



**U.S. ARMY REDSTONE TEST CENTER**

# **MACM Discussion Forum**

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# MACM

## – Missile Application Condensed Message

### Discussion Topic

- How Best to Modify MACM for Multiple Frequencies
  - RCC-264-04 is the current document
  - Electronic Trajectory Measurements Group

# MACM

## – Missile Application Condensed Message

**Table 1. Parameters of the MACM Message**

- a. Name of message
- b. Version of code
- c. Number of remaining satellites structures in the message
- d. GPS time tag
- e. Receiver clock offset
- f. Satellite identification number
- g. Satellite status
- h. Signal to noise ratio at the receiver
- i. Carrier phase counter output
- j. Pseudorange from satellite to receiver
- k. Rate of change of carrier phase counter
- l. Time satellite is under continuous track
- m. Message checksum byte

**Note:** Further definition and description of these individual parameters is provided in Table 2, Table 3, and in Paragraph 2, Data Descriptions, of this standard.

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## – Missile Application Condensed Message

**Table 2. Example MACM Data Record Format**

Data	Function	Total Bytes
[MACM:4] [VERSION:1] [NUMOBS:1] [GPSTIME:4] [OFFSET: 4]	Header	14
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[PRN:1] [CONDITION:2] [CN0:1] [PHASE:8] [PSRNGE:4] [RATE:4] [LCK_TIME:4]	OBSERV'N	24
[CHECKSUM:1]	CHECKSUM	1

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## – Missile Application Condensed Message

**Table 3. MACM Data Field Definitions**

Byte #	Name	Type	Content
1	MACM	long	Sync word (Name of message, ASCII "MACM")
5	VERSION	unsigned char	MACM version number
6	NUMOBS	short	Number of remaining structures to be sent for the current epoch. (Each structure is one satellite.)
7	GPSTIME	long	Signal received in milliseconds of week GPS system time. This is the time tag for all measurements and position data.
11	OFFSET	float	Receiver clock offset in meters.
24*j-9	PRN	unsigned char	Satellite PRN number
24*j-8	CONDITION	unsigned short	Manufacturer defined warning and condition flags
24*i-6	CN0	unsigned char	Signal-to-noise ratio of satellite observation (dB)
24*j-5	PHASE	double	Full carrier phase measurements in cycles.
24*i+3	PSRNGE	unsigned long	Pseudo-range in seconds, scale factor = 3.0e10
24*j+7	RATE	long	Rate of change of carrier phase, positive for increasing range. Scale factor = 1x 10 <sup>-4</sup> Hz. Doppler (10 <sup>-4</sup> Hz)
24*j+11	LOCKTIME	unsigned long	Continuous counts since satellite is locked. This number is to be incremented 500 times per second
24*N+15	CHECKSUM	unsigned char	Checksum includes bytes 5 through the end of the message. (Checksum does not include bytes 1-4 nor the checksum byte its self.)

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**Table 4. Example of MACM Hexadecimal Messages**

Byte Offset	Byte Number																	ANSI Character							
	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	10	11	12	13	14	15	16	17	
000000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
000018	00	4d	41	43	4d	02	06	0e	a0	0c	90	40	7c	10	00	02	02	05	24	c1	1c	27	ad	b6	.MACM... ..@ .....\$Á.'-¶
000030	83	39	e0	7a	b4	24	64	00	96	be	29	00	09	6d	48	18	0a	05	29	c1	39	82	89	7c	.9àz' \$d..¼) ..mH...)Á9..
000048	1b	61	a4	89	33	d2	34	fe	43	11	7e	00	00	95	6a	07	02	05	2b	c1	33	4f	3c	9e	.a.3ò4pC.~...j...+Á3O<.
000060	05	a3	14	7e	58	d9	a6	00	0d	96	3b	00	0a	49	cb	09	aa	00	28	c1	3d	92	f9	54	.£.~XÛ ...;..IË.ª. (Á='ùT
000078	e0	d4	a0	8c	d4	36	fa	ff	63	5c	85	00	00	04	65	0e	02	05	25	c1	2d	bf	f5	b9	àÔ .Ô6úýç\....e...%Á-¿õ¹
000090	4d	05	18	8b	f8	67	a3	00	80	9c	42	00	09	cb	08	10	00	05	26	c1	37	44	bb	7d	M...øgf...B..Ë....&Á7D»}
0000a8	0b	c6	e0	84	a7	1c	e7	ff	41	00	68	00	00	60	c7	27	00	00	00	00	00	00	00	00	.Èà.Ş.çýA.h...`ç'.....
0000c0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
0000d8	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
0000f0	00	00	00	00	00	00	00	00	00	00	00	00	00	4d	41	43	4d	02	06	0e	a0	33	a0	3f	.....MACM... 3 ?
000108	b8	c0	00	02	02	05	22	c1	1b	8d	09	d0	27	ee	00	7a	b7	03	4b	00	97	7d	25	00	.À...."Á...Đ'î.z.·K..}%.
000120	09	80	d0	18	0a	05	28	c1	39	f4	6a	4c	f5	33	d0	89	2b	59	77	fe	43	7e	7a	00	..Đ... (Á9òjLò3Đ.+YwþC~z.
000138	00	a8	f2	07	02	05	2e	c1	33	4b	c5	3d	b7	31	a0	7e	59	1b	77	00	0d	bf	cf	00	..ò....Á3KÁ=·1 ~Y.w...¿İ.
000150	0a	5d	53	09	aa	05	29	c1	33	ab	98	8d	f9	f9	80	8c	d1	3b	75	ff	64	11	ad	00	.]S.ª.)Á3«..ùù..Ñ;uýd.-.
000168	00	12	d9	0e	02	05	25	c1	2d	7d	f9	a9	25	17	a0	8b	fa	db	bc	00	81	70	cf	00	..Û...%Á-}ù©%. úÛ¼..pİ.
000180	09	de	90	10	00	05	26	c1	37	75	8e	e2	62	4e	40	84	a3	7a	fc	ff	41	d6	cc	00	.Đ....&Á7u.âbN@.£zúýAÖİ.
000198	00	74	4f	3a	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.tO:.....
0001b0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	

# Questions?