

MIL-STD-188-183  
18 SEPTEMBER 1992

**MILITARY STANDARD**

INTEROPERABILITY STANDARD

FOR

25-kHz UHF TDMA/DAMA TERMINAL WAVEFORM



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

(This page intentionally left blank.)

# MIL-STD-188-183

## FOREWORD

1. Originally, Military Standard -188 (MIL-STD-188) covered technical standards for tactical and long-haul communications. It later evolved through revisions (MIL-STD-188A, MIL-STD-188B) into a document applicable to tactical communications only (MIL-STD-188C).
2. The Defense Communications Agency (DCA), now the Defense Information Systems Agency (DISA), published DCA circulars (DCAC). These DCACs promulgated standards and engineering criteria that apply to the long-haul Defense Communications System (DCS) and to technical support of the National Military Command System (NMCS).
3. As a result of a Joint Chiefs of Staff (JCS) action, standards for all military communications are now being published in a MIL-STD-188 series. The MIL-STD-188 series is subdivided into a MIL-STD-188-100 series, which covers common standards for tactical and long-haul communications; a MIL-STD-188-200 series, which covers standards for tactical communications only; and a MIL-STD-188-300 series, which covers standards for long-haul communications only. Ultimately, the -200 and -300 series will be absorbed into the -100 series.
4. This MIL-STD was prepared to comply with a Joint Staff direction requiring a new standard be developed that defines all technical characteristics essential for interoperability and performance of satellite communications (SATCOM) terminals that use 25-kHz ultra high frequency (UHF) demand-assigned multiple access (DAMA) SATCOM transponder channels. This MIL-STD defines mandatory system parameters for planning, engineering, procuring, and using UHF SATCOM terminals in joint operations.
5. This MIL-STD is approved and will be used by the Office of the Secretary of Defense, the military departments, the JCS, the unified and specified commands, DoD agencies, and DoD field activities to ensure interoperability and compatibility in accordance with DoD Instruction 5000.2, dated 23 February 1991.
6. Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this MIL-STD should be addressed to:

Director  
Joint Interoperability and Engineering Organization  
ATTN: TBBA  
Fort Monmouth, New Jersey 07703-5613

by using the standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

(This page intentionally left blank.)

# MIL-STD-188-183

## CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
1.	SCOPE . . . . .	1
1.1	Purpose . . . . .	1
1.2	Scope . . . . .	1
1.3	Application guidance . . . . .	1
2.	APPLICABLE DOCUMENTS . . . . .	3
2.1	Government documents . . . . .	3
2.1.1	Specifications, standards, and handbooks . . . . .	3
2.1.2	Other Government documents, drawings, and publications . . . . .	4
2.2	Non-Government documents . . . . .	4
2.3	Order of precedence . . . . .	4
3.	DEFINITIONS . . . . .	5
3.1	Abbreviations and acronyms . . . . .	5
3.2	Definitions of terms . . . . .	7
4.	GENERAL REQUIREMENTS . . . . .	15
4.1	TDMA/DAMA . . . . .	15
4.2	General waveform structure . . . . .	15
4.2.1	Time-slot structure . . . . .	17
4.2.2	User access and waveform control . . . . .	17
4.2.2.1	AC Mode . . . . .	17
4.2.2.2	DC Mode . . . . .	17
4.2.3	System timing . . . . .	17
4.3	Orderwire commands . . . . .	17
5.	DETAILED REQUIREMENTS . . . . .	23
5.1	Waveform characteristics . . . . .	23
5.1.1	Frame format structure . . . . .	23
5.1.1.1	Format number 1 . . . . .	23
5.1.1.2	Format number 2 . . . . .	28
5.1.2	Preamble structure . . . . .	28
5.1.3	Timing requirements . . . . .	28
5.1.3.1	CCOW slot timing . . . . .	32
5.1.3.2	RCCOW slot timing . . . . .	32
5.1.3.3	Range slot timing . . . . .	38
5.1.3.4	Link-test-slot timing . . . . .	39
5.1.3.5	User-segment-slot timing . . . . .	39
5.1.4	Range processing . . . . .	39
5.1.4.1	Active ranging . . . . .	39
5.1.4.1.1	Random ranging . . . . .	39
5.1.4.1.2	Dedicated ranging . . . . .	49
5.1.4.1.2.1	Method one . . . . .	49
5.1.4.1.2.2	Method two . . . . .	50

5.1.4.1.3	Assigned ranging . . . . .	51
5.1.4.2	Passive ranging . . . . .	51

## CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
5.2	Protocols . . . . .	51
5.2.1	Baseband-data formatting requirements . . . . .	51
5.2.1.1	Orderwire structure . . . . .	51
5.2.1.2	Orderwire data formatting . . . . .	51
5.2.1.3	Orderwire cyclic redundancy check . . . . .	51
5.2.2	Detailed orderwire commands . . . . .	52
5.2.2.1	CCOW in the AC mode . . . . .	52
5.2.2.1.1	CALL ACK field . . . . .	52
5.2.2.1.2	RCCOW Assignment field . . . . .	53
5.2.2.1.3	User Number field . . . . .	55
5.2.2.1.4	Flag field . . . . .	56
5.2.2.1.5	Parity field . . . . .	56
5.2.2.1.6	Command field . . . . .	56
5.2.2.1.7	Unique CCOW message fields . . . . .	57
5.2.2.1.7.1	Master Frame . . . . .	57
5.2.2.1.7.2	Slot Disconnect . . . . .	58
5.2.2.1.7.3	Slot Connect . . . . .	59
5.2.2.1.7.4	Link Test and Range Frame-Number Assignment . . . . .	61
5.2.2.1.7.5	Channel Control Handover Request . . . . .	62
5.2.2.1.7.6	Special Format Change Order . . . . .	62
5.2.2.1.7.7	Call Canceled . . . . .	63
5.2.2.1.7.8	Channel Assignment . . . . .	63
5.2.2.1.7.8.1	Channel Reassignment (TDMA) . . . . .	64
5.2.2.1.7.8.2	Timed Channel Assignment (dedicated) . . . . .	65
5.2.2.1.7.9	Enter Guard List . . . . .	66
5.2.2.1.7.10	Delete from Guard List . . . . .	66
5.2.2.1.7.11	Call Waiting . . . . .	67
5.2.2.1.7.12	Call in Queue . . . . .	68
5.2.2.1.7.13	Computer Data Transfer . . . . .	68
5.2.2.1.7.14	Information Request . . . . .	69
5.2.2.1.7.14.1	Operational Code Information Request . . . . .	69
5.2.2.1.7.14.2	Constant Key Alarm Information Request . . . . .	69
5.2.2.1.7.15	Zeroize . . . . .	69
5.2.2.1.7.16	Time-Slot Preparation . . . . .	70
5.2.2.1.7.17	Requested Party Out-of-Service . . . . .	70
5.2.2.1.7.18	Transmit Control . . . . .	71
5.2.2.2	RCCOW in the AC mode . . . . .	71
5.2.2.2.1	Station ID field . . . . .	72
5.2.2.2.2	Message Code field . . . . .	72
5.2.2.2.3	Parity field . . . . .	73
5.2.2.2.4	Unique RCCOW message fields . . . . .	73
5.2.2.2.4.1	Status Report B . . . . .	73
5.2.2.2.4.2	Data Transfer . . . . .	75
5.2.2.2.4.2.1	Data Transfer (Type A) . . . . .	75
5.2.2.2.4.2.2	Data Transfer (Type B (optional)) . . . . .	76
5.2.2.2.4.3	Link Test Request . . . . .	77



**MIL-STD-188-183**

5.2.2.2.4.4	Call Complete . . . . .	77
5.2.2.2.4.5	Out-of-Service . . . . .	78
5.2.2.2.4.6	Information Report . . . . .	78

## CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
5.2.2.2.4.6.1	Operational Code Information Report . . . . .	79
5.2.2.2.4.6.2	Constant Key Alarm Information Report . . . . .	79
5.2.2.2.4.7	Two-Party Request (or Cancel Call) . . . . .	80
5.2.2.2.4.8	Conference Calls . . . . .	80
5.2.2.2.4.8.1	Conference Request (or Cancel Call) (Type A) . . . . .	81
5.2.2.2.4.8.2	Conference Party List . . . . .	82
5.2.2.2.4.8.3	Conference Request (Type B) (Cancel Call) (optional) and Conference Party List . . . . .	83
5.2.2.2.4.9	Link Test Results . . . . .	84
5.2.2.2.4.10	Status Report A . . . . .	85
5.2.2.2.4.11	Acknowledge Channel Control Request . . . . .	87
5.2.2.2.4.12	Guard List Report . . . . .	88
5.2.2.2.4.12.1	Guard List Report (Type A) . . . . .	88
5.2.2.2.4.12.2	Guard List Report (Type B) (optional) . . . . .	90
5.2.2.2.4.12.3	Guard List Report (Type B) Groups 1 to 5 . . . . .	91
5.2.2.2.4.13	Paging . . . . .	92
5.2.2.3	RCCOW transmit decision in the AC mode . . . . .	92
5.2.2.3.1	Transmit enable . . . . .	92
5.2.2.3.2	Dedicated RCCOW access . . . . .	93
5.2.2.3.3	Random RCCOW access . . . . .	95
5.2.2.4	CCOW in the DC mode . . . . .	98
5.2.2.4.1	CALL ACK field . . . . .	98
5.2.2.4.2	RCCOW Assignment field . . . . .	99
5.2.2.4.3	User Number field . . . . .	99
5.2.2.4.4	Flag field . . . . .	99
5.2.2.4.5	Parity field . . . . .	99
5.2.2.4.6	Command field . . . . .	99
5.2.2.4.7	Unique CCOW message fields . . . . .	100
5.2.2.4.7.1	Master Frame . . . . .	100
5.2.2.4.7.2	Information Request . . . . .	101
5.2.2.4.7.2.1	Operational Code Information Request . . . . .	101
5.2.2.4.7.2.2	Constant Key Alarm Information Request . . . . .	101
5.2.2.4.7.3	Zeroize . . . . .	102
5.2.2.4.7.4	Time-Slot Preparation . . . . .	102
5.2.2.4.7.5	DC CCOW #1 . . . . .	103
5.2.2.4.7.6	DC CCOW #2 . . . . .	104
5.2.2.4.7.7	DC CCOW #3 . . . . .	105
5.2.2.5	RCCOW in the DC mode . . . . .	105
5.2.2.6	RCCOW transmit decision in the DC mode . . . . .	106
5.2.2.6.1	Transmit enable . . . . .	106
5.2.2.6.2	Random RCCOW access . . . . .	106
5.3	Orderwire processing . . . . .	107
5.3.1	Plain-text orderwire processing . . . . .	107
5.3.1.1	CCOWs received, AC mode . . . . .	107
5.3.1.2	CCOWs received, DC mode . . . . .	107

**MIL-STD-188-183**

5.3.1.3	RCCOWs transmitted . . . . .	108
5.3.1.4	CCOWs transmitted . . . . .	108

## CONTENTS

<u>PARAGRAPH</u>		<u>PAGE</u>
5.3.1.5	RCCOWs received . . . . .	108
5.3.2	Encrypted orderwire processing . . . . .	109
5.3.2.1	CCOWs received, AC and DC modes . . . . .	109
5.3.2.1.1	Master Frame CCOW reception . . . . .	109
5.3.2.1.2	Nonmaster frame CCOW reception . . . . .	110
5.3.2.2	RCCOWs transmitted . . . . .	111
5.3.2.3	CCOWs transmitted . . . . .	111
5.3.2.3.1	Encrypted Master Frame CCOW transmission . . . . .	112
5.3.2.3.2	Encrypted Nonmaster Frame CCOW transmission . . . . .	112
5.3.2.4	RCCOWs received . . . . .	113
5.4	Error control . . . . .	114
5.4.1	FEC coding . . . . .	114
5.4.2	FEC characteristics . . . . .	114
5.4.3	Interleaver random structure generation . . . . .	114
5.5	Detailed modulation requirements . . . . .	114
5.5.1	Modulation interoperability . . . . .	114
5.5.2	Modulation rates . . . . .	114
5.5.3	Types of modulation . . . . .	117
5.5.4	Modulation bit-mapping characteristics . . . . .	117
5.5.5	Modulation characteristics and timing . . . . .	117
5.5.5.1	Modulation timing jitter . . . . .	117
5.5.5.2	Modulation rate accuracy . . . . .	117
5.6	Frequency accuracy . . . . .	117
5.6.1	Uplink frequency accuracy . . . . .	118
5.6.2	Downlink frequency accuracy . . . . .	118
5.6.3	Probability of missed acquisition . . . . .	118
5.7	User Communications Security (COMSEC) . . . . .	118
5.7.1	Voice security . . . . .	118
5.7.2	Data security . . . . .	118
6.	NOTES . . . . .	119
6.1	Tailoring guidance . . . . .	119
6.2	Key word listing . . . . .	119

<u>FIGURE</u>		<u>PAGE</u>
1	General TDMA/DAMA waveform . . . . .	16
2	TDMA-1 frame formats . . . . .	24
3	Segment A slots . . . . .	25
4	Segment B slots . . . . .	26
5	Segment C slots . . . . .	27
6	Preamble structure . . . . .	29
7	Terminal receive timing . . . . .	31

8	Range and Link Test Structure . . . . .	36
9	Convolutional encoder tap connections . . . .	115

# MIL-STD-188-183

## CONTENTS

<u>TABLE</u>		<u>PAGE</u>
IA	CCOW Command listing, AC mode . . . . .	18
IB	CCOW Command listing, DC mode . . . . .	19
IIA	RCCOW Requests/Responses listing, AC mode . . . . .	20
IIB	RCCOW Requests/Responses listing, DC mode . . . . .	20
III	Legendre polynomials . . . . .	30
IV	Derivation of burst timing (duration) requirements . . . . .	33
V	CCOW, RCCOW, range, and link-test time slots . . . . .	37
VI	Segment A slot times . . . . .	40
VII	Segment B slot times--format 1 . . . . .	42
VIII	Segment B slot times--format 2 . . . . .	43
IX	Segment C slot times--format 1 . . . . .	45
X	Segment C slot times--format 2 . . . . .	47
XI	Interleaver sequence . . . . .	116
		<u>PAGE</u>
APPENDIX A	CCOW MESSAGE FORMATS . . . . .	121
APPENDIX B	RCCOW MESSAGE FORMATS . . . . .	145
APPENDIX C	FREQUENCY PLANS . . . . .	167
APPENDIX D	25-KHZ TDMA DAMA WAVEFORM ORDERWIRE COMSEC APPENDIX . . . . . (Under separate cover)	

(This page intentionally left blank.)

MIL-STD-188-183