

NATIONAL RADIO ASTRONOMY OBSERVATORY
Socorro, New Mexico

VLBA TECHNICAL REPORT NO. 5
LIST OF CURRENT MONITOR AND CONTROL
POINTS (MARCH 30, 1989)

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April 10, 1989

MCB INTERFACE ID AND SPACE ASSIGNMENTS
(FOR LATEST INFORMATION SEE uVAX1::[VLBSOFT.CODE]MCBID.H)

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DEVICE NAME	NOMEN- CLATURE	ID (HEX)	BASE ADDRESS (HEX)	BLOCK LENGTH (HEX)	PAGE NUMBERS
4m(75MHz)	FRONTEND INTERFACE		00	100	40
90/50cm	FRONTEND INTERFACE	F118	01	180	40 3
20cm(1.56Hz)	FRONTEND INTERFACE	F117	02	200	40 4-5
13cm(2.36Hz)	FRONTEND INTERFACE	F117	03	280	40 4-5
6cm (4.86Hz)	FRONTEND INTERFACE	F117	04	300	40 4-5
4cm (8.46Hz)	FRONTEND INTERFACE	F117	05	380	40 4-5
3cm(10.76Hz)	FRONTEND INTERFACE	F117	06	400	40 4-5
2cm(14.96Hz)	FRONTEND INTERFACE	F117	07	480	40 4-5
1.3cm(23.6Hz)	FRONTEND INTERFACE	F117	08	500	40 4-5
7 cm (43.6Hz)	FRONTEND INTERFACE	F117	09	580	40
4 cm (86.6Hz)	FRONTEND INTERFACE	F117	0A	600	40
2-16 GHz SYNTHESIZER #1		L104	10	1000	20 6
2-16 GHz SYNTHESIZER #2		L104	11	1100	20 6
2-16 GHz SYNTHESIZER #3		L104	12	1200	20 6
LO/IF/RF SWITCH CONTROLLER		L107	14	1400	30 7-8
ROUND TRIP PHASE MONITOR		L103	15	1500	30 9
MASER INTERFACE		M104	16	1600	40 10-11
WEATHER STATION			18	1800	80 12-13
DAR1- BASEBAND CONVERTER: #1		T122	20	2000	30 14-16
DAR1- BASEBAND CONVERTER: #2		T122	21	2040	30 14-16
DAR1- BASEBAND CONVERTER: #3		T122	22	2080	30 14-16
DAR1- BASEBAND CONVERTER: #4		T122	23	20C0	30 14-16
DAR1- BASEBAND CONVERTER: #5		T122	24	5000	30 14-16
DAR1- BASEBAND CONVERTER: #6		T122	25	5040	30 14-16
DAR1- BASEBAND CONVERTER: #7		T122	26	5080	30 14-16
DAR1- BASEBAND CONVERTER: #8		T122	27	50C0	30 14-16
DAR1- IF DISTRIBUTOR: #1		T122	28	2100	30 17-18
DAR1- IF DISTRIBUTOR: #2		T122	29	2180	30 17-18
RECORDER TRANSPORT #1			2A	2200	100 19-23
DAR1- FORMATTER			2C	2300	100 24-39
DAR2- BASEBAND CONVERTER: #1		T122	30	2400	30 14-16
DAR2- BASEBAND CONVERTER: #2		T122	31	2440	30 14-16
DAR2- BASEBAND CONVERTER: #3		T122	32	2480	30 14-16
DAR2- BASEBAND CONVERTER: #4		T122	33	24C0	30 14-16
DAR2- BASEBAND CONVERTER: #5		T122	34	5100	30 14-16
DAR2- BASEBAND CONVERTER: #6		T122	35	5140	30 14-16
DAR2- BASEBAND CONVERTER: #7		T122	36	5180	30 14-16
DAR2- BASEBAND CONVERTER: #8		T122	37	51C0	30 14-16
DAR2- IF DISTRIBUTOR: #1		T122	38	2600	30 17-18
DAR2- IF DISTRIBUTOR: #2		T122	39	2680	30 17-18
RECORDER TRANSPORT #2			3A	2800	100 19-23
DAR2- FORMATTER			3C	3C00	100 24-39

DEVICE NAME	NOMEN- CLATURE	ID (HEX)	BASE ADDRESS (HEX)	BLOCK LENGTH (HEX)	PAGE NUMBERS

RACK B INTERFACE	M102	40	4000	40	40-41
BUILDING UTILITY MODULE		42 41	4100		42-43
PEDASTAL ROOM UTILITY MODULE		41 42	4200		44-45
ANTENNA CONTROL UNIT (ACU)		70	7000	40	46-50
FOCUS ROTATION DRIVE		72	7200	70	51-54

330/610 MHz FRONT-END MONITOR/CONTROL INTERFACE (F118)

 ID (HEX) = 01
 STARTING ADDRESS (HEX) = 180
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MULT.	UNITS	RANGE	COMMENTS
00-03			NOT USED					
04	ANALOG	MON	LO CAL DIODE CURRENT		120	mA		
05	ANALOG	MON	HI CAL DIODE CURRENT		120	mA		
06	ANALOG	MON	LO CAL DIODE VOLTAGE		4	VOLTS		
07	ANALOG	MON	HI CAL DIODE VOLTAGE		4	VOLTS		
08	ANALOG	MON	RACK A TEMP. SENSOR #1 (BOTTOM): 100mV/deg C		10	deg C		
09	ANALOG	MON	HELIUM PRESSURE SENSOR #4		1	VOLTS		
0A	ANALOG	MON	+28V POWER SUPPLY MONITOR		4	VOLTS		
0B-0F			NOT USED					
10	ANALOG	MON	-15V POWER SUPPLY MONITOR		2	VOLTS		
11	ANALOG	MON	330/610 MHz FE BOX TEMP. MONITOR		100	KELVIN		
12	ANALOG	MON	+5V POWER SUPPLY MONITOR		1	VOLTS		
13	ANALOG	MON	+15V POWER SUPPLY MONITOR		2	VOLTS		
14	ANALOG	MON	HELIUM PRESSURE SENSOR #1		1	VOLTS		
15	ANALOG	MON	HELIUM PRESSURE SENSOR #2		1	VOLTS		
16	ANALOG	MON	HELIUM PRESSURE SENSOR #3		1	VOLTS		
17	ANALOG	MON	RACK A TEMP. SENSOR #2 (TOP): 100mV/deg C		10	deg C		
18	ANALOG	MON	330/610 FE SERIAL NUMBER (ANALOG)		2.5			
19	ANALOG	MON	FRONT PANEL AUX. INPUT #1(*)		1	VOLTS		
1A	ANALOG	MON	FRONT PANEL AUX. INPUT #2(*)		1	VOLTS		
1B	ANALOG	MON	FRONT PANEL AUX. INPUT #3(*)		1	VOLTS		
1C	ANALOG	MON	FRONT PANEL AUX. INPUT #4(*)		1	VOLTS		
1D	ANALOG	MON	FRONT END +15V MONITOR		2	VOLTS		
1E	ANALOG	MON	REAR PANEL AUX. INPUT #1(*)		1	VOLTS		
1F	ANALOG	MON	REAR PANEL AUX. INPUT #2(*)		1	VOLTS		
22	DIGITAL	MON/CON	0-3 NOISE CAL CONTROL	0000				NOISE CAL OFF
				0001				LO CAL MODULATED
				0010				LO CAL CONTINUOUS
				0100				HI CAL MODULATED
				1000				HI CAL CONTINUOUS

(*) = ON 330/610 MHz ADAPTER MODULE (F118)

COOLED FRONT-END INTERFACES (F117)

FREQ(GHz):	1.5	2.3	4.8	8.4	10.7	14.9	23	43	86
BAND(CM):	21	13	6	4	3	2	1.3	7mm	3mm
ID (HEX):	2	3	4	5	6	7	8	9	A
START.ADD.(HEX):	200	280	300	380	400	480	500	580	600

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
00 TO 03			NOT USED				
04	ANALOG	MON	LO CAL DIODE CURRENT	100	mA	10	(ON)
05	ANALOG	MON	HI CAL DIODE CURRENT	100	mA	10	(ON)
06	ANALOG	MON	LO CAL DIODE VOLTAGE	4	VOLTS	28	(ON)
07	ANALOG	MON	HI CAL DIODE VOLTAGE	4	VOLTS	28	(ON)
08	ANALOG	MON	PUMP VACUUM SENSOR; SCALE NON LINEAR: .161V/MICRO METER, FOR LESS THAN A FEW MICRO METERS 9.652V AT 1000 MICRO METERS, AND 10V AT 1 ATMOSPHERE.				
09	ANALOG	MON	AC CURRENT TO THE FE REFRIGERATOR etc.	0.1	A		
			TYPICAL CURRENTS (A)				
			CTI MODEL	22 (#1)	350 (#2)		
			REFRIGERATOR MOTOR:	0.7	0.76		
			VAC. SOLENOID(#):	0.25(#3)	0.25(#3)		
			HEATERS(HEAT MODE):	0.20	.040		
			HEATERS(STRESS MODE):	0.03	0.03		
			#1 = CRYO SYSTEMS USED FOR FE FREQUENCIES OF 2.3GHz AND HIGHER				
			#2 = CRYO NSYSTEM USED FOR FE FREQUENCY OF 1.56Hz				
			#3 = 0.4A , IF SOLENOID POWERED BUT NOT ACTUATED DUE TO A FAULT.				
0A	ANALOG	MON	HEMT LED VOLTAGE	1	VOLTS		
0B	ANALOG	MON	SENSOR VOLTAGE (15K STAGE TEMP. SENSSE-A); NON LINEAR				
0C	ANALOG	MON	7.5V REFERENCE	1	VOLTS		
0D	ANALOG	MON	HI QUALITY GROUND	1	VOLTS		
0E-0F			NOT USED				
10	ANALOG	MON	LCP FET #1 GATE BIAS VOLTAGE	1	VOLTS	-2 TO 0	
11	ANALOG	MON	RCP FET #1 GATE BIAS VOLTAGE	1	VOLTS	-2 TO 0	
12	ANALOG	MON	LCP FET #2 GATE BIAS VOLTAGE	1	VOLTS	-2 TO 0	
13	ANALOG	MON	RCP FET #2 GATE BIAS VOLTAGE	1	VOLTS	-2 TO 0	
14	ANALOG	MON	15K STAGE CRYO TEMP.(10mV/deg C)	100	deg C		
15	ANALOG	MON	50K STAGE CRYO TEMP.(10mV/deg C)	100	deg C		
16	ANALOG	MON	(300K) AMBIENT TEMP. SENSOR (10mV/deg C)	100	deg C		
17	ANALOG	MON	DEWAR VAC. SENSOR; SCALE NON LINEAR (SEE MON. WORD #08)				
18-1F			EXTERNAL MULTIPLEXER				
20	DIGITAL	MON/CON	0-2 FE CRYO STATE COMMAND				
			000	START UP RESET STATE			
			010	HEAT			
			100	STRESS			
			101	OFF			
			110	PUMP			
			111	COOL			

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
21	DIGITAL	MON	0-2 FE CRYO STATE MONITOR				
				000	STRESS AFTER POWER FAILURE		
				010	HEAT		
				100	STRESS		
				101	OFF		
				110	PUMP		
				111	COOL		
			3 MANUAL/COMPUTER SWITCH POSITION				
				0	MANUAL		
				1	COMPUTER		
			4 PUMP REQUEST CONDITION				
				0	OFF		
				1	ON		
			5 PUMP VALVE POSITION				
				0	CLOSED		
				1	OPEN		
22	DIGITAL	MON/CON	0-3 NOISE CALIBRATION CONTROL				
				0000	CAL OFF		
				0001	LO CAL SWITCHED		
				0010	LO CAL CONTINUOUS		
				0100	HI CAL SWITCHED		
				1000	HI CAL CONTINUOUS		
23	DIGITAL	MON	ID WORD				
			0-3 FREQ. ID				
				0	75MHz		
				1	327/610 MHz FE		
				2	1.5GHz FE		
				3	2.36GHz FE		
				4	4.86GHz FE		
				5	8.46GHz FE		
				6	10.76GHz FE		
				7	14.96GHz FE		
				8	236Hz FE		
				9	436Hz FE		
				A	866Hz FE		
				B-F	NOT ASSIGNED		
			4-5 MODIFICATION (BIT 5= MSB)				
			6-11 FE SERIAL NUMBER (BIT 11 = MSB)				
24	DIGITAL	MON	SERIAL NUMBER OF F117 (FE INTERFACE) MODULE				

2-16 GHz SYNTHESIZER (L104)

	ID (HEX)	STARTING ADD.(HEX)
SYN. #1	10	1000
SYN. #2	11	1100
SYN. #3	12	1200

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	D/A CONVERTER OUTPUT:1600MHz/V	1	VOLTS		
01	ANALOG	MON	YIG MAIN TUNNING VOLTAGE	1	VOLTS	1.96 TO 8.1	
02	ANALOG	MON	YIG FM TUNNING VOLTAGE	1	VOLTS	-.4 TO +.4	
03	ANALOG	MON	PHASE LOCK AND 100 MHz SIGNAL	1	VOLTS	2.9 TO 5.5	
04	ANALOG	MON	SIDEBAND FOR PHASE LOCKING; (+ve = upper, -ve = lower)				
05	ANALOG	MON	100 MHz REFERENCE LEVEL	1	VOLTS	3.2 TO 5.0	
06	ANALOG	MON	500 MHz POWER TO COMB GENERATOR	1	VOLTS	3.1 TO 5.1	
07	ANALOG	MON	SYNTHESIZER POWER OUTPUT LEVEL	1	VOLTS	1.5 TO 8.2	
08	DIGITAL	MON	0 PHASE LOCK STATUS: 0 LOCKED				
			1 UNLOCKED				
			1-2 BAND STATUS 00 8-16 GHz				
			01 ERROR				
			10 ERROR				
			11 2-8 GHz				
08	DIGITAL	CON	8-14 MODULE SERIAL NUMBER				
			SET FREQUENCY n : 1024 < n <= 8192: freq.= n * 1.953 MHz				

LO/IF/RF SWITCH CONTROLLER (L107)

 ID (HEX) = 14
 STARTING ADDRESS (HEX) = 1400
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8)			VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
			BIT POS.	FUNCTION							
00	ANALOG	MON		+5 VOLTS SUPPLY				1	VOLTS		
01	ANALOG	MON		+28 VOLTS SUPPLY				4	VOLTS		
02	ANALOG	MON		+15 VOLTS SUPPLY				2	VOLTS		
03	ANALOG	MON		-5 VOLTS SUPPLY				1	VOLTS		
04	ANALOG	MON		-15 VOLTS SUPPLY				2	VOLTS		
05	ANALOG	MON		REAR PANEL AUX. INPUT #1				1	VOLTS		
06	ANALOG	MON		REAR PANEL AUX. INPUT #2				1	VOLTS		
07											
08	DIGITAL	MON/CON	0-5	S1 SWITCH	POS.1	000001	BIN B SPARE				
					POS.2	000010	10.7 GHz IF				
					POS.3	000100	8.4/23 GHz IF				
					POS.4	001000					
					POS.5	010000	.33/.61 GHz IF				
					POS.6	100000	15 GHz IF				
			6	S5 SWITCH POS.		0	IFS C/D NORMAL				
			7			1	IFS C/D INTERCHANGED				
				S6 SWITCH POS.		0	IFS A/B NORMAL				
						1	IFS A/B INTERCHANGED				
09	DIGITAL	MON/CON	0-5	S2 SWITCH	POS.1	000001	BIN B SPARE				
					POS.2	000010	10.7 GHz IF				
					POS.3	000100	8.4/23 GHz IF				
					POS.4	001000					
					POS.5	010000	.33/.61 GHz IF				
					POS.6	100000	15 GHz IF				
			6-7	S102A/B	POS.1	01	610 RCP FILTER IN				
					POS.2	10	610 RCP FILTER OUT				
0A	DIGITAL	MON/CON	0-5	S3 SWITCH	POS.1	000001	BIN C SPARE				
					POS.2	000010	1.5/43 GHz IF				
					POS.3	000100	2.3 GHz IF				
					POS.4	001000	4.8 GHz IF				
					POS.5	010000					
					POS.6	100000					
			6-7	S106A/B	POS.1	01	8.4 GHz FE SELECT				
					POS.2	10	23 GHz FE SELECT				
0B	DIGITAL	MON/CON	0-5	S4 SWITCH	POS.1	000001	BIN C SPARE				
					POS.2	000010	1.5/43 GHz IF				
					POS.3	000100	2.3 GHz IF				
					POS.4	001000	4.8 GHz IF				
					POS.5	010000					
					POS.6	100000					
			6-7	S102C/D	POS.1	01	610 MHz LCP FILTERS IN				
					POS.2	10	610 MHz LCP FILTERS OUT				
0C	DIGITAL	MON/CON	0-3	S7 SW.	POS.1	0001	LO TO 15 GHz CONVERTER				
					POS.2	0010	LO TO 8.4/23 GHz CONVERTER				

REL. ADDR. ANALOG/ #(HEX)	DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	PAGE 8 COMMENTS
				POS.3	0100	LO TO 10.7 GHz CONVERTER			
				POS.4	1000	LO BIN B SPARE			
			4-7	POS.1	0001	LO BIN C SPARE			
				POS.2	0010	LO TO 2.3 GHz CONVERTER			
				POS.3	0100	LO TO 4.8 GHz CONVERTER			
				POS.4	1000	LO TO 1.5 GHz CONVERTER			
0D	DIGITAL	MON/CON	0	S9 SW.	POS.1	0	2-16 GHz SYN: #1 TO S7, #2 TO S8		
					POS.2	1	INTERCHANGE S7/S8 INPUTS		
			1-4	S10 SW.	POS.1	0001			
					POS.2	0010	ALT. LO TO 8.4/23 GHz CONVERTER		
					POS.3	0100	LO (SYN.#3) TO 23 GHz FE		
					POS.4	1000			
			5-6	S1112 SW.	POS.1	01	1.5 GHz FE SELECT		
					POS.2	10	43 GHz FE SELECT		
				S106C SW.	POS.0	0	SINGLE LO INPUT TO 8.4/23 GHz CONVERTER		
					POS.1	1	DUAL LO INPUT TO 8.4/23 GHz CONVERTER: LCP FROM S7,RCP FROM S10(SYN#3)		
0E	DIGITAL	MONITOR	0-7	SWITCH MODULE SERIAL NUMBER					

500 MHz LO ROUND TRIP PHASE MONITOR (L103)

 ID (HEX) = 15
 STARTING ADDRESS (HEX) = 1500
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT. VALUE	UNITS MEANING	RANGE	COMMENTS
00	DIGITAL	MON	500 MHz ROUND TRIP: IN-PHASE DETECTOR- WORD 1				
01	DIGITAL	MON	500 MHz ROUND TRIP: IN-PHASE DETECTOR- WORD 2 (ONLY BITS 0-3 ARE USED)				
02	DIGITAL	MON	500 MHz ROUND TRIP: QUAD. DETECTOR- WORD 1				
03	DIGITAL	MON	500 MHz ROUND TRIP: QUAD. DETECTOR- WORD 2 (ONLY BITS 0-3 ARE USED) WORD 1, BIT 0 = LSB; WORD 2, BIT 3 = MSB PHASE VALUE = (.0094 * COUNTS) degrees				
04	DIGITAL	MON	0-7 MODULE SERIAL NUMBER				
05	DIGITAL	MON/CON	0 SIGNAL/REFERENCE (130 Hz) SELECT (1 = TEST REF., 0 = ANTENNA SIGNAL, NORMAL) Comment: Presently connections are reversed. Sr. Nos. 1 thru 7 need to be modified (mod dated 89mar30) to confirm to the above command arrangement. Unmodified modules need opposite commands to perform the phase measurement.				BIT 1=0 IS NORMAL
06	ANALOG	MON	100MHz POWER FROM MASER IN THE LO TRANSMITTER	1	VOLTS	1.0	
07	DIGITAL	MON	0 500.0028MHz PLL (IN LO TRANSMITTER) LOCK INDICATOR (LOW = LOCKED, HIGH = UNLOCKED)				

MASER

 ID (HEX) = 16
 STARTING ADDRESS (HEX) = 1600
 =====

REL. #	ADD. (HEX)	ANALOG/DIGITAL	ACCESS MON/CON	DESCRIPTION (VOLTAGE=COUNTS/3276.8)	MULT.	UNITS	RANGE	COMMENTS
				BIT POS. FUNCTION VALUE MEANING				
00		ANALOG	MON	405.7 kHz SECOND IF POWER	1	VOLTS	2.5-6.5	
01		ANALOG	MON	CAVITY TEMP. SERVO CONTROL VOLTAGE	1	VOLTS	0-10	
02		ANALOG	MON	10 MHz VCXO CONTROL VOLTAGE	1	VOLTS	-1.5 to 1.5	
03		ANALOG	MON	RIGHT ION PUMP CURRENT (1V/μA)	1	μA	.05 to .1	
04		ANALOG	MON	LEFT ION PUMP CURRENT (1V/μA)	1	μA	.05 to .1	
05		ANALOG	MON	UPPER ION PUMP CURRENT (1V/μA)	1	μA	.02 to .1	
06		ANALOG	MON	1400 MHz MULTIPLIER OUTPUT POWER MONITOR	1	VOLTS	.2 to .6	
07		ANALOG	MON	BATTERY CHARGING CURRENT (Ich): (1V/AMP)	1	A	.01 to 1.8	
				Typ. charging current (when fully charged) ~.02A				
				Maximum charging current ~2 A				
08		ANALOG	MON	10 MHz VCXO HEATER CURRENT	1	A?	1.0 to 2.0	
09		ANALOG	MON	SOURCE (HYDROGEN) PRESSURE CONTROL SETTING (Vp)	1	VOLTS?	5.5 to 6.5	
0A		ANALOG	MON	SOURCE DISCHARGE OSC. EMITTER CURRENT (Is), (1V/A)	1	A	0.5 to 6.5	
0B		ANALOG	MON	MAIN MAGNETIC FIELD COIL CURRENT (H), (7.5V/μG)			+/- (2 to 7.5)	
0C		ANALOG	MON	CAVITY AUTO TUNE CORRECTION AVERAGE VOLTAGE	1	VOLTS	0 to 2.4	
0D		ANALOG	MON	+5 VOLTS SUPPLY TO RECEIVER	1	VOLTS	4.8 to 5.2	
0E		ANALOG	MON	+15 VOLTS SUPPLY TO RECEIVER	10	VOLTS	14.5 to 15.5	
0F		ANALOG	MON	-15 VOLTS SUPPLY TO RECEIVER	10	VOLTS	-14.5 to -15.5	
10		ANALOG	MON	CAVITY HEATER VOLTAGE	10	VOLTS	2.5-4.5	
11		ANALOG	MON	OUTER OVEN HEATER VOLTAGE	10	VOLTS	10-15	
12		ANALOG	MON	VACUUM ENCLOSURE LOWER SUPPORT HEATER VOLTAGE	10	VOLTS	10-17	
13		ANALOG	MON	TOP PLATE HEATER VOLTAGE	10	VOLTS	2-5	
14		ANALOG	MON	PIRANI GAUGE SENSOR HEATER VOLTAGE	10	VOLTS	8-14	
15		ANALOG	MON	PALLADIUM HEATER VOLTAGE	10	VOLTS	10-16	
16		ANALOG	MON	RIGHT VAC. ION PUMP VOLTAGE (AFTER FUSE)	10	VOLTS	23-24	
17		ANALOG	MON	LEFT VAC. ION PUMP VOLTAGE (AFTER FUSE)	10	VOLTS	23-24	
18		ANALOG	MON	UPPER VAC. ION PUMP VOLTAGE (AFTER FUSE)	10	VOLTS	23-24	
19		ANALOG	MON	+23 VOLTS RECEIVER SUPPLY VOLTAGE AFTER FUSE	10	VOLTS	23-24	
1A		ANALOG	MON	+18 VOLTS RECEIVER SUPPLY VOLTAGE AFTER FUSE	10	VOLTS	17-19	
1B		ANALOG	MON	(+24 V) BATTERY VOLTAGE;	10	VOLTS	27.5-28.3	
				READS 28V WHEN FULLY CHARGED AND DROPS TO 22V WHEN FULLY DISCHARGED				
1C		ANALOG	MON	DC OUT FROM RIGHT (AC1) SUPPLY TO MASER	10	VOLTS	23.8-24.2	
1D		ANALOG	MON	DC OUT FROM LEFT (AC2) SUPPLY TO MASER	10	VOLTS	23.8-24.2	
1E		ANALOG	MON	EXTERNALLY SUPPLIED DC INPUT VOLTAGE;	10	VOLTS	24 TO 28	
				USED WHEN TRANSPORTING OR BACKUP				
1F		ANALOG	MON	INTER SHIELD MAGNETIC FIELD SERVO CURRENT	10	VOLTS	1 TO -1	
				(not implemented Maser Sr #1-4)				
				SYNTHESIZER FREQUENCY CONTROL				
20		DIGITAL	MON/CON	0-3 EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-17 OF f (MASER FREQ.)				
				4-7 INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-17 OF f (MASER FREQ.)				
21		DIGITAL	MON/CON	0-3 EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-16 OF f (MASER FREQ.)				
				4-7 INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-16 OF f (MASER FREQ.)				
22		DIGITAL	MON/CON	0-3 EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-15 OF f (MASER FREQ.)				
				4-7 INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66±10±1-15 OF f (MASER FREQ.)				

REL. ADD. # (HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
			VALUE	MEANING			
23	DIGITAL	MON/CON	0-3	EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**14 OF f (MASER FREQ.)			
			4-7	INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**14 OF f (MASER FREQ.)			
24	DIGITAL	MON/CON	0-3	EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**13 OF f (MASER FREQ.)			
			4-7	INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**13 OF f (MASER FREQ.)			
25	DIGITAL	MON/CON	0-3	EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**12 OF f (MASER FREQ.)			
			4-7	INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**12 OF f (MASER FREQ.)			
26	DIGITAL	MON/CON	0-3	EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**11 OF f (MASER FREQ.)			
			4-7	INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**11 OF f (MASER FREQ.)			
27	DIGITAL	MON/CON	0-3	EXTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**10 OF f (MASER FREQ.)			
			4-7	INTERNAL FREQ. CONTROL DIGIT (0-9) IN STEP 4.66*10**10 OF f (MASER FREQ.)			
28	DIGITAL	MON	0-7	MASER SERIAL NUMBER			
		CON	0	SELECT SYNTHESIZER SETTING EXTERNAL/INTERNAL; (0=EXTERNAL,1=INTERNAL)			
				TO READ THE SETTING SEE MON WORD #29 BIT 13			
29	DIGITAL	MON	8	MASER RUNNING ON BATTERY POWER (1=TRUE)			
			9	10 MHz VCXO LOCK INDICATOR; (1=LOCK,0=UNLOCK)			
			10	CAVITY TUNNING REGISTER LOWER LIMIT; (1=IN RANGE,0=AT LIMIT)			
			11	CAVITY TUNNING REGISTER UPPER LIMIT; (1=IN RANGE,0=AT LIMIT)			
			12	HARDWARE SWITCH TO CONTROL SYNTHESIZER; (1=INTERNAL,0=EXTERNAL)			
			13	SOFTWARE CONTROL OF SYNTHESIZER; (1=EXTERNAL,0=INTERNAL)			

WEATHER STATION

ID (HEX) = 18

STARTING ADDRESS (HEX) = 1800

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	GROUND REFERENCE			1	VOLTS		
01			NOT USED						
02			NOT USED						
03	ANALOG	MON	AIR TEMP.(Ta):100mV/deg C			10	deg C		
04	ANALOG	MON	DEW Pt. TEMP.(Td):100mV/deg C			10	deg C		
05	ANALOG	MON	WEATHER STATION BOX TEMP.:100mV/deg C			10	deg C		
06	ANALOG	MON	WIND SPEED(W/S):100mV/MPH; MPH/2.2369= meters/sec			10	MPH		
07	ANALOG	MON	WIND AZ.DIR.(W/D):28mV/deg (Arc deg=data/91.022)						
08	ANALOG	MON	+5 VOLTS POWER SUPPLY			1	VOLTS	4.9 TO 5.1	
09	ANALOG	MON	-15 POWER SUPPLY			2	VOLTS	-15+/- .2	
0A	ANALOG	MON	+15 VOLTS POWER SUPPLY			2	VOLTS	+15+/- .2	
0B	ANALOG	MON	+12 VOLTS POWER SUPPLY,WIND MONITOR			4	VOLTS	+12+/- .2	
0C	ANALOG	MON	+12 VOLTS POWER SUPPLY,BAROMETER MONITOR			4	VOLTS	+12+/- .2	
0D	ANALOG	MON	NOT USED						
0E	ANALOG	MON	NOT USED						
0F	ANALOG	MON	NOT USED						
10	ANALOG	MON	TSL-HEAT PUMP:The control voltage to the chilled mirror heat pump/cooling circuit used for diagnostics only;Negative indicates mirror heating,positive for cooling, 0 V+/-50mV for the mirror "in control" of dew point.						
11	ANALOG	MON	TSL -12 VOLTS SUPPLY:			2	VOLTS	-12+.2	
			CHILLED MIRROR HYGROMETER POWER SUPPLY			2	VOLTS	11.6 TO 12	
12	ANALOG	MON	TSL +12 VOLTS POWER SUPPLY:						
			XMETER UNIT & TEMP./DEW Pt.SENSOR & ASPIRATOR						
13	ANALOG	MON	TSL +5V POWER SUPPLY						
14	ANALOG	MON							
15									
16									
17									
			BAROMETER PRESSURE:VALUE DEPENDS ON ST.HT. ABOVE MSL;RANGE=[1013-HT(m)*.1027]+/-25 mb						
			BP(mb)=[(B1*256+B2)*(256+B3)]/1000						
18	DIGITAL	MON	BAROMETER WD1:						
			0-7 B1 BAROMETER DATA						
			8 WIND WARN (>35 MPH)						
			9 WIND WARN(>55MPH)						
			10 LOW TEMP. WARN						
			11 L=CPER, H=CALIB.						
			12 BOX TEMP. HOT(>20 C, FAN TURNED ON)						
			13 BOX TEMP. COLD(<5 C, HEATER TURNED ON)						
			14 BAROMETER SYNC. ERROR						
			15 BAROMETER NO RESPONSE ERROR;BAROMETER HUNG UP.A RESET COMAND SHOULD BE ISSUED						
19	DIGITAL	MON	BAROMETER WD2						
			0-7 B3 BAROMETER DATA						
			8-15 B2 BAROMETER DATA						

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
1A	DIGITAL	MON	AIR TEMP. (Ta) BIT#: 10 9 8 7 6 5 4 3 2 1 0 TEMP.: 40 20 10 8 4 2 1 .8 .4 .2 .1 11-12 NOT USED 13 ERROR; HIGH=OPTICAL ERROR, SUSPECT ACCURACY 14 Tc; LOW = + deg C, HIGH = - deg C 15 NOT USED				
1B	DIGITAL	MO	DEW POINT deg C, BIT MEAN SAME AS IN MONITOR WORD #1A				
1C	DIGITAL	MON	WEATHER STATION SERIAL NUMBER 0-4 SERIAL NUMBER (BIT 4 IS MSB) 5-6 H 7 PARITY 8-15 NOT USED				
1D	DIGITAL	MON	MIN/MAX TEMP. MONITOR,BCD FORMAT,deg C.; RESET USING CONTROL WORD #02 VALUES LATCHED USING CURRENT Ta DATA 0-7 LG TEMP. 8-15 HI TEMP. BIT #: 0/8 1/9 2/10 3/11 4/12 5/13 6/14 7/15 VALUE: 1 2 4 8 16 20 40 -Tc (HIGH/LOW= +/-)				
1E	DIGITAL	MON	WIND SPEED/ WIND GUST; IN MPH, BCD FORMAT, RESET USING MONITOR WORD #03 0-7 WIND GUST 8-15 CURRENT WIND SPEED BITS #: 0/8 1/9 2/10 3/11 4/12 5/13 6/14 7/15 VALUE: 1 2 4 8 16 20 40 80				

BASE BAND CONVERTER

		BBC1	BBC2	BBC3	BBC4	BBC5	BBC6	BBC7	BBC8
DAR1	ID(HEX)	20	21	22	23	24	25	26	27
	START ADD.	2000	2040	2080	20C0	5000	5040	5080	50C0
DAR2	ID(HEX)	30	31	32	33	34	35	36	37
	START ADD.	2400	2440	2480	24C0	5100	5140	5180	51C0

REL. ADDR. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
00	DIGITAL	MON/CON	BAND WIDTH SELECTION						
			0-7	LSB BANDWIDTH (LOWER BYTE)					
			8-15	USB BANDWIDTH (HIGHER BYTE)					
				VALUE	MEANING				
				#00	62.5kHz				
				#01	125kHz				
				#02	250kHz				
				#04	500kHz				
				#08	1MHz				
				#11	2MHz				
				#24	4MHz				
				#6F	8MHz				
				#FB	16MHz				
01			BANDWIDTH GAIN COMPENSATION						
			0-7	LSB BW GAIN COMPENSATION (LOWER BYTE)					
			8-15	USB BW GAIN COMPENSATION (HIGHER BYTE)					
				VALUE	MEANING				
				#2B	62.5kHz	POSITION			
				#29	125kHz	POSITION			
				#01	250kHz	POSITION			
				#02	500kHz	POSITION			
				#04	1MHz	POSITION			
				#08	2MHz	POSITION			
				#10	4MHz	POSITION			
				#20	8MHz	POSITION			
				#40	16MHz	POSITION			
02	DIGITAL	MON/CON	0-3	LO FREQ.-MOST SIGNIFICANT 4BITS; SEE MD. WORD #03 BELOW					
			4-5	NOT USED					
			6-7	IF INPUT SELECTION	00	IF A			
					01	IF B			
					10	IF C			
					11	IF D			
			8-15	MODE CONTROL:					
			8	MANUAL GAIN/AGC	0	APPLY FIXED VALUE TO GAIN CONTROL			
					1	AGC THE OUTPUT			
			9	USB GAIN- WHEN THIS BIT IS TOGGLED FROM 0 TO 1, THE USB GAIN IS CHANGED IN MANUAL MODE					
			10	LSB GAIN (SAME AS BIT 9)					
			11	GAIN DECREMENT/INCREMENT:					
					0	DECREMENT GAIN WHEN BIT 9/10 TOGGLED			
					1	INCREMENT GAIN WHEN BIT 9/10 TOGGLED			

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
02(CONT)			12-14 AVERAGING PERIOD SELECTION				
				000	1/80 SEC		
				001	1 SEC		
				010	2 SEC		
				011	4 SEC		
				100	10 SEC		
				101	20 SEC		
				110	40 SEC		
				111	60 SEC		
03	DIGITAL	MON/CON	15 NOT ASSIGNED LO FREQ.: 4 NUMBERS OF 4 BIT BYTES. SEE MON WORD #02; COMMENTS: The LO synthesizer is programmed with 20 BITS. The coding of these 5 4-BIT bytes is psuedo 15s compliment as follows: FREQ. = ((15-U4)*40960 + (15-U3)*2560 + (15-U2)*160 + (16-U1)*10 + (15-U0)) *10 kHz where U0 -U4 are 4 BIT bytes				
04	DIGITAL	MON/CON	0-11 12 BIT MODULE SERIAL NUMBER, SET BY HARDWARE DIP ON THE INTERFACE BOARD 12-13 MICROPROCESSOR STATUS (RADIOMETRY FIRMWARE STATUS): 12 SYSTEM TIMING CHECK				
				0	1 SEC TIC IS ABSENT OR INCOMENSURATE WITH THE 80 H		
				1	1 SEC TIC IS OK		
			13 NOT ASSIGNED 14 RADIOMETRY DUTY CYCLE 15 LO LOCK				
				0	OUT OF LOCK		
				1	LO LOCKED		
05	DIGITAL	MON/CON	GAIN CONTROL 0-7 LSB GAIN 8-15 USB GAIN Comments: The values currently being applied to the 8 BIT gain controls. The voltage gain is set by the 8751 microprocessor and can oly be read not directly set by MCB communications. The full scale (#FF) gain is +12 dB while zero (#00) completely turns off the baseband signals. The initial (default) value set by the 8751 is #B4. When the 8751 radiometry software is running in the unlevelled mode (mode bit 0 not set) it is possible for the station computer to increment or decrement the gain in 0.07 dB steps per handshake.				
06	DIGITAL	MON	USB TOTAL POWER; NOMINAL VALUE = #3FC0 TO # 4040				
07	DIGITAL	MON	LSB TOTAL POWER; NOMINAL VALUE = #3FC0 TO 34040				
0E	DIGITAL	MON	USB SWITCHED POWER; NOMINAL VALUE = +/- (205 TO 2500 DECIMAL)				
0F	DIGITAL	MON	LSB SWITCHED POWER; NOMINAL VALUE = +/- (205 TO 2500 DECIMAL) Comments: The total power is measured by counters in the 8751 microprocessor which count the voltage to freq. converter output from the square law detectors on the baseband outputs. However the 16-BIT values appearing on addresses 6 & 7 depend on the mode control bits. The nominal baseband power level is 0 dBm. The samplers have fixed voltage thresholds that make 0 dBm nominally the optimum for the 4 level cotinuum encoding. The 0 dBm level corresponds to one volt out of the square law detector and 50 kHz from the voltage to frequency connverter. The 8751 firmware will normalize nnumbers so that #4000 correspond to 0 dBm. #FFFF to +6 dBm. Switched power will be normalized in the same way so that #0001 corresponds to 1.22 * 10**4 times the system temperature. MSB is the sign bit. AVT = SUM (CS(k) + CC(k))*(16384/625) /K AVD = SUM (CS(k) - CC(k))*(16384/625) /K				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
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WHERE

AVT = TOTAL POWER AVERAGE
 AVS = SWITCHED POWER AVERAGE
 CS(k)= COUNT FOR THE SIGNAL PORTION OF THE kth 80 Hz CYCLE
 CC(k)= COMPARISON
 K = TOTAL NUMBER OF 80 Hz CYCLES IN RADIOMETRY AVERAGE
 (K = 1 FOR NON AVERAGE MODE - MODE BIT 6 = 0)

In the unleveled mode the control computer should adjust the gain controls (by incrementing/decrementing in 0.07dB steps) until the total power values are satisfactory. In the auto-leveled mode the 8751 will make the total power equal to #4000 on average by performing adjustments to the gain controls.

IF DISTRIBUTOR

		ID (HEX)	STARTING ADDRESS (HEX)								
DAR1 IF DISTRIBUTOR 1		28	2100								
DAR1 IF DISTRIBUTOR 2		29	2180								
DAR2 IF DISTRIBUTOR 1		38	2600								
DAR21 IF DISTRIBUTOR 2		39	2680								
=====											
REL. ADD. # (HEX)	ANALOG/DIGITAL	ACCESS MON/CON	DESCRIPTION (VOLTAGE=COUNTS/3276.8)	MULT.	UNITS	RANGE	COMMENTS				
			BIT POS. FUNCTION	VALUE	MEANING						

01	DIGITAL	MON/CON	1	CHANNEL 2 ATTENUATION CONTROL:							
				0	NO ATTENUATION						
				1	20 dB ATTENUATION						
			2	CHANNEL 2 SIGNAL CONNECTION:							
				0	IF SIGNAL CONNECTION						
				1	EXTERNAL SIGNAL CONNECTION						
			9	CHANNEL 1 ATTENUATION CONTROL:							
				0	NO ATTENUATION						
				1	20 dB ATTENUATION						
			10	CHANNEL 1 SIGNAL CONNECTION:							
				0	IF SIGNAL CONNECTION						
				1	EXTERNAL SIGNAL CONNECTION						
02	DIGITAL	MON/CON	12-14	AVERAGING PERIOD SELECTION:							
				000	1/80 SEC						
				001	1 SEC						
				010	2 SEC						
				011	4 SEC						
				100	10 SEC						
				101	20 SEC						
				110	40 SEC						
				111	60 SEC						
04	DIGITAL	MON	0-11	MODULE SERIAL NUMBER							
			12-13	MICROPROCESSOR STATUS-RADIOMETRY FIRMWARE STATUS							
			12	SYSTEM TIMING CHECK:							
				0	1 SEC TIC ABSENT/INCONSISTANT WITH THE 80 Hz						
				1	1 SEC TIC IS OK						
			13	NOT ASSIGNED							
			14	RADIOMETRY DUTY CYCLE(RDC):STATION SYNC USED TO SYNCHRONIZE RDC							
06	DIGITAL	MON	CHANNEL 1 (A/C IF) TOTAL POWER								
07	DIGITAL	MON	CHANNEL 2 (B/D IF) TOTAL POWER								
0E	DIGITAL	MON	CHANNEL 1 (A/C IF) SWITCHED POWER								
0F	DIGITAL	MON	CHANNEL 2 (B/D IF) SWITCHED POWER								

Comments: The total power is measured by counters in the 8751 microprocessor which counts the voltage to freq. converter output from the square law detectors on the IF DISTRIBUTOR outputs.

The nominal IF DISTRIBUTOR output, for input power level of -34dBm, corresponds to one volt out of the square law detector and 50 kHz from the voltage to frequency converter.

The 8751 firmware will normalize numbers so that #4000 correspond to -34dBm input to a IFDIST. Switched power will be normalized in the same way so that #0001 corresponds to $1.22 \times 10^{11-4}$ times the system temperature. MSB is the sign bit.

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
			AVT = SUM (CS(k) + CC(k))*(16384/625) /K				
			AVD = SUM (CS(k) - CC(k))*(16384/625) /K				
			WHERE				
			AVT = TOTAL POWER AVERAGE				
			AVD = SWITCHED POWER AVERAGE				
			CS(k)= COUNT FOR THE SIGNAL PORTATION OF THE kth 80 Hz				
			CC(k)= COMPARISON				
			k = TOTAL NUMBER OF 80 Hz CYCLES IN RADIOMETRY AVERAGE				
			(K = 1 FOR NON AVERAGE MODE - MODE BIT 6 = 0)				

TAPE RECORDER (TRANSPORT)

```

          ID (HEX)  START ADD.(HEX)
TRANSPORT #1      2A      2200
TRANSPORT #2      3A      2B00
=====

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REL. ADD. ANALOG/ ACCESS  DESCRIPTION(VOLTAGE=COUNTS/3276.8)  MULT.  UNITS  RANGE  COMMENTS
#(HEX)   DIGITAL  MON/CON  BIT POS.  FUNCTION          VALUE  MEANING
-----

```

WRITE MODULE:

```

00      DIGITAL  MON      FORMATTER SELECT (=0:1 FOR FMTR1;FMTR2)
                                GROUP  RECORDED TRACK #'S
                                -----
0          GROUP 0 IN HEAD 1  0          0,2,4,.....,14,16
1          GROUP 1 IN HEAD 1  1          1,3,5,.....,15,17
2          GROUP 2 IN HEAD 1  2          18,20,22,.....,32,34
3          GROUP 3 IN HEAD 1  3          19,21,23,.....,33,35
4          GROUP 0 IN HEAD 2  0          0,2,4,.....,14,16
5          GROUP 1 IN HEAD 2  1          1,3,5,.....,15,17
6          GROUP 2 IN HEAD 2  2          18,20,22,.....,32,34
7          GROUP 3 IN HEAD 2  3          19,21,23,.....,33,35

```

COMMENTS: CORRESPONDENCE BETWEEN VLBA FORMATTER TRACKS, VLBA RECORDER TRACKS
AND VLBI MKIII TRACK NUMBERS ARE GIVEN BELOW.

VLBA FORMATTER TRACK No.	VLBA RECORDER TRACK No.	MKIII TRACK No.	VLBA FORMATTER TRACK No.	VLBA RECORDER TRACK No.	MKIII TRACK No.
32=SYS.0	1	-	34=SYS.2	0	-
0	3	-	16	2	-
1	5	2	17	4	1
2	7	4	18	6	3
3	9	6	19	8	5
4	11	8	20	10	7
5	13	10	21	12	9
6	15	12	22	14	11
7	17	14	23	16	13
8	19	16	24	18	15
9	21	18	25	20	17
10	23	20	26	22	19
11	25	22	27	24	21
12	27	24	28	26	23
13	29	26	29	28	25
14	31	28	30	30	27
15	33	-	31	32	-
33=SYS.1	35	-	35=SYS.3	34	-

```

01      DIGITAL  MON      OUTPUT GROUP ENABLE: (=0:1 FOR DISABLE;ENABLE)
0          GROUP 0 IN HEAD 1 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)
1          GROUP 1 IN HEAD 1 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)

```

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	
			2 GROUP 2 IN HEAD 1 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			3 GROUP 3 IN HEAD 1 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			4 GROUP 0 IN HEAD 2 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			5 GROUP 1 IN HEAD 2 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			6 GROUP 2 IN HEAD 2 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			7 GROUP 3 IN HEAD 2 (SEE MON WORD #00 FOR RECORDER TRACK NUMBERS)				
			SYSTEM TRACK SELECT: (RECORDER TRACK No. = 0-35)				
02	DIGITAL	MON	0-5 RECORDER TRACK 0 OF HEAD 1				
03	DIGITAL	MON	0-5 RECORDER TRACK 1 OF HEAD 1				
04	DIGITAL	MON	0-5 RECORDER TRACK 34 OF HEAD 1				
05	DIGITAL	MON	0-5 RECORDER TRACK 35 OF HEAD 1				
06	DIGITAL	MON	0-5 RECORDER TRACK 0 OF HEAD 2				
07	DIGITAL	MON	0-5 RECORDER TRACK 1 OF HEAD 2				
08	DIGITAL	MON	0-5 RECORDER TRACK 34 OF HEAD 2				
09	DIGITAL	MON	0-5 RECORDER TRACK 35 OF HEAD 2				
			MONITOR MODULE:				
			TRACK SELECT- BOTH READ AND BYPASS (RECORDER TRACK No. =- 0-35)				
10	DIGITAL	MON	0-5 HEAD 1,OUTPUT A				
11	DIGITAL	MON	0-5 HEAD 1,OUTPUT B				
12	DIGITAL	MON	0-5 HEAD 2,OUTPUT A				
13	DIGITAL	MON	0-5 HEAD 2,OUTPUT B				
			READ MODULE EQUALIZER SELECT (0:1:2 = STD.,ALT.1,ALT.2)				
14	DIGITAL	MON	0-1 HEAD 1,OUTPUT A				
15	DIGITAL	MON	0-1 HEAD 1,OUTPUT B				
16	DIGITAL	MON	0-1 HEAD 2,OUTPUT A				
17	DIGITAL	MON	0-1 HEAD 2,OUTPUT B				
18	DIGITAL	MON	0-2 OUTPUT TO FORMATTER #1, CHANNEL A; SEE OUTPUT SELECT CODE BELOW				
19	DIGITAL	MON	0-2 OUTPUT TO FORMATTER #1, CHANNEL B; SEE OUTPUT SELECT CODE BELOW				
1A	DIGITAL	MON	0-2 OUTPUT TO FORMATTER #2, CHANNEL A; SEE OUTPUT SELECT CODE BELOW				
1B	DIGITAL	MON	0-2 OUTPUT TO FORMATTER #2, CHANNEL B; SEE OUTPUT SELECT CODE BELOW				
			OUTPUT SELECT CODE: 000 HEAD 1 OUTPUT A, READ				
			001 HEAD 1 OUTPUT A, BYPASS				
			010 HEAD 1 OUTPUT B, READ				
			011 HEAD 1 OUTPUT B, BYPASS				
			100 HEAD 2 OUTPUT A, READ				
			101 HEAD 2 OUTPUT A, BYPASS				
			110 HEAD 2 OUTPUT B, READ				
			111 HEAD 2 OUTPUT B, BYPASS				
			MONITOR MODULE DECODER:				
1C	DIGITAL	MON	0-1 ON BOARD DECODER DATA TO BE EXTRACTED (ALSO SEE MONITOR WORDS #18-1B)				
			00 WHAT GOES TO FORMATTER 1, CH.A				
			01 WHAT GOES TO FORMATTER 1, CH.B				
			10 WHAT GOES TO FORMATTER 2, CH.A				
			11 WHAT GOES TO FORMATTER 2, CH.B				
1D	DIGITAL	MON	DATA EXTRACT BIT DELAY VALUE (=0 CAPTURES SYNC. BITS 61-30)				
1E	DIGITAL	MON	EXTRACTED DATA BITS 31-16				
1F	DIGITAL	MON	EXTRACTED DATA BITS 15-0				

REL. ADDR. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	
TRANSPORT MODULE: -----							
30	DIGITAL	MON	TRANSPORT MODULE FOOTAGE COUNTER (FEET)				
31	DIGITAL	MON	TRANSPORT MODULE SUPPLY REEL PACK (FEET)				
32	DIGITAL	MON	TRANSPORT MODULE TAKEUP REEL PACK (FEET)				
33	DIGITAL	MON	0 LOW TAPE SENSE (0:1 = NO:YES)				
HEAD POSITIONER: -----							
40	DIGITAL	MON	CURRENT HEAD BLOCK PARAMETER VALUE- (SEE MON. WORD #C3 FOR HEAD No. AND MON. WORD #C4 FOR PARAMETER No. SELECTED)				
41	DIGITAL	MON	TOTAL POSITION COMMAND (kA)				
42	DIGITAL	MON	ACTUAL POSITION (kA)				
A/D BOARD: -----							
50-5F	ANALOG	MON	0-11 RAW A/D CHANNEL #n(0-15) OUTPUTS; n=0 IN ADD. #50. n=0: HEAD 1- LVDT VOLTAGE 1 VOLTS n=1: HEAD 1- TEMP. n=2: TOTAL POWER HEAD 1 n=3-5: NOT USED N=6: VACUUM COLUMN PRESSURE (0.1" OF WATER/COUNT)				
60	DIGITAL	MON	0-11 TOTAL POWER HEAD 1 (0.01V)				
61	DIGITAL	MON	0-11 TOTAL POWER HEAD 2 (0.01V)				
62	DIGITAL	MON	0-11 HEAD-1 TEMPERATURE (0.1 deg C)				
63	DIGITAL	MON	0-11 HEAD-2 TEMPERATURE (0.1 deg C)				
64	DIGITAL	MON	0-11 VACUUM (0.1" OF WATER)				
VME BOARDS: -----							
70	DIGITAL	MON	READ PARAMETER VALUES IN RAM/ROM				
71	DIGITAL	MON	SOFTWARE REVISION NUMBER				
72	DIGITAL	MON	0-7 CHASSIS SERIAL NUMBER				
73	DIGITAL	MON	GENERAL STATUS WORD: (0:1 = FALSE:TRUE) 0 ERROR EXISTS 1 TAPE MOVING 2 HEAD STACK MOVING 3 RAMPING 4 HEAD POSITIONING 5 TAPE POSITIONING 6 VACUUM OK 7 5MHz PRESENT 8 1 PPS PRESENT				
74	DIGITAL	MON	ERROR FLAGS (0:1 =FALSE:TRUE) 0-1 UNUSED 2 FAILURE TO ATTAIN VACUUM WITH LOAD 3 UNABLE TO CHANGE TO THE DESIRED ACTIVE HEAD STACK 4 HEAD INDEX OUT OF RANGE 5 HEAD BLOCK PARAMETER # OUT OF RANGE 6 A/D CONVERSION TIMEOUT 7 COMMAND ATTEMPT AT READ ONLY ADDRESS 8 ATTEMPTED TAPE MOTION WITHOUT TAPE LOADED 9 HEAD MOVEMENT TIMED OUT (>15SEC) 15 SOFTWARE ERROR				
75	DIGITAL	MON	SOFTWARE ERROR CODE (INTERNAL; SEE MCBUS.WH)				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	
B0	DIGITAL	MON/CON	0 STOP DRIVE				
B1	DIGITAL	MON/CON	0 START DRIVE (0;1 = REVERSE;FORWARD)				
B2	DIGITAL	MON/CON	0 FAST MOVE TO LOW TAPE POINT (=0;1 FOR REVERSE;FORWARD)				
B3	DIGITAL	MON/CON	0 LOAD TAPE INTO VACUUM COLUMN				
B4	DIGITAL	MON/CON	0 REWIND AND UNLOAD TAPE				
B5	DIGITAL	MON/CON	SET CAPSTAN SPEED (IN UNITS OF 0.01 INCHES/SEC)				
B6	DIGITAL	MON/CON	0 ENABLE LOW TAPE (=0;1 FOR DISABLE;ENABLE)				
B7	DIGITAL	MON/CON	POSITION TAPE TO FOOTAGE # (0-65535)				
B8	DIGITAL	MON/CON	FORCE FOOTAGE COUNTER TO VALUE (FEET)				
B9	DIGITAL	MON/CON	SET CAPSTAN SIZE CONSTANT				
BA	DIGITAL	MON/CON	0 RELEASE BRAKES AND SERVOS (=0;1 FOR DISABLE;ENABLE)				
BB	DIGITAL	MON/CON	SET OFF-SET SPEED FOR THE PERIOD GIVEN IN CONTROL WORD #BC (UNITS OF 0.01"/SEC)				
BC	DIGITAL	MON/CON	OFF-SET SLEW PERIOD (INITIATES; UNITS:0.01SEC)				
BD	DIGITAL	MON/CON	TAPE THICKNESS (kA) HEAD POSITIONER COMMANDS: -----				
C0	DIGITAL	MON/CON	SET INDEX NUMBER				
C1	DIGITAL	MON/CON	DOWN LOAD INDEX POSITION (kA)				
C2	DIGITAL	MON/CON	0 SET TAPE DIRECTION FOR OFFSET (=0;1 FOR REVERSE;FORWARD)				
C3	DIGITAL	MON/CON	0-1 ACTIVE HEAD NUMBER (1 TO 4)				
C4	DIGITAL	MON/CON	0-3 SET HEAD BLOCK PARAMETER NUMBER (0-10) PARAMETER 0: SETS INCHWORM MOTOR FAST OUT SPEED PARAMETER 1: SETS INCHWORM MOTOR SLOW OUT SPEED PARAMETER 2: SETS INCHWORM MOTOR FAST IN SPEED PARAMETER 3: SETS INCHWORM MOTOR SLOW IN SPEED PARAMETER 4: SETS THE LVDT POSITIVE SCALE FACTOR PARAMETER 5: SETS THE LVDT NEGATIVE SCALE FACTOR PARAMETER 6: SETS THE LVDT POSITIVE QUADRATIC FACTOR PARAMETER 7: SETS THE LVDT NEGATIVE QUADRATIC FACTOR PARAMETER 8: SETS HEADSTACK FORWARD MOTION OFFSET (MICRONS) PARAMETER 9: SETS HEADSTACK REVERSE MOTION OFFSET (MICRONS) PARAMETER 10: SETS TEMPERATURE COEFFICIENT				
C5	DIGITAL	MON/CON	DOWN LOAD HEAD BLOCK PARAMETER VALUE				
C6	DIGITAL	MON/CON	MOVE HEAD TO ABSOLUTE VALUE (kA)				
C7	DIGITAL	MON/CON	MOVE HEAD RELATIVE TO CURRENT POSITION (kA)				
C8	DIGITAL	MON/CON	MOVE ACTIVE HEAD TO INDEX POSITION + OFFSET (kA)				
C9	DIGITAL	MON/CON	PEAK UP ON MONITOR CHANNEL A WITHIN +/- kA				
CA	DIGITAL	MON/CON	SET AUTO PEAKING INTERVAL (SECONDS); NOT IMPLEMENTED				
CB	DIGITAL	MON/CON	0 ABORT ACTION OF ACTIVE HEAD				
CC	DIGITAL	MON/CON	0 HEAD MOTION PRIMITIVE: SPEED (0;1 = SLOW ; FAST) 1 HEAD MOTION PRIMITIVE- DIRECTION (0;1 = IN ; OUT)				
CD	DIGITAL	MON/CON	0-15 DELAY (UNITS OF 40 uSEC)				
CE	DIGITAL	MON/CON	MEASURE ACTIVE HEAD POSITION				
D0	DIGITAL	MON/CON	0-13 A/D BOARD: SELECT D/A CH. #0 IN mV (0-10000);(VACUUM MOTOR)				
D1	DIGITAL	MON/CON	0-13 A/D BOARD: SELECT D/A CH. #1 IN mV (0-10000);(NOT PRESENTLY USED)				
D2	DIGITAL	MON/CON	0-13 A/D BOARD: SELECT D/A CH. #2 IN mV (0-10000);(NOT PRESENTLY USED)				
D3	DIGITAL	MON/CON	0-13 A/D BOARD: SELECT D/A CH. #3 IN mV (0-10000);(WRITE VOLTAGE)				
E0	DIGITAL	MON/CON	0-7 VME BOARDS: SET ADDRESS FOR RAM/ROM READ/WRITE (BITS 23-16)				
E1	DIGITAL	MON/CON	0-15 VME BOARDS: SET ADDRESS FOR RAM/ROM READ/WRITE (BITS 15-0)				
E2	DIGITAL	MON/CON	VME BOARDS: OVERWRITE PARAMETER VALUE IN RAM				
E3	DIGITAL	MON/CON	VME BOARDS: OR MASK INTO RAM LOCATION				
E4	DIGITAL	MON/CON	VME BOARDS: AND MASK INTO RAM LOCATION				

FORMATTER

	ID (HEX)	STARTING ADDRESS
DAR1- FORMATTER	2A	2200
DAR2- FORMATTER	2C	2300

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
01	DIGITAL	MON	INITIALIZE FORMATTER	#8000	FORMATTER IS DONE INITIALIZING				
				#8001	FORMATTER IS BUSY INITIALIZING				
02	DIGITAL	MON	CONFIGURE FORMATTER	#8000	FORMATTER IS DONE CONFIGURING				
				#8001	FORMATTER IS BUSY CONFIGURING				
03	DIGITAL	MON	CONFIGURE AUXILIARY DATA	#8000	AUX. DATA IS DONE CONFIGURING				
				#8001	AUX. DATA BUSY CONFIGURING BUFFER 'A'				
				#8002	AUX. DATA BUSY CONFIGURING BUFFER 'B'				
04	DIGITAL	MON	AUXILIARY DATA FIELD IN USE	#8001	BUFFER 'A' IN USE				
				#8002	BUFFER 'B' IN USE				
05	DIGITAL	MON	FRINGE CHECK BUFFER	#8000	FRINGE BUFFER IS IDLE				
				#8001	FRINGE BUFFER IS BUSY				
06-07			NOT USED						
08	DIGITAL	MON	QUALITY ANALYSIS	#8000	ANALYSIS IS STOPPED				
				#8001	ANALYSIS IS RUNNING				
09	DIGITAL	MON	QUAL. ANALYSIS DATA CAPTURE	#8000	FIELD IS CAPTURED (DONE)				
				#8001	FIELD IS NOT CAPTURED (BUSY)				
0D	DIGITAL	MON	0-15 LOW (0-15) TRACKS ENABLE MASK;FOR SAMPLE CODES SEE CON WORD #8D A HIGH (1) ENABLES THE CORRESPONDING TRACK						
0E	DIGITAL	MON	0-15 HIGH (16-31) TRACKS ENABLE MASK;FOR SAMPLE CODES SEE CON WORD #8E A HIGH (1) ENABLES THE CORRESPONDING TRACK						
0F	DIGITAL	MON	0-3 SYSTEM TRACKS (PHYSICAL 32-35 TRACKS) ENABLE MASK; A HIGH (1) ENABLES THE CORRESPONDING TRACK						
			15 ALWAYS HIGH						
			SAMPLE CODES:	#8000	ALL SYSTEM TRACKS DISABLED				
				#8001	SYSTEM TRACK #0 ENABLED				
				#8002	SYSTEM TRACK #1 ENABLED				
				#8004	SYSTEM TRACK #2 ENABLED				
				#8008	SYSTEM TRACK #3 ENABLED				
				#800F	ALL SYSTEM TRACKS ENABLED				
10	DIGITAL	MON	FORMAT SPEC.CODE:(DR = DATA REPLACE, NDR = NON DATA REPLACE)						
				#8000	MKIII-DR-FRINGE DETECTION TESTS				
				#8001	MKIII-DR-CORRELATION TESTS				
				#8002	MKIII-DR-MARK 3 COMPATIBLE				
				#8003	MKIII-DR-PSEUDO-RANDOM CODE-ALL TRACKS				
				#8004	MKIII-DR- HIGH TRACK DRIVE TEST				
				#8005	MKIII-DR- LOW TRACK DRIVE TEST				
				#8006	MKIII-DR- TRACK 0,2,4,6,... DRIVE TEST				
				#8007	MKIII-DR- TRACK 4,4,8,12,... DRIVE TEST				
				#8008	MKIII-NDR- FRINGE DETECTION TESTS				
				#8009	MKIII-NDR-CORRELATION TESTS				
				#800A	MKIII-NDR-MARK 3 COMPATIBLE				
				#800B	MKIII-NDR-PSEUDO-RANDOM CODE-ALL TRACKS				
				#800C	MKIII-NDR- HIGH TRACK DRIVE TEST				
				#800D	MKIII-NDR- LOW TRACK DRIVE TEST				
				#800E	MKIII-NDR- TRACK 0,2,4,6,... DRIVE TEST				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CDN	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE
11	DIGITAL	MON	SAMPLE RATE SELECT:	#B00F #F000 #B000 #B001 #B002 #B003 #B004 #B005 #B006 #B007	MKIII-NDR- TRACK 4,4,8,12,... DRIVE TEST ACCEPT DOWN LOADED FORMAT 250 kHz 500 kHz 1 MHz 2 MHz 4 MHz 8 MHz 16 MHz 32 MHz			
12	DIGITAL	MON	SAMPLE MULTIPLEX MODE SELECTION	#B000 #B001 #B002 #B003 #B004 #B005 #B006 #B007	RESERVED FOR EXPANSION RESERVED FOR EXPANSION 4:1 (4 BITSTREAMS TO 1 TRACK) 2:1 (2 BITSTREAMS TO 1 TRACK) 1:1 (1BITSTREAM TO 1 TRACK) 1:2 (1 BITSTREAM TO 2 TRACKS) 1:4 (1 BITSTREAM TO 4 TRACKS) RESERVED FOR EXPANSION			
13	DIGITAL	MON	TRACK BARREL ROLLER MODE:	#B000 #B001 #B002 #B003 #B004 #B005 #B006 #B007	DISABLE TRACK BARREL ROLLER ROLL IN 8 TRACK GROUPS - STEP 1 TRACK PER FRAME ROLL IN 8 TRACK GROUPS - STEP 2 TRACKS PER FRAME ROLL IN 8 TRACK GROUPS - STEP 4 TRACKS PER FRAME DISABLE TRACK BARREL ROLLER ROLL IN 16 TRACK GROUPS - STEP 1 TRACK PER FRAME ROLL IN 16 TRACK GROUPS - STEP 2 TRACKS PER FRAME ROLL IN 16 TRACK GROUPS - STEP 4 TRACKS PER FRAME			
14	DIGITAL	MON	TIME CODE CONTROL IN USE:	#B000 #B001 #B002 #B003 #B004 #B005 #B006 #B007	SECONDS : 10 MINUTES : 10 HOURS : 10 DAYS : 10 DAYS : 100 YEARS : 1 YEARS : 10 YEARS : 100			
15	DIGITAL	MON	FRINGE CHECK DATA BUFFER ACQUISITION MODE					
			1 TRACK CAKPTURE MODES:	#B100 #B101 #B102	CAPTURE DATA TRACK 0 CAPTURE DATA TRACK 1 CAPTURE DATA TRACK 2			
			THRU	#B11E #B11F #B120 #B121	CAPTURE DATA TRACK 30 CAPTURE DATA TRACK 31 CAPTURE SYSTEM TRACK 0 CAPTURE SYSTEM TRACK 1			

REL. # (HEX)	ADD. ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	
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#8122			CAPTURE SYSTEM TRACK				2		
#8123			CAPTURE SYSTEM TRACK				3		

2 TRACK CAPTURE MODES:

#8200	CAPTURE DATA	TRACKS	0, 1
#8202	CAPTURE DATA	TRACKS	2, 3
#8204	CAPTURE DATA	TRACKS	4, 5
#8206	CAPTURE DATA	TRACKS	6, 7
#8208	CAPTURE DATA	TRACKS	8, 9
#820A	CAPTURE DATA	TRACKS	10,11
#820C	CAPTURE DATA	TRACKS	12,13
#820E	CAPTURE DATA	TRACKS	14,15
#8210	CAPTURE DATA	TRACKS	16,17
#8212	CAPTURE DATA	TRACKS	18,19
#8214	CAPTURE DATA	TRACKS	20,21
#8216	CAPTURE DATA	TRACKS	22,23
#8218	CAPTURE DATA	TRACKS	24,25
#821A	CAPTURE DATA	TRACKS	26,27
#821C	CAPTURE DATA	TRACKS	28,29
#821E	CAPTURE DATA	TRACKS	30,31
#8220	CAPTURE SYSTEM TRACKS		0, 1
#8220	CAPTURE SYSTEM TRACKS		2, 3

4 TRACK CAPTURE MODES:

#8400	CAPTURE DATA	TRACKS	0, 1, 2, 3
#8404	CAPTURE DATA	TRACKS	4, 5, 6, 7
#8408	CAPTURE DATA	TRACKS	8, 9,10,11
#840C	CAPTURE DATA	TRACKS	12,13,14,15
#8410	CAPTURE DATA	TRACKS	16,17,18,19
#8414	CAPTURE DATA	TRACKS	20,21,22,23
#8418	CAPTURE DATA	TRACKS	24,25,26,27
#841C	CAPTURE DATA	TRACKS	28,29,30,31
#8420	CAPTURE SYSTEM TRACKS		0, 1, 2, 3

17 DIGITAL MON PARITY MODE IN USE

	ALONG-TRACK	CROSS-TRACK
#8000	EVEN	EVEN
#8001	EVEN	ODD
#8010	ODD	EVEN
#8011	ODD	ODD

18 DIGITAL MON CRCC MODE IN USE

	INITIALIZE TO:	CRCC POLYNOMIAL
#8000	ZERO	16-15-2-0
#8010	ONES	16-15-2-0
#8001	ZERO	16-15-1-0
#8011	ONES	16-15-1-0
#8002	ZERO	16-15-13-7-4-2-1-0
#8012	ONES	16-15-13-7-4-2-1-0
#8003	ZERO	12-11-3-2-1-0
#8013	ONES	12-11-3-2-1-0
#8004	ZERO	8-7-5-4-1-0

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
				VALUE	MEANING		
				#8014	ONES	8-7-5-4-1-0	
				#8005	ZERO	8-0	
				#8015	ONES	8-0	
				#8006	ZERO	16-12-5-0	
				#8016	ONES	16-12-5-0	
				#8007	ZERO	16-11-4-0	
				#8017	ONES	16-1-4-0	
19	DIGITAL	MON	QUAL. ANALYSIS RECORDER SELECTION				
				#8001	SELECT RECORDER #1		
				#8002	SELECT RECORDER #2		
1A	DIGITAL	MON	QUAL. ANALYSIS DATA				
				#8000	TIMECODE - CHANNEL 'A' - BITS 1 THRU 32		
				#8001	TIMECODE - CHANNEL 'A' - BITS 33 THRU 64		
				#8002	TIMECODE - CHANNEL 'A' - BITS 65 THRU 96		
				#8003	AUX DATA - CHANNEL 'A' - BITS 1 THRU 32		
				#8004	TIMECODE - CHANNEL 'B' - BITS 1 THRU 32		
				#8005	TIMECODE - CHANNEL 'B' - BITS 33 THRU 64		
				#8006	TIMECODE - CHANNEL 'B' - BITS 65 THRU 96		
				#8007	AUX DATA - CHANNEL 'B' - BITS 1 THRU 32		
1B	DIGITAL	MON	QUAL. ANALYSIS SYNC. DETECTOR THRESHOLD SELECTION IN USE				
				#8001	1 ALIGNED BIT REQUIRED FOR SYNC DETECTION		
				#8002	2 ALIGNED BITS REQUIRED FOR SYNC DETECTION		
				#8003	3 ALIGNED BITS REQUIRED FOR SYNC DETECTION		
					THRU		
				#803F	63 ALIGNED BITS REQUIRED FOR SYNC DETECTION		
				#8040	64 ALIGNED BITS REQUIRED FOR SYNC DETECTION		
1C	DIGITAL	MON	QUAL. ANALYSIS PHASE CAL MODE IN USE				
				#8002	2 LEVEL ROTATOR		
				#8003	3 LEVEL ROTATOR		
1D	DIGITAL	MON	QUAL. ANALYSIS PHASE CAL PERIOD IN USE				
			CODE	2-LEVEL ROTATORS	3-LEVEL ROTATORS		
			-----	-----	-----		
			#8001	8 CLOCKS/CYCLE	16 CLOCKS/CYCLE		
			#8002	16 CLOCKS/CYCLE	32 CLOCKS/CYCLE		
			#8003	24 CLOCKS/CYCLE	48 CLOCKS/CYCLE		
			#8004	32 CLOCKS/CYCLE	64 CLOCKS/CYCLE		
			THRU	THRU	THRU		
			FFFF	262,120 CLOCKS/CYCLE	524,240 CLOCKS/CYCLE		
			FFFE	262,128 CLOCKS/CYCLE	524,256 CLOCKS/CYCLE		
			FFFF	262,136 CLOCKS/CYCLE	524,272 CLOCKS/CYCLE		

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
20	DIGITAL	MON	SYSTEM STATUS REGISTER; HIGH (1) = ON/ERROR				
			00 (LSB) FORMATTER IS WAITING FOR FIFO'S TO FILL				
			01 FORMATTER IS BUSY RETREIVING Q/A ANALYSIS DATA				
			02 FORMATTER IS BUSY CONFIGURING				
			03 FORMATTER IS BUSY INITIALIZING				
			04 UNDEFINED				
			05 UNDEFINED				
			06 UNDEFINED				
			07 UNDEFINED				
			08 UNDEFINED				
			09 UNDEFINED				
			10 UNDEFINED				
			11 INTERRUPT SYSTEM ERROR DETECTED - EXAMINE ERROR REGISTER AT #24				
			12 SOFTWARE ERROR DETECTED - EXAMINE ERROR REGISTER AT #23				
			13 HARDWARE ERROR DETECTED - EXAMINE ERROR REGISTER AT #22				
			14 MCB ERROR DETECTED - EXAMINE ERROR REGISTER AT #21				
			15 (MSB) ANY ERROR DETED				
21	DIGITAL	MON	MCB COMMUNICATION REGISTER; HIGH (1) = ON/ERROR; CONFIGURE NOT REQUIRED				
			00 NON-EXISTING MONITOR REGISTER ACCESS ATTEMPTED				
			01 NON-EXISTING CONTROL REGISTER ACCESS ATTEMPTED				
			02 FORMATTER WAS BUSY DURING MONITOR ACCESS TO A REGISTER				
			03 FORMATTER WAS BUSY DURING CONTROL ACCESS TO A REGISTER				
			04 ILLEGAL CONTROL PARAMETER RECEIVED				
			05 CONTROL ACCESS ATTEMPTED TO A MONITOR-ONLY REGISTER				
			06 UNDEFINED				
			07 UNDEFINED				
			08 ARRAY POINTER WENT OUT OF LIMITS				
			09 UNDEFINED				
			10 FORMATTER WAS BUSY DURING MONITOR ACCESS TO AN ARRAY				
			11 FORMATTER WAS BUSY DURING CONTROL ACCESS TO AN ARRAY				
			12 UNDEFINED				
			13 COMMAND CONFLICT - ATTEMPT TO CONFIGURE THE ACTIVE AUX DATA BUFFER OR START AN OPERATION WHICH IS ALREADY RUNNING				
			14 TIMING CONFLICT - INITIALIZE OR CONFIGURE COMMAND ATTEMPTED WHILE BUSY WITH LAST OPERATION				
			15 ANY ERROR				
22	DIGITAL	MON	FORMATTER HARDWARE ERROR REGISTER; HIGH (1) - ON/ERROR				
			0-8 UNDEFINED				
			09 ERROR REPORTED BY QUALITY ANALYSIS MODULE - EXAMINE MONITOR LOCATION #46, #47				
			10 ERROR REPORTED BY FRINGE CHECK BUFFER MODULE - EXAMINE MONITOR LOCATION #45				
			11 ERROR REPORTED BY TRANSPORT DRIVER MODULE - EXAMINE MONITOR LOCATION #44				
			12 ERROR REPORTED BY HEADER CONTROL MODULE - EXAMINE MONITOR LOCATION #42, #43				
			13 SYSTEM REPORTED BY A/D BUFFER MODULE - EXAMINE MONITOR LOCATION #41				
			14 ERROR REPORTED BY TIMING/CONTROL MODULE - EXAMINE MONITOR LOCATION #40				
			15 ANY HARDWARE ERROR DETECTED				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	COMMENTS
23	DIGITAL	MON	FORMATTER SOFTWARE ERROR REGISTER; HIGH (1) = ON/ERROR				
			00 QUALITY ANALYSIS MANAGER REPORTED ERROR FIRMWARE ERROR-- CONTACT FACTORY!				
			01 QUALITY ANALYSIS MANAGER REPORTED ERROR MULTIPLE SYNC FIELDS FOUND IN FORMAT				
			02 QUALITY ANALYSIS MANAGER REPORTED ERROR SYNC FIELD TOO LONG...>64 BITS				
			03 QUALITY ANALYSIS MANAGER REPORTED ERROR NO END OF SYNC IN FORMAT				
			04 QUALITY ANALYSIS MANAGER REPORTED ERROR NO START OF SYNC FIELD IN FORMAT				
			05 QUALITY ANALYSIS MANAGER REPORTED ERROR NO END OF FRAME MARKER IN FORMAT				
			06 UNDEFINED				
			07 UNDEFINED				
			08 UNDEFINED				
			09 SYSTEM MANAGER REPORTED ERROR - TIMED OUT WAITING FOR TAPE TIME COUNTER 1 PPS INTERRUPT				
			10 SYSTEM MANAGER REPORTED ERROR - TIMED OUT WAITING FOR DATA FIFOS TO FILL				
			11 TIMING CONTROL MANAGER REPORTED ERROR - ILLEGAL COMBINATION OF SAMPLE RATE AND MULTIPLEX MODE				
			12 FORMAT MANAGER REPORTED ERROR - ILLEGAL FORMAT SPECIFICATION ATTEMPTED - REPORTED VIA f-setfmt()				
			13 SYSTEM MANAGER REPORTED ERROR- TIMED OUT WAITING FOR STATION 1 PPS INTERRUPT				
			14 INTERRUPT MANAGER REPORTED ERROR - EXAMINE ADDRESS #24 FOR DETAILS				
			15 ANY ERROR				
24	DIGITAL	MON	INTERRUPT SYSTEM ERRORS, HIGH (=1) = ON/ERROR				
			00 BUS ERROR				
			01 ADDRESS ERROR				
			02 ILLEGAL INSTRUCTION				
			03 ZERO DIVIDE				
			04 PRIVILEGE VIOLATION				
			05 TRACE MODE ERROR				
			06 68010 STACK FORMAT ERROR				
			07 UNINITIALIZED INTERRUPT				
			08 SPURIOUS INTERRUPT				
			09 ABORT COMMAND TO CPU BOARD				
			10 SYSTEM FAIL				
			11 AC FAIL				
			12 ILLEGAL VECTOR				
			13 UNDEFINED				
			14 UNDEFINED				
			15 ANY ERROR DETECTED				
26	DIGITAL	MON	CURRENT SERIAL STATUS REGISTER, MSB'S; SEE CON WORDS #C0 TO #C3 SEE DOC 54200D03.TXT & 54200D10.TXT				
27	DIGITAL	MON	CURRENT SERIAL STATUS REGISTER, LSB'S;				
28	DIGITAL	MON	CURRENT FORMATTER TIME-YEARS, Y Y Y Y				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
29	DIGITAL	MON	CURRENT FORMATTER TIME-DAYS, 0 D D D				
2A	DIGITAL	MON	CURRENT FORMATTER TIME-HOURS, 0 0 : H H				
2B	DIGITAL	MON	CURRENT FORMATTER MIN:SEC M M : S S				
2C	DIGITAL	MON	CURRENT SYNTHESIZER RATE MSB'S- 100MHz : 10MHz : 1MHz : 100kHz				
2D	DIGITAL	MON	CURRENT SYNTHESIZER RATE LSB'S- 10kHz : 1kHz : 100Hz : 10Hz ALSO SEE CON WORD #AD				
30	DIGITAL	MON	LAST MONITOR ADDRESS ACCESSED				
31	DIGITAL	MON	LAST MONITOR DATA FIELD RETURNED				
32	DIGITAL	MON	LAST CONTROL ADDRESSED ACCESSED				
33	DIGITAL	MON	LAST CONTROL DATA FIELD ACCEPTED				
34	DIGITAL	MON	SYSTEM TRACK 0 MODE SELECTION, SEE DDC 54200D05.TXT				
35	DIGITAL	MON	SYSTEM TRACK 1 MODE SELECTION, SEE DDC 54200D05.TXT				
36	DIGITAL	MON	SYSTEM TRACK 2 MODE SELECTION, SEE DDC 54200D05.TXT				
37	DIGITAL	MON	SYSTEM TRACK 3 MODE SELECTION, SEE DDC 54200D05.TXT				
38	DIGITAL	MON	FORMATTER TAPE CLOCK SELECTION				
			#8000 TAPE - TRANSPORT #1				
			#8001 TAPE - TRANSPORT #2				
			#8002 LOCAL SYNTHESIZER				
			#8003 EXTERNAL JACK				
			#8004 OFF - NO CLOCK				
			#8005 4 MHz VME STSTEM XTAL				
			#8006 8 MHz VME SYSTEM XTAL				
			#8007 10 MHz INTERNAL XTAL				
39	DIGITAL	MON	SAMPLER TO FORMATTER OUTPUT MAPPING				
			#8000 NORMAL MAPPING - USED FOR OPERATIONS				
			#8001 NO MAPPING - USED FOR DIAGNOSTICS				
			#8002 COMMON MAPPING - USED FOR DIAGNOSTICS				
			#8003 1 PPS MAPPING - USED FOR DIAGNOSTICS				
			COMMON MAPPING: ROUTES TRACK 0 SAMPLES TO TRACKS 0 THRU 7				
			ROUTES TRACK 8 SAMPLES TO TRACKS 8 THRU 15				
			ROUTES TRACK 16 SAMPLES TO TRACKS 16 THRU 23				
			ROUTES TRACK 24 SAMPLES TO TRACKS 24 THRU 31				
			1 PPS MAPPING: ROUTES NORMAL ONE PPS SAMPLE TO ALL ODD TRACKS 1,3,5,7,....				
			ROUTES INVERTED ONE PPS SAMPLE TO ALLEVEN TRACKS 0,2,4,6,...				
3A-3F			NOT USED				
40	DIGITAL	MON/CON	TIMING/CONTROL MODULE STATUS REGISTER				
			4 ENABLE FRINGE CHECK BUFFER ACQUISITION - MCB COMMAND TO ACQUIRE DATA IN THE FRINGE BUFFER, ACQUISITION STARTS SYNCHRONOUS WITH THE 1 SEC EPOCH				
			5 RELEASE FORMAT - ALLOWS MODULE FORMAT RAM TO PROVIDE TEMPLATE TO SYSTEM, STEPPING ONE LOCATION PER TRANSPORT CLOCK, OTHERWISE, RAM CONTROLLED BY FIRMWARE FOR LOADING AND VERIFICATION				
			7 FIFO'S ARE LOADED W/SAMPLES AND THE FORMT IS RUNNING, OTHERWISE-WAITING FOR FIFO'S TO FILL BEFORE STARTING OUTPUTS				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	PAGE 31 COMMENTS
			8				AUX DATA BUFFER 'B' SELECTED - BUFFER 'B' IS BEING OUTPUT TO THE TRANSPORT, OTHERWISE BUFFER 'A' BEING OUTPUT, UPDATES ON THE ONE SECOND EPOCH
			13				FORMAT RAM ACCESS ERROR - ATTEMPT TO ACCESS RAM BY FIRMWARE WHILE IT WAS GENERATING FORMAT CONTROL CODE
			14				VME BUS ACCESS ERROR
41	DIGITAL	MON	15				ANY ERROR DETECTED
			4				BACKPLANE STATION SYNC DRIVER ENABLE
			5				ENABLE A/D ACQUISITION
			7				A/D ACQUISITION RUNNING
			11				ONE PPS MARKER MISALIGNMENT ERROR
			12				SAMPLE CLOCK DROPOUT ERROR - SECOND A/D MODULE IN SYSTEM
			13				SAMPLE CLOCK DROPOUT ERROR - FIRST A/D MODULE IN SYSTEM
			14				VME BUS ACCESS ERROR
			15				ANY ERROR DETECTED
42	DIGITAL	MON					HEADER CONTROL MODULE STATUS REGISTER
			4				BACKPLANE FIFO HALF FULL DRIVER ENABLE
			7				FIFO'S HALF FULL LATCH
			8				FORMAT IS RUNNING
			9				AUX DATA RAM 'B' IS SELECTED FOR OUTPUT
			12				FIFO ERRORS - REFER TO ERROR REGISTER #43 FOR CAUSE
			13				AUX DATA RAM ACCESS ERROR - ATTEMPT TO ACCESS RAM BY FIRMWARE WHILE IT IS GENERATING AUX DATA OUTPUT PATTERN
			14				VME BUS ACCESS ERROR - ATTEMPT TO ACCESS MODULE WHILE STILL BUSY
			15				ANY ERROR DETECTED
43	DIGITAL	MON					HEADER CONTROL MODULE REGISTER
			00				FIFO 0 EMPTY ERROR

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	PAGE 32 COMMENTS
			1 FIFO 1 EMPTY ERROR				
			2 FIFO 2 EMPTY ERROR				
			3 FIFO 3 EMPTY ERROR				
			4 FIFO 0 FULL ERROR				
			5 FIFO 1 FULL ERROR				
			6 FIFO 2 FULL ERROR				
			7 FIFO 3 FULL ERROR				
			8 FIFO 0 ONE PPS MARKER DETECTED				
			9 FIFO 1 ONE PPS MARKER DETECTED				
			10 FIFO 2 ONE PPS MARKER DETECTED				
			11 FIFO 3 ONE PPS MARKER DETECTED				
			12 BACKPLANE ONE PPS MARKER DETECTED				
44	DIGITAL	MON	TRANSPORT DRIVER MODULE STATUS REGISTER				
			3 ENABLE FRINGE CHECK DRIVERS				
			4 ENABLE TRANSPORT #1 CLOCK				
			5 ENABLE TRANSPORT #2 CLOCK				
			8 CRCC POLYNOMIAL SELECT - LSB				
			9 CRCC POLYNOMIAL SELECT				
			10 CRCC POLYNOMIAL SELECT- MSB				
			11 CRCC INITIALIZE TO ONES				
			12 CROSS TRACK PARITY ODD				
			13 ALONG TRACK PARITY ODD				
			14 VME BUS ACCESS ERROR - ATTEMPT TO ACCESS MODULE WHILE STILL BUSY				
			15 ANY ERROR DETECTED				
45	DIGITAL	MON	FRINGE CHECK MODULE STATUS REGISTER				

REL. ADD. ANALOG/ #(HEX)	DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
			0 TO BE DESIGNED				
			1 "				
			2 "				
			3 "				
			4 "				
			5 "				
			6 "				
			7 "				
			8 "				
			9 "				
			10 "				
			11 "				
			12 "				
			13 "				
			14 "				
			15 "				
46	DIGITAL	MON	QUALITY ANALYSIS MODULE STATUS REGISTER				
			2 SELECT RECORDER #2				
			3 ALONG TRACK PARITY EVEN				
			4 CRCC POLYNOMIAL SELECT -LSB				
			5 CRCC POLYNOMIAL SELECT -				
			6 CRCC POLYNOMIAL SELECT - MSB				
			7 CRCC INITIALIZE TO ONES				
			8 RELEASE FORMAT RAM				
			9 RUN ANALYSIS				
			10 CAPTURE DATA SELECT CODE - LSB				
			11 CAPTURE DATA SELECT CODE -				
			12 CAPTURE DATA SELECT CODE - MSB				
			13 CAPTURE DATA REQUEST				
			14 CAPTURE DATA READY				
			15 ANY ERROR DETECTED - REFER TO ERROR REGISTER #47 FOR CAUSE				
47	DIGITAL	MON	QUALITY ANALYSIS MODULE ERROR REGISTER				
			12 CHANNEL 'B' CLOCK ERROR				
			13 CHANNEL 'A' CLOCK ERROR				
			14 FORMAT RAM ACCESS ERROR - ATTEMPT TO ACCESS RAM BY FIRMWARE WHILE IT WAS GENERATING FORMAT FOR ANALYSIS				
			15 VME BUS ACCESS ERROR - ATTEMPT TO ACCESS MODULE WHILE STILL BUSY				
48	DIGITAL	MON	Q/A CAPTURED DATA MSB'S - SEE DOC. 54200D09.TXT				
49	DIGITAL	MON	Q/A CAPTURED DATA LSB'S - "				
4A	DIGITAL	MON	Q/A CAPTURED TIME MSB'S - "				
4B	DIGITAL	MON	Q/A CAPTURED TIME LSB'S - "				
4C-4E			UNASSIGNED				
4F	DIGITAL	MON	SYSTEM CONFIGURATION SWITCHES:				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	COMMENTS
			0 T/C MODULE SWITCH 1- NOT DEFINED AT PRESENT				
			1 T/C MODULE SWITCH 2- NOT DEFINED AT PRESENT				
			2 T/C MODULE SWITCH 3- NOT DEFINED AT PRESENT				
			3 T/C MODULE SWITCH 4- NOT DEFINED AT PRESENT				
			4 T/C MODULE SWITCH 5- NOT DEFINED AT PRESENT				
			5 T/C MODULE SWITCH 6- NOT DEFINED AT PRESENT				
			6 T/C MODULE SWITCH 7- NOT DEFINED AT PRESENT				
			7 T/C MODULE SWITCH 1- FORMATTER REMOTE RESET ENABLE/DISABLE;1=ENABLE,SEE ADD.#EF				
			8 NVME-117 SWITCH 1- NOT DEFINED AT PRESENT				
			9 NVME-117 SWITCH 2- NOT DEFINED AT PRESENT				
			10 NVME-117 SWITCH 3- NOT DEFINED AT PRESENT				
			11 NVME-117 SWITCH 4- NOT DEFINED AT PRESENT				
			12 NVME-117 SWITCH 5- NOT DEFINED AT PRESENT				
			13 NVME-117 SWITCH 6- NOT DEFINED AT PRESENT				
			14 NVME-117 SWITCH 7- NOT DEFINED AT PRESENT				
			15 NVME-117 SWITCH 8- NOT DEFINED AT PRESENT				
50-5F			NOT USED				
60	DIGITAL	MON	FIRMWARE VERSION NUMBER (HEX), e.g. VERSION 1.23=0123				
61	DIGITAL	MON	FIRM WARE DATE (HEX) DDMM E.E. 23 JUL - 2307				
62	DIGITAL	MON	FIRMWARE DATE (YEAR) (HEX),				
63-6F			NOT USED				
70-7F			RESERVED FOR MCB SYSTEM USE				
81	DIGITAL	MON/CON	INITIALIZE FORMATTER #8001 - INITIALIZE FORMATTER				
82	DIGITAL	MON/CON	CONFIGURE FORMATTER #8001 - CONFIGURE FORMATTER				
83	DIGITAL	MON/CON	CONFIGURE AUX.DATA BUFFER A/B				
			#8001 - CONFIGURE AUX BUFFER 'A'				
			#8002 - CONFIGURE AUX BUFFER 'B'				
84	DIGITAL	MON/CON	SELECT AUX.DATA OUTPUT A/B				
			#8001 - SELECT BUFFER 'A'				
			#8002 - SELECT BUFFER 'B'				
85	DIGITAL	MON/CON	START FRINGE CHECK DATA BUFFER				
			#8001 - START ACQUISITION				
86-87			UNASSIGNED				
88	DIGITAL	MON/CON	START/STOP QUALITY ANALYSIS				
			#8000 - STOP QUALITY ANALYSIS				
			#8001 - START QUALITY ANALYSIS				
89	DIGITAL	MON/CON	START Q/A DATA CAPTURE				
8A-8C			UNASSIGNED				
8D	DIGITAL	MON/CON	TRACK 0-15 ENABLE MASK				
			SAMPLE CODES ARE:				
			#0000 ALL LOW TRACKS DISABLED				
			#0001 TRACK 0 ENABLED				
			#8000 TRACK 15 ENABLED				
			#FFFF ALL LOW TRACKS ENABLED				
8E	DIGITAL	MON/CON	TRACK 16-31 ENABLE MASK				
			SAMPLE CODES ARE:				
			#0000 ALL HIGH TRACKS DISABLED				
			#0001 TRACK 16 ENABLED				
			#8000 TRACK 31 ENABLED				
			#FFFF ALL HIGH TRACKS ENABLED				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
8F	DIGITAL	MON/CON	SYSTEM TRACK ENABLE MASK	SEE MON WORD #0E ABOVE FOR COMMAND CODES			
90	DIGITAL	MON/CON	FORMAT SPECIFICATION	SEE FORMATTER MON WORD #10 ABOVE			
91	DIGITAL	MON/CON	SAMPLE RATE SELECTION	"	"	#11	"
92	DIGITAL	MON/CON	MULTIPLEX MODE SELECTION	"	"	#12	"
93	DIGITAL	MON/CON	TRACK ROLLER CONTROL	"	"	#11	"
94	DIGITAL	MON/CON	TIME CODE CONTROL	"	"	#14	"
95	DIGITAL	MON/CON	FRINGE CHECK DATA BUFFER MODE	"	"	#15	"
96			UNASSIGNED				
97	DIGITAL	MON/CON	PARITY MODE CONTROL	"	"	#17	"
98	DIGITAL	MON/CON	CRCC MODE CONTROL	"	"	#18	"
99	DIGITAL	MON/CON	Q/A RECORDER SELECTION CONTROL	"	"	#19	"
9A	DIGITAL	MON/CON	Q/A DATA CAPTURE MODE CONTROL	"	"	#1A	"
9B	DIGITAL	MON/CON	Q/A SYNC THRESHOLD CONTROL	"	"	#1B	"
9C	DIGITAL	MON/CON	Q/A PHASE CAL MODE CONTROL	"	"	#1C	"
9D	DIGITAL	MON/CON	Q/A PHASE CAL PERIOD	"	"	#1D	"
9A-A0			UNASSIGNED				
A1	DIGITAL	MON/CON	SYSTEM ERROR REGISTER 1 -				
			REGISTER ADDRESS #A1 ALLOWS THE MCB TO SELECTIVELY RESET THE ERROR INDICATORS. BITS CLEARED IN THE COMMAND WORD RESET THE CORRESPONDING FLAG. SEE MONITOR WORD #21 ABOVE FOR BIT ASSIGNMENTS. REFER TO DOCUMENTATION FILE 54200D07.TXT FOR MORE DETAILED DESCRIPTION.				
A2-A5			UNASSIGNED				
A6	DIGITAL	MON/CON	SERIAL STATUS REGISTER MSB'S				
			THIS ADDRESS WILL RETURN THE CURRENT CONTENTS OF THE SERIAL STATUS REGISTER WHICH IS COMMON TO ALL TRACKS. SERIAL STATUS DATA CAN BE WRITTEN TO THE OUTPUTS BY SELECTING OUTPUT CODE 3 IN THE FORMAT DEFINITION ARRAY. REFER TO ARRAY ADDRESSES #C0-#C3 BELOW AND TO DOCUMENTATION FILE 54200D1C.TXT FOR ADDITIONAL DETAILS.				
A7	DIGITAL	MON/CON	SERIAL STATUS REGISTER LSB'S	SEE #A6 ABOVE			
A8	DIGITAL	MON/CON	CURRENT STATION TIME - YEARS: Y Y Y Y				
A9	DIGITAL	MON/CON	CURRENT STATION TIME - DAYS: 0 D D D				
AA	DIGITAL	MON/CON	CURRENT STATION TIME - HOURS: 0 0 : H H				
AB	DIGITAL	MON/CON	CURRENT STATION TIME - MIN,SEC MM:SS				
AC	DIGITAL	MON/CON	COMMAND SYNTHESIZER RATE MSB'S: 100MHz : 10MHz : 1MHz : 100kHz				
AD	DIGITAL	MON/CON	COMMAND SYNTHESIZER RATE LSB'S: 10kHz : 1kHz : 100Hz : 10Hz				

THE LOCAL SYNTHESIZER SUPPLIED IN THE PRE-PRODUCTION MODULES USE
ONLY THE LEAST SIGNIFICANT 4 BITS OF THE SYNTHESIZER CONTROL WORDS
AS FOLLOWS:

CODE	TAPE CLOCK FREQUENCY
#0	UNUSED
#1	UNUSED
#2	9,072/32 MHz (NON DATA REPLACEMENT MODES)

REL. # (HEX)	ADD. ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
			#3 9,072/16 MHz (NON DATA REPLACEMENT MODES)				
			#4 9,072/8 MHz (NON DATA REPLACEMENT MODES)				
			#5 9,072/4 MHz (NON DATA REPLACEMENT MODES)				
			#6 9,072/2 MHz (NON DATA REPLACEMENT MODES)				
			#7 9,072/1 MHz (NON-DATA REPLACEMENT MODES)				
			#8 UNUSED				
			#9 UNUSED				
			#A 9/32 MHz (DATA REPLACEMENT MODES)				
			#B 9/16 MHz (DATA REPLACEMENT MODES)				
			#C 9/8 MHz (DATA REPLACEMENT MODES)				
			#D 9/4 MHz (DATA REPLACEMENT MODES)				
			#E 9/2 MHz (DATA REPLACEMENT MODES)				
			#F 9/1 MHz (DATA REPLACEMENT MODES)				
AE-B3			UNASSIGNED				
B4	DIGITAL	MON/CON	SYSTEM TRACK 0 MODE CONTROL	--	SEE BELOW		
B5	DIGITAL	MON/CON	SYSTEM TRACK 1 MODE CONTROL	--	SEE BELOW		
B6	DIGITAL	MON/CON	SYSTEM TRACK 2 MODE CONTROL	--	SEE BELOW		
B7	DIGITAL	MON/CON	SYSTEM TRACK 3 MODE CONTROL	--	SEE BELOW		

EACH SYSTEM TRACK CAN BE ASSIGNED TO DUPLICATE ONE OF EIGHT
DIFFERENT DATA TRACKS, CODES AS FOLLOWS:

SYSTEM TRACK 0 HAS ACCESS TO DATA TRACKS 0 THRU 7 CODED #0000 THRU #0007
SYSTEM TRACK 1 HAS ACCESS TO DATA TRACKS 8 THRU 16 CODED #0008 THRU #000F
SYSTEM TRACK 2 HAS ACCESS TO DATA TRACKS 16 THRU 23 CODED #0010 THRU #0017
SYSTEM TRACK 3 HAS ACCESS TO DATA TRACKS 24 THRU 31 CODED #0018 THRU #001F

EACH SYSTEM TRACK CAN ALSO ACCESS ONE OF SIX CROSS TRACK PARITY GENERATORS,
CROSS TRACK PARITY IS CONTROLLED BY BIT 10 OF THE FORMAT
DEFINITION WORD AND OVERWRITES DATA TRACK SAMPLES WHEN BOTH ARE SELECTED.
THE CROSS TRACK PARITY GENERATORS ARE CODED AS FOLLOWS:

#8000 PARITY OVER TRACKS 0 THRU 7
#8100 PARITY OVER TRACKS 8 THRU 15
#8200 PARITY OVER TRACKS 16 THRU 23
#8300 PARITY OVER TRACKS 24 THRU 31
#8400 PARITY OVER TRACKS 00 THRU 15
#8500 PARITY OVER TRACKS 08 THRU 23
#8600 PARTIY OVER TRCKS 16 THRU 31
#8700 CROSS TRACK PARTIY UNUSED

THE SYSTEM TRACK MCB CONTROL REGISTERS SHOULD BE SET WITH THE SUM
OF THE DATA TRACK AND CROSS TRACK PARITY CODES DESIRED. NORMALLY,
SYSTEM TRACKS WOULD CARRY EITHER DATA SAMPLES OR PARITY BUT THERE
IS NO HARDWARE LIMITATION PROHIBITING BOTH, IF YOU CAN MAKE SENSE
OF IT, YOU CAN COMMAND IT, A FEW SAMPLES FOLLOW:

DATA DUPLICATION....

COMMAND #8704 TO SYSTEM TRACK 0...DUPLICATE A/D SAMPLES FROM TRACK 4
COMMAND #870A TO SYSTEM TRACK 1...DUPLICATE A/D SAMPLES FROM TRACK 10
COMMAND #871F TO SYSTEM TRACK 3...DUPLICATE A/D SAMPLES FROM TRACK 31

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	

			CROSS TRACK PARITY..				
			COMMAND #8000 TO SYSTEM TRACK X...CARRY PARITY OVER TRACKS 0 THRU 7				
			COMMAND #8100 TO SYSTEM TRACK Y...CARRY PARITY OVER TRACKS 8 THRU 15				
			COMMAND #8600 TO SYSTEM TRACK Z...CARRY PARTIY OVER TRACKS 16 THRU 31				
			MIXED MODE.....				
			COMMAND #8006 TO SYSTEM TRACK 0...CARRY PARITY OVER TRACKS 0 THRU 7,				
			DUPLICATE TRACK 6				
			COMMAND #800F TO SYSTEM TRACK 1...CARRY PARTITY OVER TRACKS 0 THRU 7,				
			DUPLICATE TRACK 15				
			COMMAND #8510 TO SYSTEM TRACK 2...CARRY PARITY OVER TRACKS 8 THRU 23,				
			DUPLICATE TRACK 16				
B8	DIGITAL	MON/CON	FORMATTE - TAPE				
			FORMATTE - TAPE CLOCK SELECTION - SEE MON.WORD #38 ABOVE				
B9 BA-BF	DIGITAL	MON/CON	SAMPLER OUTPUT MAPPING - SEE MON.WORD #39 ABOVE				
			UNASSIGNED				
			INDIRECT ACCESS TO FORMAT DEFINITION ARRAY - REF:54200D10.TXT				

C0	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS			
C1	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS			
C2	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING			
C3	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE			
			INDIRECT ACCESS TO FRINGE CHECK DATA BUFFER MONITOR ARRAY REF:54200D11.TXT				

C4	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS			
C5	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS			
C6	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE D/B RUNNING			
C7	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE			
			INDIRECT ACCESS TO QUALITY ANALYSIS RESULT REGISTERS REF:54200D09.TXT				

C8	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS			
C9	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS			
CA	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE Q/A RUNNING			
CB	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE			
			INDIRECT ACCESS TO LOCAL PROCESSOR'S PHYSICAL MEMORY SPACE				

CC	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS			
CD	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS			
CE	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE FORMATTER RUNNING			
CF	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE			
			LOCATIONS #D0 THRU #DF RESERVED FOR FORMATTER TRACK AND AUX DATA CONTROLS				
			INDIRECT ACCESS TO TRACK DATA ASSIGNMENT ARRAY REF:54200D04.TXT				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT. ERROR MES.MEANING	UNITS	RANGE
D0	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
D1	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
D2	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
D3	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
INDIRECT ACCESS TO AUXILIARY DATA FIELD ARRAY 'A' REF:54200D08.TXT						
D4	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
D5	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
D6	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
D7	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
INDIRECT ACCESS TO AUXILIARY DATA FIELD ARRAY 'B' REF:54200D08.TXT						
D8	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
D9	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
DA	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
DB	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
DC		NONE	UNASSIGNED	NON-EXISTING REGISTER		
DD		NONE	UNASSIGNED	NON-EXISTING REGISTER		
DE		NONE	UNASSIGNED	NON-EXISTING REGISTER		
DF		NONE	UNASSIGNED	NON-EXISTING REGISTER		
INDIRECT ACCESS TO TRACK DATA ASSIGNMENT ARRAY - EXPANSION						
E0	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
E1	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
E2	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
E3	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
INDIRECT ACCESS TO AUXILIARY DATA FIELD ARRAY 'A' - EXPANSION						
E4	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
E5	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
E6	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
E7	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
INDIRECT ACCESS TO AUXILIARY DATA FIELD ARRAY 'B' - EXPANSION						
E8	DIGITAL	MON/CON	HIGH ADDRESS BITS (16-32)	ILLEGAL ADDRESS		
E9	DIGITAL	MON/CON	LOW ADDRESS BITS (00-15)	ILLEGAL ADDRESS		
EA	DIGITAL	MON/CON	DATA TRANSFER REGISTER	COMMAND ATTEMPT WHILE INITIALIZING		
EB	DIGITAL	MON/CON	CHECKSUM REGISTER	NONE		
EC		NONE	UNASSIGNED	NON-EXISTING REGISTER		
ED		NONE	UNASSIGNED	NON-EXISTING REGISTER		
EE		NONE	UNASSIGNED	NON-EXISTING REGISTER		
EF		NONE	RESET FORMATTER			
			[ACCESS CODE #AE51]	ILLEGAL ACCESS CODE		

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
VALUE	MEANING						
F0		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F1		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F2		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F3		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING
F4		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F5		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F6		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING
F7		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F8		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
F9		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
FA		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
FB		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING
FC		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
FD		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
FE		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER
FF		NONE	RESERVED FOR MCB SYSTEM USE				NON-EXISTING REGISTER

B-RACK INTERFACE (M102)

ID (HEX) = 40

STARTING ADDRESS (HEX) = 4000

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REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	100 MHz LO RECEIVER INPUT POWER			1	VOLTS	1.0	
01	ANALOG	MON	500MHz LO RECEIVER INPUT POWER				VOLTS	0.1	
02	ANALOG	MON	100MHz LO RECEIVER OUTPUT POWER				VOLTS	-0.5	
03	ANALOG	MON	500MHz LO RECEIVER OUTPUT POWER				VOLTS	-0.5	
4	ANALOG	MON	TEMP. SENSOR #3- VR DOWN SIDE				deg C		
05	ANALOG	MON	TEMP. SENSOR #4- FC DOWN SIDE				deg C		
06	ANALOG	MON	TEMP. SENSOR #5- VR UP SIDE				deg C		
07	ANALOG	MON	TEMP. SENSOR #6- FC UPSIDE				deg C		
08	ANALOG	MON	NOT USED				VOLTS		
09	ANALOG	MON	1.56Hz IF CONVERTER (T103) LO POWER				VOLTS	0.23V	
0A	ANALOG	MON	DIFFERENTIAL ANALOG MONITOR, NOT USED				VOLTS		LABEL AV11
0B	ANALOG	MON	DIFFERENTIAL ANALOG MONITOR, NOT USED				VOLTS		LABEL AV12
0C	ANALOG	MON	DIFFERENTIAL ANALOG MONITOR, NOT USED				VOLTS		LABEL AV13
0D	ANALOG	MON	DIFFERENTIAL ANALOG MONITOR, NOT USED				VOLTS		LABEL AV14
0E	ANALOG	MON	TEMP. SENSOR #1- B-RACK TOP				deg C	26 deg C	
0F	ANALOG	MON	TEMP. SENSOR #2- B-RACK BOTTOM				deg C	23deg C	
10	DIGITAL	MON/CON	0 .336Hz (T101)CONV. 0		NORMAL				
			INPUTS 1		INTERCHANGED				
11	DIGITAL	MON/CON	0 1 BIT RELAY DRIVER- NOT USED						LABEL RD2
12	DIGITAL	MON/CON	0 1.56Hz (T103)CONV. 0		NORMAL				
			INPUTS 1		INTERCHANGED				
13	DIGITAL	MON/CON	0						
14	DIGITAL	MON/CON	0 4.86Hz (T104)CONV. 0						
			INPUTS 1						
15	DIGITAL	MON/CON	0 SWITCH S106D 0		8.46Hz CONVERTER LCP & RCP MIXERS INPUTS NORMAL				
				1	LCP DIVIDED TO BOTH LCP & RCP				
16	DIGITAL	MON/CON	0 10.76Hz CONV. 0						
			INPUTS 1						
17	DIGITAL	MON/CON	0 156Hz CONV. 0						
			INPUTS 1						
18	DIGITAL	MON/CON	0 1 BIT RELAY DRIVER, NOT USED						LABEL RD9
19	DIGITAL	MON/CON	0 1 BIT RELAY DRIVER, NOT USED						LABEL RD10
1A	DIGITAL	MON/CON	0 1 BIT RELAY DRIVER, NOT USED						LABEL RD11
1B	DIGITAL	MON/CON	0 1 BIT RELAY DRIVER, NOT USED						LABEL RD12
1C	DIGITAL	MON/CON	0 1 BIT TTL LEVEL, NOT USED						LABEL C9
1D	DIGITAL	MON/CON	0 1 BIT TTL LEVEL, NOT USED						LABEL C10
1E	DIGITAL	MON/CON	0 1 BIT TTL LEVEL, NOT USED						LABEL C11
1F	DIGITAL	MON/CON	0 1 BIT TTL LEVEL, NOT USED						LABEL C12
20	DIGITAL	MON/CON	0-7 8 BIT WORD: TTL LEVEL, NOT USED						LABEL C1-8
21	DIGITAL	MON	0 LO RCVR 500MHz LOCK 0		LOCKED				
			INDICATOR 1		NOT LOCKED				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
22	DIGITAL	MON/CON	MODULE (M102) SERIAL NUMBER ANY COMMAND TO THIS ADDRESS WILL CLEAR THE 1 BIT COMMANDS TO ADDRESSES 4010 THRU' 401F				

BUILDING UTILITY MODULE

 ID (HEX) = 42
 STARTING ADDRESS (HEX) = 4200
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REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	EXTERNAL SIGNAL, AVAILABLE FOR USE			1	VOLTS		
01	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
02	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
03	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
04	ANALOG	MON	EXTERNAL SIGNAL, AVAILABLE FOR USE			1	VOLTS		
05	ANALOG	MON	EXTERNAL SIGNAL, AVAILABLE FOR USE			1	VOLTS		
06	ANALOG	MON	EXTERNAL SIGNAL, AVAILABLE FOR USE			1	VOLTS		
07-0F	ANALOG	MON	NOT IMPLEMENTED						
10	ANALOG	MON	-15 VOLTS POWER SUPPLY			2	VOLTS		
11	ANALOG	MON	10 VOLTS POWER SUPPLY			1.5	VOLTS		
12	ANALOG	MON	ANALOG GROUND			1	VOLTS		
13	ANALOG	MON	+15 VOLTS POWER SUPPLY			2	VOLTS		
14	ANALOG	MON	+5 VOLTS POWER SUPPLY			1	VOLTS		
15	ANALOG	MON	+28 VOLTS POWER SUPPLY			4	VOLTS		
16	ANALOG	MON	ANALOG GROUND			1	VOLTS		
17	ANALOG	MON	ANALOG GROUND			1	VOLTS		
18	ANALOG	MON	TEMP. MONITOR T1: C RACK TEMP. (100mV/deg C)			10	deg C		
19	ANALOG	MON	TEMP. MONITOR T2: DAR-1 TEMP. (100mV/deg C)			10	deg C		
1A	ANALOG	MON	TEMP. MONITOR T3: ELECTRONICS ROOM (100mV/deg C)			10	deg C		
1B	ANALOG	MON	TEMP. MONITOR T4: COMPUTER ROOM TEMP. (100mV/deg C)			10	deg C		
1C	ANALOG	MON	TEMP. MONITOR T5: TAPE RECORDER-1 (100mV/deg C)			10	deg C		
1D	ANALOG	MON	TEMP. MONITOR T6: CONTROL ROOM AIR (100mV/deg C)			10	deg C		
1E	ANALOG	MON	TEMP. MONITOR T7: AUX. ROOM AIR (100mV/deg C)			10	deg C		
1F	ANALOG	MON	TEMP. MONITOR T8: NOT USED, AVAILABLE (100mV/deg C)				deg C		
20	DIGITAL	MON	0 UPS ALARM (1=ALARM)						
			1 UPS INVERTER ON (1=TRUE)						
			2 AVAILABLE, NOT USED						
			3 ANTENNA NON CRITICAL CB CONTACT; (1= TRIPPED)						
			4 ANTENNA CRITICAL CB CONTACT; (1= TRIPPED)						
			5 AVAILABLE, NOT USED						
			6 ANTENNA FIRE ALARM; (1= ALARM)						
			7 AIR HANDLER #2 ALARM (1=FAULT)						
			8 AIR HANDLER #1 ALARM (1=FAULT)						
			9 ACU FAUL; (1=FAULT)						
			10 BUILDING FIRE ALARM TROUBLE; (1= TROUBLE)						
			11 AVAILABLE, NOT USED						
			12 +15V MONITOR, NOT USED						
			13 +15V MONITOR, NOT USED						
			14 +15 VOLT MONITOR						
			15 NOT USED, NOT IMPLEMENTED						
21-27			NOT IMPLEMENTED						
28	DIGITAL	MON	TTL CMD. #0, AVAILABLE, NOT USED						
29	DIGITAL	MON	TTL CMD. #1, AVAILABLE, NOT USED						
2A	DIGITAL	MON	TTL CMD. #2, AVAILABLE, NOT USED						

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
			VALUE MEANING				
2B	DIGITAL	MON	TTL CMD. #3, AVAILABLE, NOT USED				
2C	DIGITAL	MON	TTL CMD. #4, AVAILABLE, NOT USED				
2D	DIGITAL	MON	TTL CMD. #5, AVAILABLE, NOT USED				
2E	DIGITAL	MON	CMD. #6: +15V COMMAND, AVAILABLE, NOT USED				
2F	DIGITAL	MON	CMD. #7: +15V COMMAND, AVAILABLE, NOT USED				
30	DIGITAL	CON	CMD. #8: +28V COMMAND, AVAILABLE, NOT USED				
31	DIGITAL	CON	CMD. #9: +28V COMMAND, AVAILABLE, NOT USED				
32	DIGITAL	CON	RELAY CONTACT COMMAND: UPS SHUT DOWN				
33	DIGITAL	CON	RELAY CONTACT COMMAND, NOT USED				
34-36			NOT USED, NOT AVAILABLE				
37	DIGITAL	CON	COMPUTER RESET COMMAND: ALTERNATING "1" AND "0" REQUIRED AT 20 MIN. INTERVALS, ELSE SHUTS OFF COMPUTER 120V AC FOR 20 SECONDS				

PEDASTAL ROOM UTILITY MODULE

 ID (HEX) = 41
 STARTING ADDRESS (HEX) = 4100
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	EXTERNAL,NOT USED, AVAILABLE			1	VOLTS		
01	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
02	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
03	ANALOG	MON	NOT AVAILABLE, USED INTERNALLY						
04	ANALOG	MON	EXTERNAL,NOT USED, AVAILABLE			1	VOLTS		
05	ANALOG	MON	EXTERNAL,NOT USED, AVAILABLE			1	VOLTS		
06	ANALOG	MON	EXTERNAL,NOT USED, AVAILABLE			1	VOLTS		
07	ANALOG	MON	NOT IMPLEMENTED						
08	ANALOG	MON	NOT IMPLEMENTED						
09	ANALOG	MON	NOT IMPLEMENTED						
0A	ANALOG	MON	NOT IMPLEMENTED						
0B	ANALOG	MON	NOT IMPLEMENTED						
0C	ANALOG	MON	NOT IMPLEMENTED						
0D	ANALOG	MON	NOT IMPLEMENTED						
0E	ANALOG	MON	NOT IMPLEMENTED						
0F	ANALOG	MON	NOT IMPLEMENTED						
10	ANALOG	MON	-15V POWER SUPPLY VOLTAGE			2	VOLTS		
11	ANALOG	MON	+10V POWER SUPPLY VOLTAGE			1.5	VOLTS		
12	ANALOG	MON	ANALOG GROUND			1	VOLTS		
13	ANALOG	MON	=15V SUPPLY VOLTAGE			2	VOLTS		
14	ANALOG	MON	+5V SUPPLY VOLTAGE			1	VOLTS		
15	ANALOG	MON	+28V POWER SUPPLY VOLTAGE			4	VOLTS		
16	ANALOG	MON	ANALOG GROUND			1	VOLTS		
17	ANALOG	MON	ANALOG GROUND			1	VOLTS		
18	ANALOG	MON	T1: PEDASTAL ROOM AIR TEMP.		.1V/deg C 10		deg C		
19	ANALOG	MON	T2: ACU RACK TEMP.		.1V/deg C 10		deg C		
1A	ANALOG	MON	T3: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
1B	ANALOG	MON	T4: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
1C	ANALOG	MON	T5: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
1D	ANALOG	MON	T6: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
1E	ANALOG	MON	T7: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
1F	ANALOG	MON	T8: TEMP. MONITOR; NOT USED, AVAILABLE		.1V/deg C 10		deg C		
20	DIGITAL	MON	0 SMOKE DETECTOR TROUBLE CONTACT (1 = TROUBLE)						
			1-11 DISCRETE;NOT USED, AVAILABLE						
			12 +15V MONITOR; NOT USED						
			13 +15V MONITOR; NOT USED						
			14 +15V MONITOR; NOT USED						
			15 NOT IMPLEMENTED						
21-27			NOT IMPLEMENTED						
28	DIGITAL	MON/CON	0 FEED HEATER POWER (HIGH = ON)						
29	DIGITAL	MON/CON	TTL COMMAND; NOT USED, AVAILABLE						
2A	DIGITAL	MON/CON	TTL COMMAND; NOT USED, AVAILABLE						
2B	DIGITAL	MON/CON	TTL COMMAND; NOT USED, AVAILABLE						
2C	DIGITAL	MON/CON	TTL COMMAND; NOT USED, AVAILABLE						
2E	DIGITAL	MON/CON	TTL COMMAND; NOT USED, AVAILABLE						
2E	DIGITAL	MON/CON	+15V COMMAND,NOT USED, AVAILABLE						

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
2F	DIGITAL	MON/CON	+15V COMMAND,NOT USED, AVAILABLE				
30	DIGITAL	MON/CON	+28V COMMAND,NOT USED, AVAILABLE				
31	DIGITAL	MON/CON	+28V COMMAND,NOT USED, AVAILABLE				
32	DIGITAL	MON/CON	RELAY CONTACT COMMAND; NOT USED, AVAILABLE				
33	DIGITAL	MON/CON	RELAY CONTACT COMMAND; NOT USED, AVAILABLE				
34			NOT IMPLEMENTED				
35			NOT IMPLEMENTED				
36			NOT IMPLEMENTED				
37	DIGITAL	MON/CON	ACU/NPL RESET COMMAND;2SEC 28V RELAY DRIVER				

ANTENNA CONTROL UNIT

 ID (HEX) = 70
 STARTING ADDRESS (HEX) = 7000
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	AZ 1 MOTOR CURRENT (10A/V)	0.1	A	-6 TO +6	9A/V AT PT
01	ANALOG	MON	AZ 2 MOTOR CURRENT(10A/V)	0.1	A	-6 TO +6	9A/V AT PT
02	ANALOG	MON	EL 1 MOTOR CURRENT(10A/V)	0.1	A	-6 TO +6	6.4A/V@PT
03	ANALOG	MON	EL 2 MOTOR CURRENT(10A/V)	0.1	A	-6 TO +6	6.4A/V@PT
04	ANALOG	MON	AZ VELOCITY COMMAND (.15deg/SEC/V)		deg/SEC	-10 TO +10	
05	ANALOG	MON	EL VELOCITY COMMAND (.05deg/SEC/V)		deg/SEC	-10 TO +10	
06	ANALOG	MON	DRIVE CABINET POWER (SUPPLY VOLTAGE SUM 1)	1	VOLTS	8.5 TO -7.16	
07	ANALOG	MON	ACU POWER SUPPLY (VOLTAGE SUM)	1	VOLTS	-6 TO -4.5	
08-0F			NOT USED				
10	ANALOG	MON	AZ ENCODER POSITION HIGH WORD	SEE BELOW			
11	ANALOG	MON	AZ ENCODER POSITION LOW WORD	SEE BELOW			
12	ANALOG	MON	EL ENCODER POSITION HIGH WORD	SEE BELOW			
13	ANALOG	MON	EL ENCODER POSITION LOW WORD	SEE BELOW			
14	ANALOG	MON	AZ SYNCHRO POSITION HIGH WORD	SEE BELOW			
15	ANALOG	MON	AZ SYNCHRO POSITION LOW WORD	SEE BELOW			
16	ANALOG	MON	EL SYNCHRO POSITION HIGH WORD	SEE BELOW			
17	ANALOG	MON	EL SYNCHRO POSITION LOW WORD	SEE BELOW			
18	ANALOG	MON	AZ POSITION ERROR HIGH WORD	SEE BELOW			
19	ANALOG	MON	AZ POSITION ERROR LOW WORD	SEE BELOW			
1A	ANALOG	MON	EL POSITION ERROR HIGH WORD	SEE BELOW			
1B	ANALOG	MON	EL POSITION ERROR LOW WORD	SEE BELOW			
1C	DIGITAL	MON/CON	AZ POSITION COMMAND HIGH WORD	SEE BELOW			
1D	DIGITAL	MON/CON	AZ POSITION COMMAND LOW WORD	SEE BELOW			
1E	DIGITAL	MON/CON	EL POSITION COMMAND HIGH WORD	SEE BELOW			
1F	DIGITAL	MON/CON	EL POSITION COMMAND LOW WORD	SEE BELOW			

Comments: Position Designation command summary:

HIGH WORD LOW WORD

15	360 #	0.005493
14	180	0.002747
13	90	0.001373
12	45	0.000687
11	22.5	0.000343
10	11.25	0.000172 ##
9	5.625	0.000086 ##
8	2.8125	NOT USED
7	1.40625	NOT USED
6	0.703125	NOT USED
5	0.351563	NOT USED
4	0.175781	NOT USED
3	0.087891	NOT USED
2	0.043945	NOT USED
1	0.021973	NOT USED
0	0.010986	NOT USED

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	
‡ = The 360 BIT (bit 15 of the high word) is not used in elevation ‡‡= Not used on Synchro information NOTE: To obtain the angle value displayed at the ACU do the following: If high word bit 15 is set (1) obtain the two's compliment value of high and low words and move that amount in degrees counterclockwise in the CCW path. If high word bit 15 is cleared (0) move in the CW path clockwise the high/low word amount in degrees. EXAMPLE: HIGH+LOW WORD = 1010 0000 0000 0000 000X XXXX XXXX TWO'S COMPLIMENT = 0110 0000 0000 0000 000X XXXX XXXX OR 180 + 90 = 270 degrees in the CCW path (-270 deg.)							
20	DIGITAL	MON	MODULE REVISION NUMBER				
21	DIGITAL	MON	ACU STATUS REPORT WORD 0; SEE STATUS/MESSAGE CODING BELOW				
22	DIGITAL	MON	ACU STATUS REPORT WORD 1; SEE STATUS/MESSAGE CODING BELOW				
23	DIGITAL	MON	ACU STATUS REPORT WORD 2; SEE STATUS/MESSAGE CODING BELOW				
24	DIGITAL	MON	ACU STATUS REPORT WORD 3; SEE STATUS/MESSAGE CODING BELOW				
25	DIGITAL	MON	ACU STATUS REPORT WORD 4; SEE STATUS/MESSAGE CODING BELOW				
26	DIGITAL	MON	ACU STATUS REPORT WORD 5; SEE STATUS/MESSAGE CODING BELOW				
27	DIGITAL	MON	ACU STATUS REPORT WORD 6; SEE STATUS/MESSAGE CODING BELOW				
28	DIGITAL	MON	ACU STATUS REPORT WORD 7; SEE STATUS/MESSAGE CODING BELOW				
29	DIGITAL	MON	ACU STATUS REPORT WORD 8; SEE STATUS/MESSAGE CODING BELOW				
2A	DIGITAL	MON	ACU STATUS REPORT WORD 9; SEE STATUS/MESSAGE CODING BELOW				

STATUS MESSAGE CODING (SEE TABLE OF MESSAGES BELOW):

Status Word no.	BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	-	M23	M16	M59	M5	M21	M10	-	M6	M24	M18	M19	M36	M22	M12	M13
1	M39	M37	M15	M60	M29	M27	M9	-	M44	M42	M17	M80	M34	M32	M11	M41
2	M26	M38	M50	M53	M14	M28	M48	M52	M31	M43	M51	M54	M20	M33	M49	M58
3	-	M35	M8	-	-	M25	M7	M56	-	M40	-	M55	-	M30	-	M57
4	-	-	-	-	-	-	M61	-	-	-	-	-	-	-	M62	M67
5	-	-	-	-	-	-	M63	-	-	-	-	-	-	-	S1	M1
6	-	-	-	-	-	-	S2	-	-	-	-	-	-	-	S3	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M74	-
8	M2	-	M3	M4	M65	M64	M46	M45	M72	M70	-	M71	M66	M69	M68	M47
9	-	-	M79	M78	M73	M77	M76	M75	-	-	-	-	-	-	-	-

2B	DIGITAL	MON	ACU CURRENT MODE:	#0000	LOCAL CONTROL, MANUAL
				#0101	LOCAL CONTROL, STANDBY
				#0404	LOCAL CONTROL, STOW
				#0505	LOCAL CONTROL, POSITION A
				#0606	LOCAL CONTROL, POSITION B
				#0707	LOCAL CONTROL, POSITION DESIGNATE
				#0A0A	LOCAL CONTROL, MANUAL POSITION
				#0B0B	LOCAL CONTROL, PORTABLE CONTROL BOX
				#8181	COMPUTER CONTROL, STANDBY
				#8484	COMPUTER CONTROL, STOW
				#8585	COMPUTER CONTROL, POSITION A
				#8686	COMPUTER CONTROL, POSITION B

REL. ADD. ANALOG/ #(HEX)	DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	MULT.	UNITS	RANGE	
2C	DIGITAL	MON/CON	AZ AXIS DISABLE/ ENABLE:	#8787	COMPUTER CONTROL, POSITION DESIGNATE		
				#1111	DISABLE		
				#1212	ENABLE		
2D	DIGITAL	MON/CON	EL AXIS DISABLE/ ENABLE:	#1111	DISABLE		
				#1212	ENABLE		
2E	DIGITAL	MON/CON	SYNCHRO/ ENCODER SELECT:	#2121	ENCODER SELECT		
				#2222	SYNCHRO SELECT		
2F	DIGITAL	MON/CON	ACU MODE SELECT:	#0101	AUTO STANDBY		
				#0404	STOW		
				#0505	POSITION A		
				#0606	POSITION B		
				#0707	POSITION DESIGNATE		
				#0909	STOW RELEASE		
30	DIGITAL	MON/CON	ALARM SET:	#3131	ACTIVATE ALARM		
				#3232	DEACTIVATE ALARM		

<u>Message Number</u>	<u>Function Monitored</u>	<u>Alarm</u>	<u>*Disable</u>	<u>Message at ACU</u>
1	Encoder Coarse Fault	X		Encoder PWR FLT
2	Internal Clock	X		Check Time
3	ACU Ram	X		RAM Error
4	AUI Communication Link	X		AUI COMM DEAD
5	Portable Control Status	X		REMOTE ENABLED
6	EL Motor Enable Status	X		NO MESSAGE
7	AZ Brake Fault	X	AZ	AZ BRAKE FAULT
8	EL Brake Fault	X	EL	EL BRAKE FAULT
9	AZ CW Pre Limit	X	AZ	AZ CW PRE LIMIT
10	AZ CW Limite	X	AZ	AZ CW LIMIT
11	AZ CCW Pre Limit	X	AZ	AZ CCW PRE LIMIT
12	AZ CCW Limit	X	AZ	AZ CCW LIMIT
13	AZ Brake CB/Interlock	X	AZ	AZ BRAKE INTRLK
14	AZ CW 1st Limit	X	AZ	AZ CW 1st LIMIT
15	EL Up Pre Limit	X	EL	EL UP PRE LIMIT
16	EL Up Limit	X	EL	EL UP LIMIT
17	EL Down Pre Limit	X	EL	EL DN PRE LIMIT
18	EL Down Limit	X	EL	EL DOWN LIMIT
19	EL Brake CB/Interlock	X	EL	EL BRAKE INTERLK
20	AZ CCW 1st Limit	X	AZ	AZ CCW 1ST LIMIT
21	AZ #1 Armature Current	X	AZ1	AZ1 CURRENT FAULT
22	AZ #2 Armature Current	X	AZ2	AZ2 CURRENT FAULT
23	EL #1 Armature Current	X	EL1	EL1 CURRENT FAULT
24	EL #2 Armature Current	X	EL2	EL2 CURRENT FAULT
25	AZ #1 Arm/Electronics CB	X	AZ1	AZ1 MTR CONTROL
26	EL UP 1ST Limit	X	EL	EL UP 1ST LIMIT
27	AZ #1 Field Current	X	AZ1	AZ1 FIELD FAULT
28	AZ #1 Motor Thermostat	X	AZ1	AZ1 MTR OVERTEMP
29	AZ #1 Blower/Lube Pump CB	X		AZ1 BLOW/LUBE CB
30	AZ #2 Arm/Electronics CB	X	AZ2	AZ2 MTR CONTROL
31	EL Dost 1ST Limit	X	EL	ED DOWN 1ST LIMIT
32	AZ #2 Field Current	X	AZ2	AZ2 FIELD FAULT
33	AZ #2 Motor Thermostat	X	AZ2	AZ2 MTR OVERTEMP
34	AZ #2 Blower/Lube Pump CB	X		AZ2 BLOW/LUBE CB
35	EL #1 Arm/Electornics CB	X	EL1	EL1 MTR CONTROL
36	AZ Motor Enable Status	X		NO MESSAGE
37	EL #2 Field Current	X	EL1	EL1 FIELD FAULT
38	EL #1 Motor Thermostat	X	EL1	EL1 MTR OVERTEMP
39	EL #1 Blower/Lube Pump CB	X		EL1 BLOW/LUBE CB
40	EL #2 Arm/Electronics CB	X	EL2	EL2 MTR CONTROL
41	AZ Motor Velocity	X	AZ	AZ MTR OVERSPEED
42	EL #2 Field Current	X	EL2	EL2 FIELD FAULT
43	EL #2 Motor Thermostat	X	EL2	EL2 MTR OVERTEMP

<u>Message Number</u>	<u>Function Monitored</u>	<u>Alarm</u>	<u>*Disable</u>	<u>Message at ACU</u>
44	EL #2 Blower/Lube Pump CB	X	EL2	EL2 BLOW/LUBE CB
45	Azimuth Data Gearbox	X		AZ DGB FAULT
46	Elevation Data Gearbox	X		EL DGB FAULT
47	AZ Disable Via Supervisory		AZ	AZ CMD DISABLE
48	AZ #1 Lube Pressure	X		AZ1 LUBE PRESSURE
49	AZ #2 Lube Pressure	X		AZ2 LUBE PRESSURE
50	EL #1 Lube Pressure	X		EL1 LUBE PRESSURE
51	EL #2 Lube Pressure	X		EL2 LUBE PRESSURE
52	Console Emergency Switch	X	SYS	ACU EMERGENCY
53	Vertex Room Emergency Swit	X	SYS	VERTEX EMERG
54	Pedestal Emergency Switch	X	SYS	PEDESTAL EMERG
55	EL Drive Emergency Switch	X	SYS	EL EMERGENCY
56	AZ Drive #1 Emergency Swit	X	SYS	AZ1 EMERGENCY
57	AZ Drive #1 Emergency Swit	X	SYS	AZ2 EMERGENCY
58	AZ Stairway Emergency Swit	X	SYS	AZ STAIRS EMERG
59	EL Stow Lock Engaging		EL	EL STOW ENGAGING
60	EL Stow Lock Engaged	X		EL STOWED
61	High Winds (Above 55 MPH)	X		55 MPH WINDS +
62	Low Temperature(Below -20)	X		LOW TEMP
63	High Winds (Above 30 MPH)	X		30 MPH WINDS +
64	Command Relative Address	X		CMD RA BAD
65	Encoder/Synchro Difference	X		ENCOD/SYN ERROR
66	Drive Cabinet Elect Power	X		SERVO PWR FLT
67	Warning Horn Command	X		WARNING HORN
68	EL Disable via Supervisory	X	EL	EL CMD DISABLE
69	Supervisory Mode Command	X		MODE CMD ERROR
70	Supervisory AZ Disable/ Enable Cmd	X		AZ DISABLE CMD ERR
71	Encoder/Synchro Select Cmd	X		ENCODER CMD ERR
72	Supervisory EL Disable/ Enable Cmd	X		EL DSABLE CMD ERR
73	Encoder Selected			No associated messag
74	Computer Selected			No associated messag
75	Prom A2U17	X		Prom A2U17
76	Prom A3U32	X		Prom A3U32
77	Prom A3U33	X		Prom A3U33
78	AUI Initiated Alarm	X		AUI Initiated Alarm
79	Alarm Command Fault	X		Alarm CMD ERR
80	EL Motor Velocity	X	EL	EL MTR OVERSPEED

* DISABLE column represented as follows:

Blank - no motor disable
 SYS - both axis disabled
 AZ - AZ axis disabled
 EL - EL axis disabled
 AZ1, AZ2, EL1, EL2 - one motor disabled

FOCUS ROTATION DRIVE SYSTEM

 ID (HEX) = 72
 STARTING ADDRESS (HEX) = 7200
 =====

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	COMMENTS
00	ANALOG	MON	SYSTEM DIGITAL GROUND	1	VOLTS		
01	ANALOG	MON	SYSTEM +15V POWER SUPPLY	2	VOLTS		
02	ANALOG	MON	SYSTEM -15V POWER SUPPLY	2	VOLTS		
03	ANALOG	MON	SYSTEM +5V POWER SUPPLY	1	VOLTS		
04	ANALOG	MON	WEST ROTATION SERVO (BDS3) +12V POWER	2	VOLTS		
05	ANALOG	MON	WEST ROTATION SERVO (BDS3) -12V POWER	2	VOLTS		
06	ANALOG	MON	EAST ROTATION SERVO (BDS3) +12V POWER	2	VOLTS		
07	ANALOG	MON	EAST ROTATION SERVO (BDS3) -12V POWER	2	VOLTS		
08	ANALOG	MON	SYSTEM DIGITAL GROUND	1	VOLTS		
09	ANALOG	MON	(RDP2) BACKLASH CONTROLLER +12V POWER	2	VOLTS		
0A	ANALOG	MON	(RDP2) BACKLASH CONTROLLER -12V POWER	2	VOLTS		
0B	ANALOG	MON	FOCUS SERVO (BDS3) +12V POWER	2	VOLTS		
0C	ANALOG	MON	FOCUS SERVO (BDS3) -12V POWER	2	VOLTS		
0D	ANALOG	MON	SYSTEM DIGITAL GROUND (SPARE)	1	VOLTS		
0E	ANALOG	MON	SYSTEM DIGITAL GROUND (SPARE)	1	VOLTS		
0F	ANALOG	MON	SYSTEM DIGITAL GROUND (SPARE)	1	VOLTS		
10	DIGITAL	MON/CON	FOCUS COMMAND; 2300COUNTS/INCH. TOTAL TRAVEL=28.5 INCHES, LIMITS:\$0A00 TO \$F200 (MAX. OUT)				
11	DIGITAL	MON	FOCUS POSITION				
		CON	NAP COMMAND SET/RESET; 1=SET, 0=RESET				
12	DIGITAL	MON	FOCUS ERROR = COMMAND - ACTUAL				
		CON	MANUAL COMMAND OVER-RIDE SET/RESET; 1 = SET, 0 = RESET				
13	DIGITAL	MON	FOCUS SYSTEM PARAMETERS				
			0 NAP FLAG: HIGH = IN NAP				
			1 MODE: 0 = COMPUTER, 1 = MANUAL				
			2 BRAKE STATUS: 0 = ENGAGE, 1 = RELEASE				
		CON	FOCUS SERVO AMPLIFIER (BDS3) RESET, ANY VALUE RESETS				
14	DIGITAL	MON	FOCUS FAULT INFORMATION (BIT VALUE = 1 INDICATES FOLLOWING)				
			0 APEX INTERFACE NOT RESPONDING				
			1 FIRST LOWER LIMIT				
			2 SECOND LOWER LIMIT				
			3 FIRST UPPER LIMIT				
			4 SECOND UPPER LIMIT				
			5 COMMAND FAULT FLAG- M&C REQUEST OUT OF RANGE				
			6 MONITOR FAULT FLAG- M&C REQUEST OUT OF RANGE				
			7 OPERATOR FAULT FLAG- POSITION COMMAND OUT OF RANGE				
			8 BRAKE FAULT FLAG- BRAKES DID NOT RELEASE/ENGAGE WHEN THEY SHOULD HAVE				
			9 DRIVE FAULT FLAG- COMMAND POSITION NOT REACHED BEFORE MOTORS STOPPED				
			15 SECOND SCREW FAULT- OCCURES WHEN SECOND SCREW IS NOT ROTATING				
		CON	FOCUS SOFTWARE RESET; ANY VALUE RESETS				
			RESET CLEARS NAP, MANUAL OVERRIDE AND MEMORY				
15	DIGITAL	MON	FOCUS SERVO AMPLIFIER FAULT INFORMATION (BIT VALUE =1 INDICATES FOLLOWING):				
			0 BUS FAULT: 300 VDC HAS DISAPPEARED				
			1 FOLD BACK: THE CONDITION THE MOTOR IS IN IF IT REACHED ITS PEAK TORQUE LIMIT AND IT HAD TO SLOW DOWN				
			2 OVER TEMPERATURE- TEMP. SENSOR INDICATES MOTOR HOT				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	
			3 DRIVE DOWN- SERVO AMPLIFIER NOT READY TO RUN				
			4 OVER CURRENT- MOTOR TAKING TOO MUCH CURRENT				
			5 POWER LOSS- POWER SUPPLY ON SERVO AMPLIFIER IS OUT				
			6 REMOTE INHIBITED- F/R CONTROLLER HAS NOT RELEASED THE SERVO AMPLIFIER INHIBIT				
			7 OVER SPEED- MOTOR RUNNING FASTER THAN IT IS COMMANDED				
16	DIGITAL	MON	ANALOG FAULT- APEX ANALOG FAULT FLAGS (BIT VALUE = 1 MEANS FAULT CONDITION)				
			0 GROUND FAULT				
			1 GROUND FAULT				
			2 GROUND FAULT				
			3 VELOCITY				
			4 +15V				
			5 -15V				
			6 +5V				
			7 +10V				
			8 MOUNT TEMP.1				
			9 -10V				
			10 MOUNT TEMP.2				
			11 BIN TEMP.				
			12 SPARE BIT				
			13 SPARE BIT				
			14 SPARE BIT				
			15 SPARE BIT				
17	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
18	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
19	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
1A	ANALOG	MON	FOCUS VELOCITY				
1B	ANALOG	MON	APEX +15V POWER SUPPLY	2	VOLTS		
1C	ANALOG	MON	APEX -15V POWER SSUPPLY	2	VOLTS		
1D	ANALOG	MON	APEX +5V POWER SUPPLY	1	VOLTS		
1E	ANALOG	MON	APEX +10V REF. POWER SUPPLY	1	VOLTS		
1F	ANALOG	MON	MOUNT TEMP.1 (100mV/deg C)	10	deg C		
20	ANALOG	MON	APEX -10V REF POWER SUPPLY	1	VOLTS		
21	ANALOG	MON	MOUNT TEMP.2 (100mV/deg C)	10	deg C		
22	ANALOG	MON	BIN TEMP. (100mV/deg C)	10	deg C		
23	DIGITAL	MON	0-7 FOCUS SOFTWARE REVISION NUMBER (BIT 7 IS MSB)				
			8-15 MODULE SERIAL NUMBER (BIT 15 IS MSB)				
24	ANALOG	MON	FOCUS VELOCITY (VEL 1)				
25	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
26	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
27	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
28	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
29	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2A	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2B	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2C	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2D	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2E	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
2F	ANALOG	MON	SPARE,NOT USED, AVAILABLE				
30	DIGITAL	MON/CON	ROTATION COMMAND; 156COUNTS/deg TOTAL TRAVEL =420 deg, LIMITS: #0A00 TO #F200.				
31	DIGITAL	MON/CON	ROTATION POSITION;NAP COMMAND SET/RESET (1=SET,0=RESET)				
32	DIGITAL	MON	ROTATION ERROR = COMMAND - ACTUAL				

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION VALUE MEANING	MULT.	UNITS	RANGE	PAGE 53 COMMENTS
32	DIGITAL	CON	MANUAL COMMAND OVER-RIDE SET/RESET; 1 = SET, 0 = RESET				
33	DIGITAL	MON	ROTATION SYSTEM PARAMETERS: 0 NAP FLAG: HIGH = IN NAP 1 MODE: 0 = COMPUTER, 1 = MANUAL 2 BRAKE STATUS: 0 = ENGAGE, 1 = RELEASE				
34	DIGITAL	CON MON	ROTATION SERVO AMPLIFIER (BDS3) RESET; ANY VALUE RESETS ROTATION FAULT INFORMATION (BIT VALUE = 1 INDICATES FOLLOWING) 1 FIRST (CCW) LIMIT 2 SECOND (CCW) LIMIT 3 FIRST (CW) LIMIT 4 SECOND (CW) LIMIT 5 COMMAND FAULT FLAG- M&C REQUEST OUT OF RANGE 6 MONITOR FAULT FLAG- M&C REQUEST OUT OF RANGE 7 OPERATOR FAULT FLAG- POSITION COMMAND OUT OF RANGE 8 BRAKE FAULT FLAG- BRAKES DID NOT RELEASE/ENGAGE WHEN THEY SHOULD HAVE 9 DRIVE FAULT FLAG- COMMAND POSITION NOT REACHED BEFORE MOTORS STOPPED 15 SECOND SCREW FAULT- OCCURES WHEN SECOND SCREW IS NOT ROTATING				
35	DIGITAL	CON MON	ROTATION SOFTWARE RESET; ANY VALUE RESETS; RESET CLEARS NAP, MANUAL OVERRIDE AND MEMORY ROTATION SERVO AMPLIFIER FAULT INFORMATION (BIT VALUE =1 INDICATES FOLLOWING): (BITS 0-7 PERTAIN TO WEST ROTATION MOTOR, AND BITS 8-15 PERTAIN TO EAST ROTATION MOTOR) 0/8 BUS FAULT: 300 VDC HAS DISAPPEARED 1/9 FOLD BACK: THE CONDITION THE MOTOR IS IN IF IT REACHED ITS PEAK TORQUE LIMIT AND IT HAD TO SLOW DOWN 2/10 OVER TEMPERATURE- TEMP. SENSOR INDICATES MOTOR HOT 3/11 DRIVE DOWN- SERVO AMPLIFIER NOT READY TO RUN 4/12 OVER CURRENT- MOTOR TAKING TOO MUCH CURRENT 5/13 POWER LOSS- POWER SUPPLY ON SERVO AMPLIFIER IS OUT 6/14 REMOTE INHIBITED- F/R CONTROLLER HAS NOT RELEASED THE SERVO AMPLIFIER INHIBIT 7/15 OVER SPEED- MOTOR RUNNING FASTER THAN IT IS COMMANDED				
36	DIGITAL	MON	ANALOG FAULT- APEX ANALOG FAULT FLAGS (BIT VALUE = 1 MEANS FAULT CONDITION) 0 GROUND FAULT 1 GROUND FAULT 2 GROUND FAULT 3 VELOCITY 4 +15V 5 -15V 6 +5V 7 +10V 8 MOUNT TEMP.1 9 -10V 10 MOUNT TEMP.2 11 BIN TEMP. 12 SPARE BIT 13 SPARE BIT 14 SPARE BIT 15 SPARE BIT				
37	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
38	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
39	ANALOG	MON	APEX GROUND: 0V	1	VOLTS		
3A	ANALOG	MON	FOCUS VELOCITY				
3B	ANALOG	MON	APEX +15V POWER SUPPLY	2	VOLTS		

REL. ADD. #(HEX)	ANALOG/ DIGITAL	ACCESS MON/CON	DESCRIPTION(VOLTAGE=COUNTS/3276.8) BIT POS. FUNCTION	VALUE	MEANING	MULT.	UNITS	RANGE	
3C	ANALOG	MON	APEX -15V POWER SSUPPLY			2	VOLTS		
3D	ANALOG	MON	APEX +5V POWER SUPPLY			1	VOLTS		
3E	ANALOG	MON	APEX +10V REF. POWER SUPPLY			1	VOLTS		
3F	ANALOG	MON	MOUNT TEMP.1 (100mV/deg C)			10	deg C		
40	ANALOG	MON	APEX -10V REF POWER SUPPLY			1	VOLTS		
41	ANALOG	MON	MOUNT TEMP.2 (100mV/deg C)			10	deg C		
42	ANALOG	MON	BIN TEMP. (100mV/deg C)			10	deg C		
43	DIGITAL	MON	0-7 FOCUS SOFTWARE REVISION NUMBER (BIT 7 IS MSB)						
			8-15 MODULE SERIAL NUMBER (BIT 15 IS MSB)						
44	ANALOG	MON	FOCUS VELOCITY (VEL 1)						
45	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
46	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
47	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
48	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
49	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4A	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4B	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4C	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4D	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4E	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
4F	ANALOG	MON	SPARE,NOT USED, AVAILABLE						
50-5F	DIGITAL	CON	MASTER CLEAR~ HARDWARE RESET; BOTH AXES ARE RESET YOU ONLY HAVE TO SEND COMMAND TO ONE ADDRESS						