:

AL - Radar Altimeter

LA - LMSC Structures & Mechanics Subsystem (SS/A)

LB - LMSC Orbit Insertion System and OAS/RCS (SS/B)

LC - LMSC Electrical Power System (SS/C)

LD - LMSC Ascent and Orbit Guidance and Control Subsystem (SS/D)

LH - LMSC Telecommunication and Data System (SS/H)

RA - Laser Retroreflector (LRA)

SA - LMSC Synthetic Aperature Radar (SAR) Antenna

SD - SAR Data Link

SM - Scanning Multichannel Microwave Radiometer (SMMR)

SR - SAR Electronics

SS - Scatterometer (SASS)

TR - Tranet Beacon

VI - Visible and Infrared Radiometer (VIRR)

The three digit numbers following the letters can be used to identify the type of measurements. The code for identifying the type of measurements is shown below:

LRS, Ascent, Orbit, and Orbit Adjust Data Block

01x		LRS Word 11, bits 3 through 8
1xx	2xx	Analog data
4xx		Serial bit data
5xx	6xx	Discrete data

Sensor Data Block

7xx, 8xx, 9xx

Data Block Preamble

The 00x numbers are used to identify the measurements in the first ten 8-bit words (bits 1 through 80) of every data block.

Mode

ne applicable engineering telemetry block modes are identified in this column. The following abbreviations are used:

LRS - Low Rate Sampled Block

ASC - Ascent Block

ORB - Orbit Block

O/A - Orbit Adjust Block

Data Pos. Desig.

The designations of data positions in the engineering block data frame structures consist of combinations of numbers and a vocabulary of three symbols. The numbers are in the decimal system and the symbols are "slash" (/), "colon"(:), "comma"(,), and "dash" (-).

1. The first number in the designator identifies the main frame word.
   Example: "27" indicates that the information is located in the twenty-seventh word of the main frame.

2. A comma indicates that the information is super-commutated. The number on the left of the comma identifies the first (or previous) occurrence and the number on the right of the comma indicates the next occurrence.
   Example: "11, 31, 67, 87" indicates that th information is in the eleventh, thirty-first, sixty-seventh, and eighty-seventh words as super commutation.

3. A slash indicates that the information is on a sub-frame. The number to the left of the slash identifies the word on the main frame which contains the sub-frame. The number to the right indicates the sub-frame which contains the information of interest.
   Example: "94/4" indicates that the information is located in the fourth sub-frame and is carried by the ninety fourth main frame word.

4. The colon indicates that the information is discrete (bi-level). The number to the left of the colon identifies the word in which the discrete is located and the number to the right indicates the bit position which contains the discrete (the most significant bit is position number one).

Example: "29/1:8" indicates that the information is a discrete is located in the first subframe, and is carried by the eight bit of the twenty ninth main frame word.

5. The dash indicates that the information is contained in adjacent frame words (or bits). The number on the left identifies the beginning frame word (or bits) which contains the measurement expression and the number on the right identifies the frame word (or bits) which contains the end of this expression.

Example: "1-2" indicates that the information is carried in words 1 and 2.

Example: "11:6-8" indicates that the information is carried in bits 6, 7, and 8 of word 11.

To summarize the preceding paragraphs, the expression always starts with a number that identifies a main frame word. If there is no "colon" (:) in the expression the datum position defined contains analog information. If the expression contains a "slash" (/) the datum position is sub-commutated. If the expression contains a "dash" (-) the information is carried by adjacent words or bits.

Samp Rate - Sampling rate (Samples per Second)

It should be noted that the sampling rate specified is not the required sampling rate, but is always equal to or greater than the required rate.

Range Engr. Unit

This column contains both the range in engineering units of the analog monitors and the two states of the bilevel monitors. Where bilevel data are listed the column is divided into two columns by a vertical dash line. The information in the left column represents the "true" state ("1") and the information in the right column represents the "false" state ("0").

Conn-Pin

The noted pins of the Telemetry and Sensor Interface Unit (TSU) connect to the corresponding telemetry channels referenced in the TLM Mode/Data Pos Desig columns.

Data Source

This column lists the source of the data and does not necessarily indicate the point at which the data is signal conditioned.

Block ID

Data block ID identifies the sensor block in which the data appears. This section applies where multiple data blocks are used in a major frame.

Sensor Data Pos. Desig.

The designation's of data positions in the sensor data frame structure consist of combinations of numbers and a vocabulary of three symbols. The numbers are in decimal system and the symbols are "slash" (1),"comma"(,), "dash" (-), & parenthesis( )

1. The first number in the designator identifies the sensor data word and does not represent the 128 8-bit data words in the 1024-bit data block.
2. A comma has the same meaning as used in the Data Pos. Desig. column. A comma indicates that the information is super-commutated. The number on the left of the comma identifies the first (or previous) occurrence and the number on the right of the comma indicates the next occurrence.
3. A slash has the same meaning as used in the Data Pos. Desig. column. A slash indicates that the information is on a sub-frame. The number to the left of the slash identifies the word in the sensor main frame which contains the sub-frame. The number to the right indicates the subframe which contains the information of interest.
4. The dash has the same meaning as used in the Data Position Design column.
5. The number contained in the parenthesis indicates the sensor main frame bit at which the data starts.
   Example: "5(31)" indicate that the information is in the fifth sensor main frame word, which starts at the thirty-first bit of the sensor main frame.
   It should be noted that bit No 1 of a sensor main frame corresponds to bit No 81 of the 1024-bit data block.

No of Bits/Meas.

The number listed in this column represent the number of bits used by the designated measurement.

Example:	Sensor Data Pos. Desig	No of Bits/ Meas.
	16/39(153)	6

The example indicates that the information is located in the thirty-ninth subframe and is carried by the sixteenth word of the sensor main frame. The data is six bits in length and starts at bit no. 153 of the sensor main frame.

C SCHEMATIC PAGE ZONE

The Telemetry measurement can be found on the Vehicle Schematic at the location specified in these columns.

C Revision Notation

Letter notation in the left hand margin of this document indicate changes added by the noted letter-revision.

	Meas. Desig.	Measurement Title		TLM Mode	Data Pos. Design.	Samp Rate SPS	Range Engr. Unit	Conn-Pin TSU 1	Conn-Pin TSU 2	Data Source	SCHEMATIC PAGE	SCHEMATIC ZONE
D	SY000	Sync Word	LRS Data Block Preamble (a)	LRS	1-2	25	11101011-10010000	N/A	N/A	TSU 1 & 2	6.3	4A
	SP001	Frame Counter		LRS	3-4	25	Increments One count per data block output	N/A	N/A	TSU 1 & 2	6.3	5B
	SP002	ID		LRS	5	25	Identifies data source and block number - see data block formats				6.3	7D
	SP003	Time Tag-Sec (MSB)		LRS	6:1-8 7:1-2	25	MSB's of time tag in seconds	N/A	N/A	TSU 1 & 2	6.4	9D
	SP004	Time Tag - Sec (LSB)		LRS	7:3-8 8:1-8 9:1-2	25	LSB's of time tag in seconds	N/A	N/A	TSU 1 & 2	6.4	9D
D	SP005	Time Tag - Subsec		LRS	9:3-8 10:1-8	25	Time tag in subseconds	N/A	N/A	TSU 1 & 2	6.4	9D
	LH010	LRS Word No 11 Bits 3, 4, & 5		LRS	11:3-5	1	"0" bits	N/A	N/A	TSU 1 & 2	6.4	9D
	LH011	LRS Subframe Counter		LRS	11:6-8	1	000 = SF No. 1 001 = SF No. 2 . . . 111 = SF No. 8	N/A	N/A	TSU 1 & 2	6.4	9E

D (a) For other data block preamble measurement designations see Data Block Preamble Word Format, page 50A.

Meas. Desig.	Measurement Title	TLM Mode	Data Pos. Desig.	Samp Rate SPS	Range Engr. Unit	Conn-Pin TSU 1	Conn-Pin TSU 2	Data Source	SCHEMATIC PAGE	SCHEMATIC ZONE
AL101	ALT Transmit Pwr	LRS	70	1		J3-21		Sig Proc	8.3	9C
AL102	ALT TWTA Beam Current	LRS	72	1		J3-22				9C
AL103	ALT TWTA Temp	LRS	94/6	1/8		J3-38				9E
AL104	ALT Noise Gate Ampl	LRS	74	1		J3-23				9C
AL105	ALT Plateau Gate Ampl	LRS	76	1		J3-24				9C
AL106	ALT 5 MHz Ref	LRS	78	1		J3-25				9B
AL107	ALT SACU PLO Lock	LRS	80	1		J3-26				9B
AL108	ALT LVPS Current Mon	LRS	96/6	1/8		J3-46				9A
AL109	ALT HSWS Temp	LRS	98/6	1/8		J3-54				9D
AL110	ALT DDL Temp	LRS	100/6	1/8		J3-62				9D
AL111	ALT DFB Temp No. 1	LRS	102/6	1/8		J3-70				9D
AL112	ALT SACU Temp	LRS	104/6	1/8		J3-78		Sig Proc		9D
AL113	ALT TWTA Base Temp (RF Assy)	LRS	106/6	1/8	0 to +150°F	J3-86		RF Assy.		12H
AL114	ALT TWTA P/S Temp (RF Assy)	LRS	108/6	1/8	0 to +150°F	J3-94				12G
AL115	ALT DDL Temp (RF Assy)	LRS	94/7	1/8	0 to +150°F	J3-39				12G
AL116	ALT UCFM Temp (RF Assy)	LRS	96/7	1/8	0 to +150°F	J3-47				12F
AL117	ALT MTU Temp (RF Assy)	LRS	98/7	1/8	0 to +150°F	J3-55				12F
AL118	ALT Rcvr Temp (RF Assy)	LRS	100/7	1/8	0 to +150°F	J3-63			8.3	12F

Meas. Desig.	Measurement Title	TLM Mode	Data Pos. Desig.	Samp Rate SPS	Range Engr. Unit	Conn-Pin TSU 1	Conn-Pin TSU 2	Data Source	SCHEMA PAGE	SCHEMA ZONE
AL119	ALT +X Temp (RF Assy)	LRS	102/7	1/8	-35 to +180°F	J3-71		RF Assy	8.3	12E
AL120	ALT -X Temp (RF Assy)	LRS	104/7	1/8	-35 to +180°F	J3-79				12E
AL121	ALT +Y Temp (RF Assy)	LRS	106/7	1/8	-35 to +180°F	J3-87				12E
AL122	ALT -Y Temp (RF Assy)	LRS	108/7	1/8	-35 to +180°F	J3-95		RF Assy.	8.3	12D

	Meas. Desig.	Measurement Title	TLM Mode	Data Pos. Desig.	Samp Rate SPS	Range Engr. Unit	Conn-Pin TSU 1	Conn-Pin TSU 2	Data Source	SCHEMATIC PAGE	SCHEMATIC ZONE
	LA123	+Xs FWD Sect Skin Temp	LRS	101/1	1/8	-100 to +200°F		J3-57	1616310-033	6.6	20G
	LA124	-Ys Guid Mod Skin Temp	LRS	105/3	1/8	-100 to +200°F		J3-75	1616310-033	6.6	20F
	LA125	SM Mast Temp	LRS	106/3	1/8	-100 to +200°F	J3-83		1616310-033	6.6	20F
	LA126	SAR Louver +Xs Temp	LRS	108/3	1/8	0 to +150°F	J3-91		1617848-003	8.2	5F
	LA127	TRANET Beacon Mtg Struct Temp No 1	LRS	104/1	1/8	-35 to +180°F	J3-73		1617848-003	8.2	8F
	LA128	TRANET Beacon Mtg. Struct Temp No 2	LRS	105/1	1/8	-35 to +180°F		J3-73	1617848-003	8.2	8F
	LA129	ALT Sig Proc BasePlate Temp No1	LRS	106/1	1/8	-35 to +180°F	J3-81		1617848-003	8.3	21B
	LA130	ALT Sig Proc BasePlate Temp No2	LRS	107/3	1/8	-35 to +180°F		J3-83	1617848-003	8.3	21A
C	LA131	NOT USED									
C	LA132	NOT USED									
	LA501	Fairing Separation +Y	ASC	25:4,87:4	16	Mated | Sep		J4-37	Conn J/P827	6.6	14H
	LA502	Fairing Separation -Y	ASC	25:5,87:5	16	Mated | Sep		J4-38	Conn J/P826	6.6	14G
C	LA503	NOT USED									

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL700	Coarse Height		1(1) → 80 → 81	10	10.2		MSB=819.2 Micro-sec.
AL701	Med. Height		2(11) 81 - 110 altitude				MSB=0.8 Micro-sec.
AL702	Fine Height		3(21)				MSB=0.781
AL703	Altitude Rate		4(31)				LSB=1.52 P-sec/PRI
AL704	Height Error		5(41)				MSB=Sign LSB=1.5625
AL705	AGC Gate Amp		6(51)				DFB Output X100 ÷ 64
AL706	Early Gate Amp.		7(61)				DFB Output
AL707	Late Gate Amp.		8(71)				DFB Output
AL708	Middle Gate Amp.		9(81)				DFB Output
AL709	$\overline{L_6 - E_6}$		10(91)				DFB Output X100 ÷ 64
AL710	Noise Gate Amp		11(101)				A/D Conv. X100 ÷ 32
AL711	Plateau Gate Amp.		12(111)				A/D Conv.
AL712	Attitude Gate Amp.		13(121)				A/D Conv.
AL713	Transmit Power		14(131)				A/D Conv. X100 ÷ 32
AL714	Status/Mode #1 (Parity)		15(141)	1			MSB#10 = Parity
AL715	Status/Mode #1 (Spare)		15(142) 222	1			Bit #9

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
				1	10.2		Bit #8
AL716	Status/Mode #1 (Cal. III)		15(143)	1			Bit #7
AL717	(Cal. I, II)		15(144)	4			Bits #6, 5, 4 & 3
AL718	(Multi-Level Mode C&D)		15(145)				Bit #2
AL719	(Init. Tracker)		15(149)	2		Exec. Bits 3 + 6 Now	Init. Tracker, Then Exec. Bits 3 + 6
AL720	Not Used.		16(151)	2	10.2		Bit #10 = 1* Bit #9 = 0* *for AL718 Bit #10-#9=0 for AL719 + AL762
AL721	Engr. Data MSB's for Sub-C Words #1 + #42						
AL722	TWT Beam Current		16/1(153) 233	8	0.22		
AL723	TWT Cathode Voltage		16/2(153)				
AL724	TWT HVPS Temp.		16/3(153)				
AL725	TWT Collector Temp		16/4(153)				
AL726	No Data		16/5(153)				
AL727	Receiver Temp.		16/6(153)				
AL728	Noise Gate Ampl.		16/7(153)				
AL729	Plateau Gate Ampl.		16/8(153)				
AL730	Attitude Gate Ampl.		16/9(153)		8	0.22	

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL731	Transmit Power Ampl.		16/10(153)	8	0.22		
AL732	UCFM Temp.		16/11(153)				
AL733	DDL Temp.		16/12(153)				
AL734	DDL Assembly Temp.		16/13(153)				
AL735	HSWS Temp.		16/14(153)				
AL736	DFB Temp. #1		16/15(153)				
AL737	A.T. #1 Temp.		16/16(153)				
AL738	A.T. #2 Temp.		16/17(153)				
AL739	ICU Temp.		16/18(153)				
AL740	SACU Temp.		16/19(153)				
AL741	LVPS Temp.		16/20(153)				
AL742	LVPS 38.V Current		16/21(153)				
AL743	+28V. S/C Bus Isolated		16/22(153)				
AL744	+28 Volts		16/23(153)				
AL745	+15 Volts		16/24(153)				
AL746	-15 Volts		16/25(153)				
AL747	+7 Volts		16/26(153)				
AL748	-9 Volts		16/27(153)				
AL749	+5 Volts		16/28(153)				
AL750	-5.2 Volts		16/29(153)				
AL751	1.00 V. Reference		16/30(153)				
AL752	0.657 V. Reference		16/31(153)				
AL753	SACU PLO Lock		16/32(153).				
AL754	MTU Temperature		16/33(153)				

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit		Comment
AL755	No Data		16/34(153)	8	0.22			
AL756	DFB Temperature #2		16/35(153)					
AL757	Spare		16/36(153)					
AL758	Spare		16/37(153)					
AL759	Spare		16/38(153)					
AL760	Spare		16/39(153)					
AL761	Spare		16/40(153)					
AL762	Spare		16/41(153)	5	0.22			
AL763	TWTA Fault		16/41(158)	1	0.22	Normal	Override	MSB's 8-4
AL764	LVPS Currents		16/41(159)	1		Normal	Override	
AL765	A.T.		16/41(160)	1		A.T.#2	A.T.#1	LSB
AL766	Spare		16/42(153)	8				
AL767	Index to Sel. ACQ. Run Time Const.		16/43(151)	2	0.22			Word #43-#46 are zeros when no Sel. is made.
AL768	Index to Sel. Trk Run Time Const.		16/43(153)	2				
AL769	Index to Sel. Trk AGC Threshold		16/43(155)	4				
AL770	Word #43 LSB's		16/43(159	2				Bit #2 = #1 = (1)
AL771	Index to Sel. ACQ/α/ β/ AGC Time Const.		16/44(151)	4				

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL772	Index to Sel. Trk/α/β/		16/44(155)	4	0.22		
	AGC Time Const.						
AL773	Word #44 LSB's		16/44(159)	2			Bit #2 = 1 = (1)
AL774	Index to Sel. Min. Gate Width for ΔH		16/45(151)	2			
AL775	Index to Sel $\overline{L_6 - E_6}$ Threshold for T_{TT}		16/45(153)	2			
AL776	Index to Sel. $T_{\Delta H}$		16/45(155)	2			
AL777	Index to Sel $\overline{L_6 - E_6}$ Threshold for T_{TA}		16/45(157)	2			
AL778	Word #45 LSB's		16/45(159)	2			B #2 = #1 = (1)
AL779	Offset for Adj. ΔK_{L-E}		16/46(151)	4			
AL780	Offset for ACQ. HT.		16/46(155)	4			LSB = 25 ns.
AL781	Word #46 LSB's		16/46(159)	2	0.22		
D AL782	AGC Word Coarse	241	17(161)	6	10.2	Attn. Insert	
	→ AL 900 AGC WORD FINE 17(167)			4			
AL783	Not Used	24	18(171)	2			Bits 10 & 9, Not used = 0
AL784	Cal. Attn./SACU Status		18(173) 253	4		Attn. Insert.	0-60 db* (11 Setps)* *Bits 8,7,6 & 5

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit		Comment
AL785	Spare		18(177)	1	10.2			Bit #4
AL786	HV On		18(178)	1		On	Off	Bit #3
AL787	HV Ready		18(179)	1		Ready	NotReady	Bit #2
AL788	TWT Fault		18(180) 260	1		Fault	No Fault	Bit #1
AL789	Stat. Mode #3(ATU Br. Stat) (Gate Width)		19(181)	3				Bits 10,9 & 8 Gate Width (6 = 50 ns)
AL790	#3(ATU Br. Stat.) (ACQ/TRK)		19(184) 264	1				Acq./Trk. (Bit #7)
AL791	#3(ATU Br. Stat.) (Chirp ACQ Step)		19(185)	2				Chirp.Acq. Step (Bits 6 & 5)
AL792	#3(ATU Br. Stat.) (Re-Acq Flag)		19(187)	1				Re-Acq.Flag (Bit #4)
AL793	#3(ATU Br. Stat.) ($\overline{\Delta H} > T_{\Delta H}$)		19(188)	1				$\overline{\Delta H} > T_{\Delta H}$ (Bit #3)
AL794	Stat. Mode #3(Spare)		19(189)	2				Bits 2 & 1
AL795	Stat. Mode #4 SACU Mode CMD (Not used)		20(191)	2				Bits 10 & 9 not used
AL796	#4 (Chirp/CW)		20(193) 293	1	10.2	Chirp (Gates) Output Wave-forms	CW-Output AL870 - AL876	Bit #8

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL797	Stat. Mode #4(SACU Mod CMD) (Hi V. On/Off)		20(194)	1	10.2	HV On	Bit #7
AL798	#4 (TWTA Fault Reset)		20(195)	1		TWTA Fault Reset	Bit #6
AL799	#4 (Trigger Kill)		20(196)	1		Trigger. Kill	Bit #5
AL800	#4 (Cal. Mode I)		20(197) -> 277	1			Cal. Mode I (Bit #4) 1st 11 Steps
AL801	#4 (Cal. Mode II)		20(198) -> 278	1			Cal. Mode II (Bit #3) Noise only
AL802	#4 (TWT Htr On/Off)		20(199) -> 279	1		TWT Htr On	Bit #2 (on when power applied)
AL803	Status Mode #4 (Spare)		20(200) -> 280	1			Bit #1
AL804	Wavcheight (H-1/3)		21(201) 281-290 .H1/3	10			MSB=10 meters
AL805	Status Mode #2(Eng. Data Ch) (Channel Select)		22(211) 291	6			S-F Counter (Bits #10-#5) Ch. Sel. (1-46)
AL806	Status Mode #2(ATU Mode)		22(217) 297	4	10.2		Bits 4-1

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL807	Waveform (-30 Gate)		23(221) 301-330	10	10.2		Scale=DFB Output x100:64
AL808	Waveform (-29 Gate)		24(231)				
AL809	Waveform (-28 Gate)		25(241)				
AL810	Waveform (-27 Gate)		26(251)				
AL811	Waveform (-26 Gate)		27(261)				
AL812	Waveform (-25 Gate)		28(271)				
AL813	Waveform (-24 Gate)		29(281)				
AL814	Waveform (-23 Gate)		30(291)				
AL815	Waveform (-22 Gate)		31(301)				
AL816	Waveform (-21 Gate)		32(311)				
AL817	Waveform (-20 Gate)		33(321)				
AL818	Waveform (-19 Gate)		34(331)				
AL819	Waveform (-18 Gate)		35(341)				
AL820	Waveform (-17 Gate)		36(351)				
AL821	Waveform (-16 Gate)		37(361)				
AL822	Waveform (-15 Gate)		38(371)				
AL823	Waveform (-14 Gate)		39(381)				
AL824	Waveform (-13 Gate)		40(391)				
AL825	Waveform (-12 Gate)		41(401)				
AL826	Waveform (-11 Gate)		42(411)	10	10.2		Scale=DFB Output x100:64

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL827	Waveform (-10 Gate)		43(421)	10	10.2		Scale=DFB Output x100:64
AL828	Waveform (-9 Gate)		44(431)				
AL829	Waveform (-8 Gate)		45(441)				
AL830	Waveform (-7 Gate)		46(451)				
AL831	Waveform (-6 Gate)		47(461)				
AL832	Waveform (-5 Gate)		48(471)				
AL833	Waveform (-4 Gate)		49(481)				
AL834	Waveform (-3 Gate)		50(491)				
AL835	Waveform (-2 Gate) 29		51(501)				
AL836	Waveform (-1 Gate) 30		52(511)				
AL837	Waveform (+1 Gate) 31		53(521)				
AL838	Waveform (+2 Gate)		54(531)				
AL839	Waveform (+3 Gate)		55(541)				
AL840	Waveform (+4 Gate)		56(551)				
AL841	Waveform (+5 Gate)		57(561)				
AL842	Waveform (+6 Gate)		58(571)				
AL843	Waveform (+7 Gate)		59(581)				
AL844	Waveform (+8 Gate)		60(591)				
AL845	Waveform (+9 Gate)		61(601	10	10.2		Scale=DFB Output x100:64

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL846	Waveform (+10 Gate)	62(611)		10	10.2		Scale=DFB Output x100 ÷ 64
AL847	Waveform (+11 Gate)	63(621)					
AL848	Waveform (+12 Gate)	64(631)					
AL849	Waveform (+13 Gate)	65(641)					
AL850	Waveform (+14 Gate)	66(651)					
AL851	Waveform (+15 Gate)	67(661)					
AL852	Waveform (+16 Gate)	68(671)					
AL853	Waveform (+17 Gate)	69(681)					
AL854	Waveform (+18 Gate)	70(691)					
AL855	Waveform (+19 Gate)	71(701)					
AL856	Waveform (+20 Gate)	72(711)					
AL857	Waveform (+21 Gate)	73(721)					
AL858	Waveform (+22 Gate)	74(731)					
AL859	Waveform (+23 Gate)	75(741)					
AL860	Waveform (+24 Gate)	76(751)					
AL861	Waveform (+25 Gate)	77(761)					
AL862	Waveform (+26 Gate)	78(771)					
AL863	Waveform (+27 Gate)	79(781)					
AL864	Waveform (+28 Gate)	80(791)					
AL865	Waveform (+29 Gate)	81(801)		10	10.2		Scale=DFB Output x100 ÷ 64

Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
AL866	Waveform (+30 Gate)	60	82(811)	10	10.2		Scale-DFB Output x100 ÷ 64
AL867	Waveform (-1-1/2 Gate)	61	83(821)				
AL868	Waveform (0 Gate)	62	84(831)				
AL869	Waveform (+1-1/2 Gate)	63	85(841)	10	10.2		Scale-DFB Output x100 ÷ 64
AL870	Xmit Word CTR		23(221),30(291), 37(361),44(431), 51(501),58(570), 65(641),72(711), 79(781)	10	91.8		Output when Bit #193=0 CW Count
AL871	Xmit CW HIT CTR		24(231),31(301), 38(371),45(441), 52(511),59(581), 66(651),73(721), 80(791)	10	91.8		Output when Bit #193=0 HIT Count
AL872	CW Height LSB's		25(241),32(311), 39(381),46(451), 53(521),60(591), 67(661),74(731), 81(801)	10	91.8		Output when Bit #193=0 If HIT CTR < 16 LSB's =50 ns =HIT Count If HIT CTR ≥ 16 LSB's = 0.195 ns

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Meas. Desig.	Measurement Title	Data Block ID	Sensor Data Pos. Desig.	No. of Bits/ Meas.	Samp Rate SPS	Range Engr. Unit	Comment
858 AL873	CW Height SSB's		26(251),33(321), 40(391),47(461), 54(531),61(601), 68(671),75(741), 82(811)	10	91.8		Output when Bit #193=0
859 AL874	CW Height MSB's		27 361),34(331), 41(401),48(471), 55(541),62(611), 69(681),76(751), 83(821)	10	91.9		Output when Bit #193=0
AL875	CW AGC LSB's		28(271),35(341), 42(411),49(481), 56(551),63(621), 70(691),77(761), 84(831)	10	91.8		Output when Bit #193=0
AL876	CW AGC MSB's		29(281),36(351), 43(421),50(491), 57(561),64(631), 71(701),78(771), 85(851)	10	91.8		Output when Bit #193=0 MSB - 32 dB
D AL900	AGC Word Fine		17(167)	4	10.2		