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MILITARY STANDARD

Interoperability and Performance Standards for Tactical Digital Information Link

(TADIL) A

AMSC N/A

AREA TCTS

DEPARTMENT OF DEFENSE
Washington, DC 20363-5100

Interoperability And Performance Standards For
Tactical Digital Information Link (TADIL) A

MIL-STD-188-203-1A

1. This Military Standard is approved and mandatory for use by all Departments and Agencies of the Department of Defense (DoD) in accordance with the Office of the Assistant Secretary of Defense (OASD) (CCCI) Memorandum, dated 10 May 1977, (see APPENDIX A).

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Space and Naval Warfare Systems Command, ATTN: 003-121, Washington, DC 20360-5100, by using the self-addressed StandarAization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

1. Originally, MIL-STD-188 covered technical standards for tactical and long-haul communications, but 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) published DCA Circulars (DCAC) promulgating standards and engineering criteria applicable to the long-haul Defense Communications System (DCS) and to the 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 of documents. The MIL-STD-188 series is subdivided into a MIL-STD-188-100 series covering common standards for tactical and long-haul communications, a MIL-STD-188-200 series covering standards for tactical communications only, and a MIL-STD-188-300 series covering standards for long-haul communications only. Emphasis is being placed on developing common standards for tactical and long-haul communications published in the MIL-STD-188-100 series.

4. The MIL-STD-188-203 series of documents results from the JCS action requiring that the technical characteristics of Tactical Digital Information Links (TADILS) A, B, and C formerly contained in JCS-PUB-10 be updated and published in the MIL-STD-188 series. This document contains the technical requirements for TADIL A, MIL-STD-188-203-2 contains the requirements for TADIL B, and MIL-STO-188-203-3 contains the requirements for TADIL C. The MIL-STD-188-203 series of documents does not contain TADIL message formats and related information. These requirements will continue to be contained in JCS-PUB-10 and revisions thereto. It is intended that technical characteristics of other TADILs currently under development, such as the Joint Tactical Information Distribution System (JTIDS), will be included as part of the MIL-STD-188-203 series.

IDENTIFICATION OF INTERNATIONAL STANDARDIZATION AGREEMENT

Certain provisions of this document are the subject of International Standardization Agreement (STANAG) 5511. When a change notice, revision, or cancellation of this document is proposed which will affect or violate the international agreement concerned, the preparing activity shall take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.

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APPENDIXES

1. SCOPE

1.1 Purpose. The purpose of this document is to establish technical standards and design objectives (DOs) that are necessary to ensure interoperability and to promote commonality for communications equipment and subsystems used in TADIL A (see APPENDIX C). Another purpose of this document is to establish acceptable overall system performance and maximum flexibility of system layout in order to satisfy diverse user requirements without the restrictions caused by interface and incompatibility problems. Standard message formats are not included in this document. The TADIL A message formats are contained in JCS-PUB-10, Tactical Command and Control and Communication System Standards.

1.2 Application. This document is applicable to the design and development of new equipment, assemblages, and subsystems used in TADIL A. This document is applicable also to the engineering and operation of existing TADIL A facilities. It is not intended that existing TADIL A facilities be immediately converted to comply with the standards contained in this document. New TADIL A facilities and those undergoing major modification or rehabilitation shall comply with the standards contained in this document subject to the applicable requirements of current procurement regulations. TADIL A can be used over common long-haul and tactical communication circuits. In this case, both this standard and MIL-STD-188-100 shall apply.

1.3 Objectives. The main objectives of this document are to provide subsystem performance requirements that ensure interoperation of equipment and subsystems consistent with military requirements and to achieve the necessary degree of performance and interoperation in the most economical way. These objectives will be accomplished by continuing efforts in the following areas:

a. Standardizing user-to-user performance characteristics.
b. Standardizing the type of signals at various interface points in the applicable subsystem.
c. Specifying maximum permissible degradation of a signal in the process of transmission, and allocating the permissible degradation among various parts of a system.
d. Establishing performance parameters and operating features of equipment that govern the interface characteristics with subsystems in which the TADIL A equipment will be used.
e. Defining performance parameters without specifying the technology that should be used to obtain the required performance.

An additional objective of this document is to prevent proliferation of equipment serving the same or a similar function. The variety of equipment shall be the minimum necessary to effectively support the missions of the tactical forces in accordance with Department of Defense Directive (DODD) 4630.5, Compatibility and Commonality of Equipment for Tactical Command and Control, and Communications.

1.4 System standards and DOs. The parameters and other requirements specified in this document are mandatory system standards (See APPENDIX A) if the word "shall" is used in connection with the parameter value or requirement under consideration. Nonmandatory DOs are indicated as optional by the word " should" in connection with the parameter value or requirement under consideration. For a definition of the terms System Standard and Design Objective, see FED-STD-1037. Information paragraphs, shown as notes, have been included to better define certain methods currently in use with TADILS.

2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Standards and handbooks. Unless otherwise specified, the following standards and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this standard to the extent specified herein.

STANDARDS

FEDERAL

FED-STD-1037	Glossary of Telecommunication Terms

MILITARY

MIL-STD-188-100	Common Long Haul and Tactical Military Communication System Technical Standards
MIL-STD-188-114	Electrical Characteristics of Digital Interface Circuits
MIL-STD-188-124	Grounding, Bonding, and Shielding for Common Long Haul/Tactical Communication Systems
MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-1397	Input/Output Interfaces, Standard Digital Data, Navy Systems

HANDBOOKS

MILITARY

MIL-HDBK-232	RED/BLACK Engineering-Installation Guidelines
MIL-HDBK-237	Electromagnetic Compatibility Management Guide for Platforms, Systems, and Equipments
MIL-HDBK-241	Design Guide for Electromagnetic Interference Reduction in Power Supplies

(Copies of standards and handbooks required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.1.2 Other Government documents. The following other Government documents and publications form a part of this standard to the extent specified herein.

PUBLICATIONS

North Atlantic Treaty Organization (NATO) Standardization Agreements

STANAG 5511	Tactical Data Exchange - LINK 11 (U)

(Application for copies of NATO standardization documents required by contractors in connection with specific procurement functions should be made to the appropriate NATO Subregistry.)

National Security Agency

NACSIM 5100	Compromising Emanation Laboratory Test Requirements Electromagnetics (U) (This document was downgraded to unclassified by Revision A.)
NACSEM 5200	Compromising Emanations Design Handbook (U)

(Application for copies of NACSIM and NACSEM standardization documents required by contractors in connection with specific procurement functions should be made to the Director, National Security Agency, Fort George G. Meade, MD 20755.)

2.2 Other publications. The following publication forms a part of this document to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

International Regulations

General Secretariat of the International Telecommunications Union (ITU)	Radio Regulations

(Application for copies should be addressed to the ITU, Consultant Committee International Radio, Geneva, Switzerland.)

2.3 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

3. DEFINITIONS

3.1 Definition of terms. Definitions of terms used in this standard shall be as specified in FED-STD-1037. The following term is unique to TADIL A:

3.1.1 TADIL A single tone attenuability (STA). The TADIL A STA expressed in decibels (dB) is used as an overall figure of merit for TADIL A system equipments. When the STA test is conducted, the composite 16-tone signal is adjusted to a specified level (such as 0 dBm). The level of a single data tone is attenuated until a specified bit error rate (BER) is observed at the data terminal set (DTS) receiver. This is repeated for each of the other data tones. The smallest value of attenuation observed among these 15 measurements is referred to as the TADIL A STA.

3.2 Abbreviations and acronyms. The abbreviations and acronyms used in this document are listed in APPENDIX B.

4. GENERAL REQUIREMENTS

(A tutorial describing TADIL A operation and equipments is provided in APPENDIX C.)

4.1 NATO interoperability. The interchange of information among NATO member nations using TADIL A Shall comply with applicable requirements of the current edition of STANAG 5511.

4.2 Communications security equipment. Communications security equipment shall be located between the TS and the Tactical Data System (TDS) computer as illustrated in FIGURE 1. Communications security equipment employed in any TADIL A system shall be transparent and shall not change the standard TADIL A transmission frame format. Any change in the DTS-to-TDS computer interface timing (see APPENDIX D2) caused Ay the use of security equipment must be accounted for in either the security equipment design or in the TDS computer.

4.3 Compromising emanations (TEMPEST). All communication equipment, subsysteis, anU-Yystems shall comply with the applicable TEMPEST criteria of the current edition of the NACSIM 5100 series. NACSEM 5200 provides design guidance and MIL-HDBK-232 provides installation guidelines for avoiding compromising emanations.

4.4 Electromagnetic interference (EMI) and electromagnetic compatibility (EMC).

4.4.1 Equipment. Any item, including subassemblies and parts, serving functionally in an electromagnetic environment in the broadest sense, shall comply with the applicable requirements of MIL-STD-461. Techniques used for the measurement and determination of EMI characteristics shall comply with the applicable requirements of MIL-STD-462. MIL-HDBK-241 provides guidance for EMI reductions in equipment power supplies.

4.4.2 Systems and subsystems. Communications systems and associated subsystems shall be designed to achieve intrasystem and intersystem EMC. There shall be neither unacceptable responses nor malfunctions of any item of the system or subsystem beyond the tolerances established by the applicable requirements of MIL-STD-461. MIL-HDBK-237 provides guidance for implementing an EMC program.

4.5 Grounding, bonding, and shielding. Methods and practices for grounding, bonding, and shielding of ground-based telecommunications equipment and facilities, including buildings and structures supporting tactical communications, shall comply with the applicable requirements of MIL-STD-188-124.

4.6 Radio regulations. For subsystem and equipment design, the choice and performance of the equipment, as well as frequencies and emissions of any radio subsystem, shall comply with the applicable requirements of the International Telecommunications Union (ITU) Radio Regulations. Adequate familiarity with these regulations is therefore required of designers and users of radio subsystems. Final approval of frequency bands, operating modes, and equipment characteristics rests within DoD with the Military Communications-Electronics Board (MCEB).

4.7 Radio regulations information. The use of the frequency spectrum is regulated-Ey international agreeements embodied in the ITU Radio Regulations published by the General Secretariat of the ITU, Geneva, Switzerland, and modified periodically by a World Administrative Radio Conference (WARC). These radio regulations are further qualified at the national level through Federal Government agencies, such a the Department of Commerce, the Interdepartment Radio Advisory Committee (IRAC), and through military agencies, such as the JCS and the MCEB. Military frequency planning, including joint functional frequency allocation tables, is established as a joint action area under the MCEB.

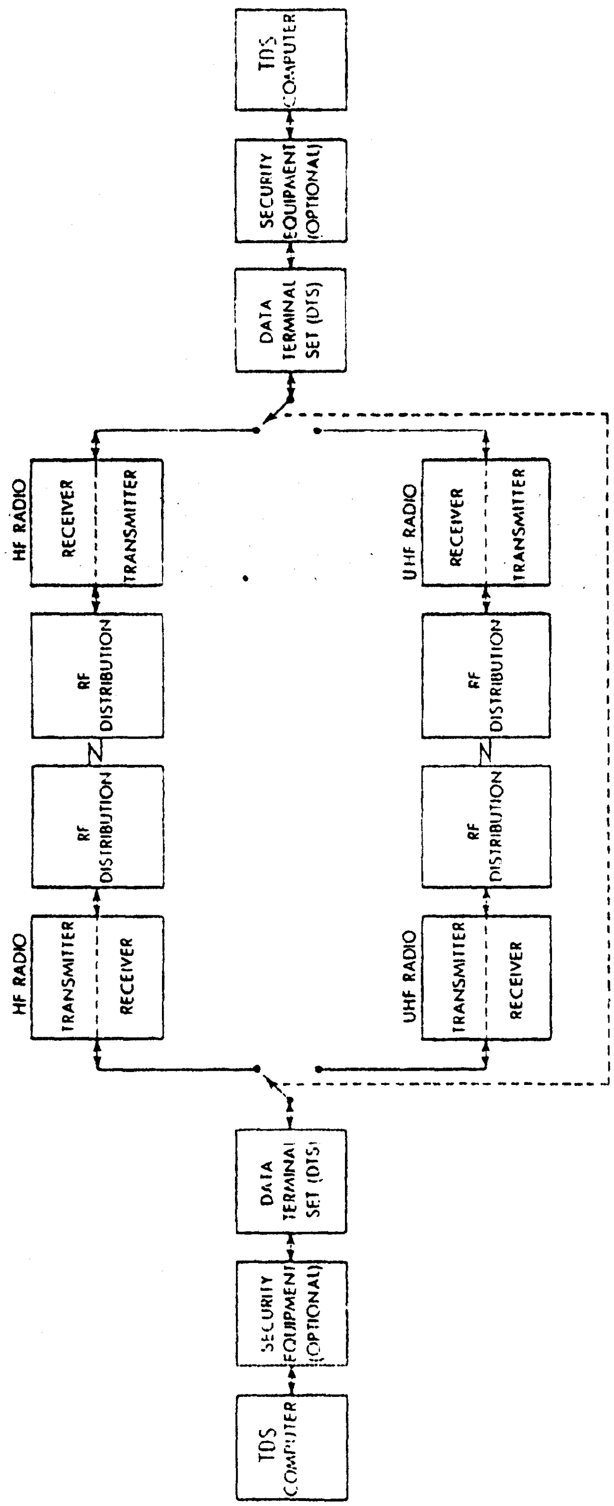


FIGURE 1. TADIL A system.

5. DETAILED REQUIREMENTS

5.1 TADIL A system requirements.

5.1.1 Frequency coverage. TADIL A data communications shall be capable of operation in either the high frequency (HF) or ultrahigh frequency (UHF) bands. In the HF band, the radio equipment shall be capable of being tuned to any integral multiple of 100 hertz (Hz) in the frequency range of 2.0000 megahertz (MHz) through 29.9999 MHz. In the UHF band, the radio equipment shall be capable of being tuned to any integral multiple of 25 kilohertz (kHz) in the frequency range of 225.000 MHz through 399.975 MHz.

5.1.2 Radio frequency (RF) emissions. At HF, the radio equipment should be capable ot providing omnidirectional gipless coverage of up to 300 nautical miles (nm) from the transmitter. The equipment shall be capable of operating on upper sideband (USB), lower sideband (LSB), or independent sideband (ISB) diversity (DIV), also referred to as DIV (ISB) operation. The accuracy and stability of the HF emission are contained in 5.3.2.1.2. At UHF, the radio equipment should be capable of providing omnidirectional gapless coverage line-of-sight from the transmitter (approximately 23 nm ship-to-ship, 150 nm ship-to-air). Frequency modulation (FM) shall be employed. The accuracy and stability of the UHF emissions are contained in 5.3.3.1.2.

5.1.3 Subcarrier characteristics and modulation. The RF signal shall be modulated by a signal consisting of 2 or lb multiplexed audio frequency tones,

5.1.3.1 Tone frequency. The tone frequencies shall be 605 Hz (used for Doppler correction), 2915-Rz (used for data and synchronization), and 935 Hz, 1045 Hz, 1155 Hz, 1265 Hz, 1375 Hz, 1485 Hz, 1595 Hz, 1705 Hz, 1815 Hz, 1925 Hz, 2035 Hz, 2145 Hz, 2255 Hz, and 2365 Hz. After being set, the tone frequencies shall remain within *O.l Hz for at least 6 months of either continuous or intermittent operation.

5.1.3.2 Data subcarrier modulation. With the exception of the preamble (see 5.1.4.1), all information sEal-1 be conveyed by differential quadrature phase shift keying modulation of the 15 data subcarrier tones. The 605 Hz Doppler correction tone shall remain unmodulated. Each of the 15 data subcarrier tones shall represent 2 data bits, resulting in a total of 30 data bits. The two binary digits represented by each data subcarrier tone shall be encoded by phase changes as defined in TABLE I and illustrated in FIGURE 2. The phase of each data subcarrier tone shall remain unchanged until new data are obtained for transmission. The phase transition of each data subcarrier tone shall occur at the frame boundary of each 13.33-millisecond or 22-millisecond frame and shall be referenced to the phase of that data subcarrier tone in the previous frame. The relationship of the data bits and the data subcarrier tones is illustrated in TABLE II.

5.1.3.3 Relative subcarrier levels. During any portion of the signal in any transmission format (see 5.l.4). the 605 Hz Doppler tone shall be 6 dB +/- 1 dB greater than any of the other sync or data subcarrier tones.

5.1.3.3.1 Preamble frame level. During the preamble (see 5.1.4.1), the level of the 605 Hz tone shall be 12 dB +\- 1 dB above the level of a phase reference frame (see 5.1.3.3.2) data subcarrier tone and the 2915 Hz tone shall be 6 dB +/- 1 dB above the level of a phase reference frame data subcarrier tone.

5.1.3.3.2 Phase reference frame level. The phase reference frame (see 5.1.4.2) shall be comprised of the 16-tone composite signal described in 5.1.3.1 and TABLE II. The difference in amplitude between the maximum level data subcarrier tone and the minimum level data subcarrier tone shall not exceed 1.5 dB.

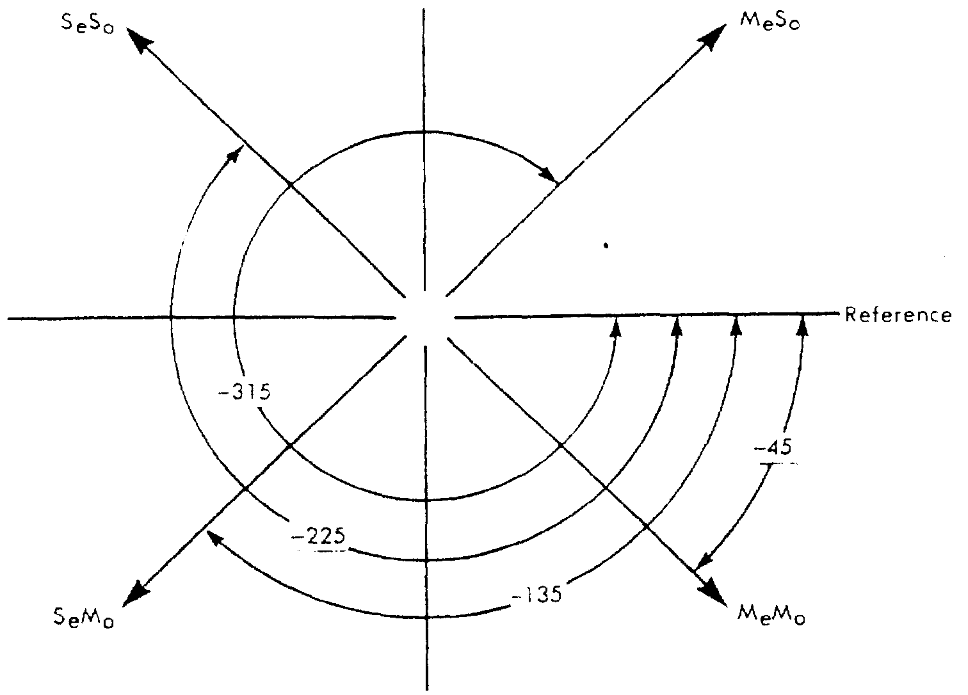
5.1.3.3.3 Information segment frame level. The requirements for the information segment frames shall be the same as the requirements for the phase reference frame (see 5.1.3.3.2). For 0 dBm composite audio signal level across 600 ohms, the signal should have the following voltage levels:

Frame	Tones and voltage levels
Preamble:	605 Hz Doppler = 0.692 volts root-mean-square (Vrms) (1 tone)
	2915 Hz sync = 0.346 Vrms (1 tone)
Phase reference and information segment:	605 Hz Doppler = 0.356 Vrms (1 tone)
	Data subcarrier = 0.178 Vrms (each of 15 tones)

TABLE I. Data subcarrier modulation.

1/Even bit locations	1/Odd bit locations	Tone phase relative to the tone phase during the preceding frame interval
1	1	-45 degrees
0	1	-135 degrees
0	0	-225 degrees
1	0	-315 degrees

1/The even bit locations are defined as carrying even numbered bits from 0 through 28. The odd bit locations are defined as carrying the odd numbered bits from 1 through 29.



M = Mark (Logical 1)
S = Space (Logical 0)
Subscript e refers to even bit locations
Subscript o refers to odd bit locations

FIGURE 2. Modulation vector diagram.

TABLE II. Tone library.

Number	Frequency (Hz)	Description	Bit location
1	605	Doppler	1/
2	935	Data	0 and 1
3	1045	Data	2 and 3
4	1155	Data	4 and 5
5	1265	Data	6 and 7
6	1375	Data	8 and 9
7	1485	Data	10 and 11
8	1595	Data	12 and 13
9	1705	Data	14 and 15
10	1815	Data	16 and 17
11	1925	Data	18 and 19
12	2035	Data	20 and 21
13	2145	Data	22 and 23
14	2255	Data	24 and 25
15	2365	Data	26 and 27
16	2915	Data/sync	28 and 291/

1/There is no bit location associated with the 2915 Hz sync tone during preamble (see 5.1.4.1) or with the 605 Hz Doppler tone.

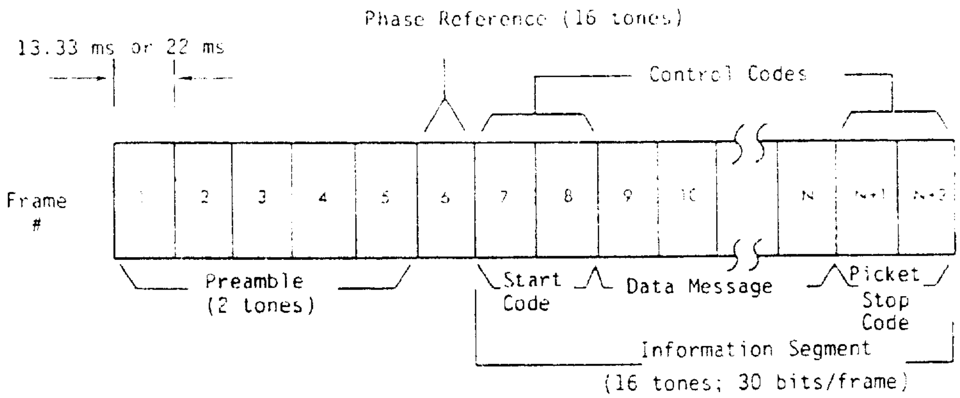
5.1.3.4 Data rate. The data rates shall be 2250 bits per second (bps) corresponding to a frame length of 13.33 milliseconds, or 1364 bps corresponding to a frame length of 22 milliseconds.

5.1.4 Transmission format. Each transmission shall be composed of preamble, phase reference, and information segment frames as shown in FIGURES 3 and 4.

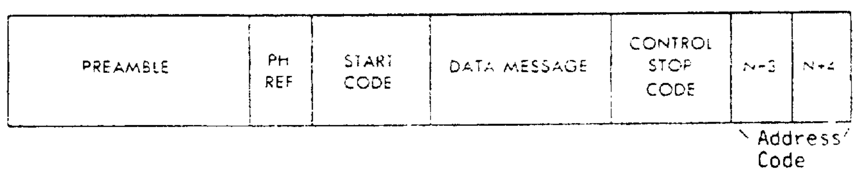
5.1.4.1 Preamble. The preamble shall be the first five frames of every transmission and shall be a 2-tone signal consisting of a 605 Hz and a 2915 Hz tone. The 605 Hz tone shall be used for Doppler correction (see 5.2.7) and the 2915 Hz tone shall be used for synchronization (see 5.2.6). The 2915 Hz tone shall be phase shifted 180 degrees each successive frame, enabling the receiving unit to detect frame transitions.

5.1.4.2 Phase reference frame. Except for a net sync transmission (see 5.1.6.5), the phase reference frame shall immediately follow the preamble, shall be composed of the normal 16-tone composite, and shall serve as the phase reference for the first frame of the information segment.

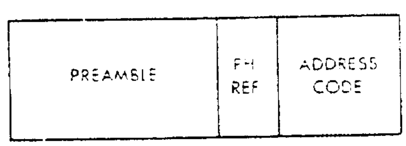
5.1.4.3 Information segment. The information segment shall be a 16-tone Composite signal consisting of control code frames and data message frames. The first control code frame shall immediately follow the phase reference frame.



Picket Reply Transmission

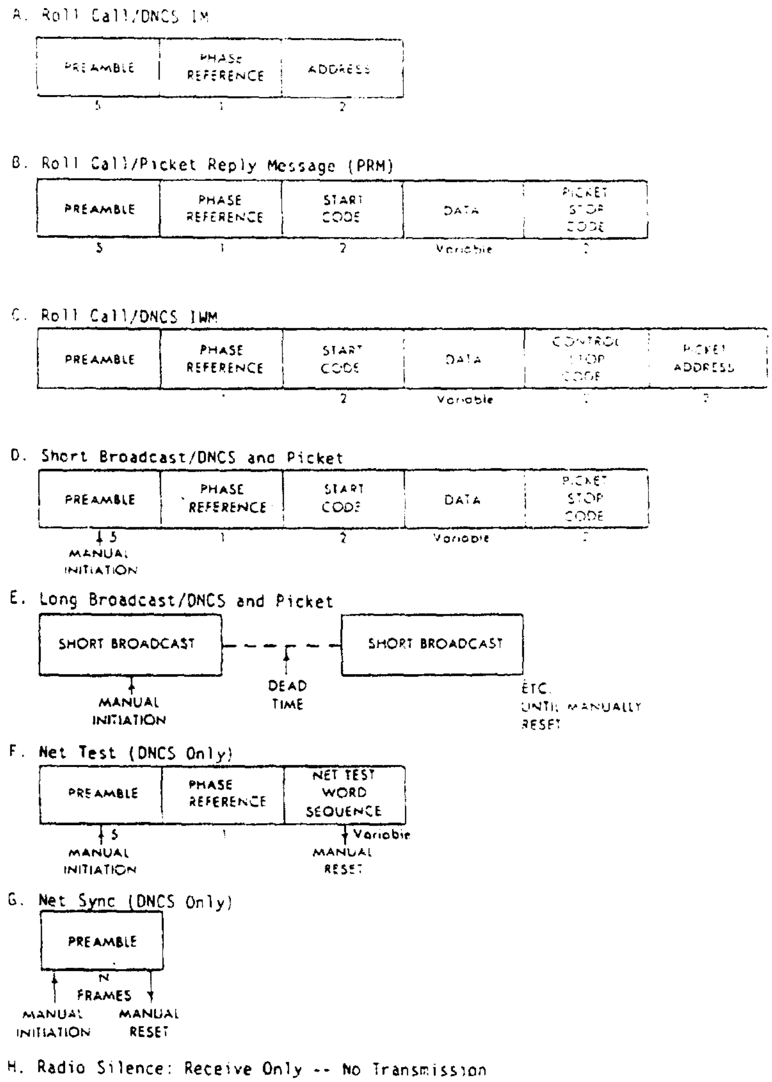


Data Net Control Station (DNCS) Transmission with Data (Roll Call/DNCS Interrogation with Message (IWM)).



DNCS Transmission without Data (Roll Call/DNCS Interrogation Message (IM)).

FIGURE 3. Roll call transmission formats.



NOTE: Numbers indicate the number of frames

FIGURE 4. Transmission frame structure.

5.1.4.3.1 Control code frames. The three basic control codes which are used to operate the net shall be the start code, stop code, and address code. Each control code shall consist of two 30-bit frames, encoded according to TABLE III. The receiving terminal shall be capable of correctly recognizing a control code containing four or fewer bit errors per frame.

5.1.4.3.1.1 Start code. With the exception of the roll call DNCS interrogation message (see 5.1.6.1.1), the start code shall be the first two frames of the information segment of the transmission and shall be used by the receiving system (DNCS or picket) to signal the associated TDS computer in accordance with APPENDIX Dl, D2, or D3 as applicable (see 5.1.11) to prepare to receive a data message. The start code shall be encoded as described in TABLE III.

5.1.4.3.1.2 Stop code. The stop code shall be a 2-frame code immediately following the last data message frame (see 5.1.4.3.2) to signify the end of the data message. There are two unique stop codes which are identified in 5.1.4.3.1.2.1 and 5.1.4.3.1.2.2.

5.1.4.3.1.2.1 Control stop code. The control stop code shall be a 2-frame code consisting of-all -zeros , and shall be only used following a data message in a transmission from the DNCS when in the roll call mode. The control stop code shall be a signal to all participating units that an address code follows immediately. Receipt of the control stop code shall cause each picket unit to: (a) signal the associated TDS computer in accordance with APPENDIX DI, D2, or D3 as applicable (see 5.1.11) that the end of the message has occurred, and (b) search for an address code in the next two received frames.

5.1.4.3.1.2.2 Picket stop code. The picket stop code shall be a 2-frame code consisting of all “ones"s that shall follow the data message in a picket transmission or a short or long broadcast transmission (see 5.1.6). Receipt of the picket stop code by net member units shall cause them to signal the associated TDS computers in accordance with APPENDIX DI, D2, or D3 as applicable (see 5.1.11) that the end of the message has occurred. Receipt of a picket stop code by the DNCS operating in the roll call mode additionally shall cause the DNCS to initiate the processing necessary to generate an interrogation message or an interrogation with message as appropriate (see 5.1.6.1).

5.1.4.3.1.3 Address code. Each net participating unit (PU) shall be identified by a unique 6-b,7-PU address, octal 01 through 76. The address code shall be a 2-frame code generated by the DNCS to identify the next picket to transmit. The address code shall immediately follow the control stop code if the DNCS transmitted data or the phase reference frame if the DNCS did not transmit data (see 5.1.6.1.1). The PU addresses shall be encoded as defined in TABLE III. All DTSs shall be capable of generating and recognizing all address codes defined in TABLE III. Each PU address shall be operator-selectable based on the octal address shown in TABLE III. Two methods of address generation shall be provided (see 5.2.1).

TABLE III. Library of control codes.

	Bit Locations in First Frame of Code																													
Start	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1
Control stop 1/ 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Picket stop 1/ 2/	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PU **Address**	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
01	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1
03	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1
07	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1
17	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1
37	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1
76	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0
75	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1
72	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0
65	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1
52	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0
25	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1
53	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1
26	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0
54	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0
31	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1
63	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1
46	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0
15	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1
33	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1
67	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1
56	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0
35	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1
73	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1
66	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0
55	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1
32	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0
64	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0
51	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1
22	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0
44	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0
11	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1
23	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1
47	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1
16	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0

TABLE III. Library of control codes. (continued)

PU Address	Bit Locations in First Frame of Code																													
	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
34	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0
70	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0
61	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1
42	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0
05	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1
13	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1
27	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1
57	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1
36	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0
74	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0
71	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1
62	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0
45	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1
12	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0
24	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0
50	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0
21	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1
43	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1
06	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0
14	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0
30	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0
60	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0
41	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1
02	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0
04	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0
10	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0
20	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0
40	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0

TABLE III. Library of control codes. (continued)

	Bit Locations in Second Frame of Code																													
Start	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0
Control stop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Picket stop	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PU Address	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
01	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1
03	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0
07	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0
17	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0
37	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1
76	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1
75	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1
72	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1
65	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1
52	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0
25	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0
53	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1
26	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0
54	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1
31	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0
63	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0
46	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0
15	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1
33	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1
67	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0
56	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0
35	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0
73	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0
66	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1
55	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0
32	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0
64	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0
51	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0
22	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0
44	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1
11	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1
23	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1
47	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1

TABLE III. Library of control codes. (concluded)

PU Address	Bit Locations in Second Frame of Code																													
	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
16	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1
34	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1
70	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0
61	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1
42	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0
05	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1
13	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0
27	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1
57	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1
36	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0
74	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0
71	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1
62	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1
45	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0
12	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1
24	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1
50	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1
21	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0
43	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1
06	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1
14	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0
30	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1
60	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0
41	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0
02	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1
04	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0
10	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0
20	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1
40	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1

1/ With the exception of control stop and picket stop codes, the two-frame control codes listed are equivalent to 60-bit portions of the maximum-length shift register sequence with generator polynomial: $G(X) = X^5 + X + 1$

2/ With the exception of control stop and picket stop codes, the first six bits of the control codes listed (bits 0 through 5 of the first frame) are the binary equivalents of the octal PU addresses.

5.1.4.3.2 Data message frames. The data message shall be that portion of the transmission containing tactical information. The data message shall be composed of any number of frames, each consisting of 30 data bits, and shall immediately follow the start code.

5.1.5 Error detection and correction (EDAC). An EDAC capability shall be provided ai-Uescribed In 5.2.4.

5.1.6 Modes of operation. The modes of operation and structure of transmission shall be as defined in 5.1.6.1 through 5.1.6.6.

5.1.6.1 Roll call. The roll call (see FIGURE 4) mode is the normal mode of operation of a TADIL . A net. In the roll call mode, data are disseminated throughout the net by the automatic reporting of pickets in response to the interrogations by the DNCS. The DNCS shall be capable of interrogating all stations in the net in any sequence and inserting its own data transmission at any point in the sequence.

5.1.6.1.1 Roll call (DNCS). A manual initiation shall be required at the DNCS (see PIGURES 4A and 4C) to start the automatic interrogation of the pickets. The order of the interrogation shall be as established by the operator in the DTS PU address table or as supplied by the TDS computer (see 5.2.1). The DNCS in the roll call mode shall normally allot 15 frames for reception of the responding picket's start code. The allotted number of frames shall be measured from the end of the second frame of the address code at the DNCS audio output to the end of the second frame of the picket's start code at the DNCS audio input. If the start code is not received within the allotted number of frames, the DNCS shall automatically send another interrogation to the addressed picket. This second interrogation shall be accomplished without requesting the TDS computer or DTS PU address table to resupply the picket address. If the DNCS does not receive the start code in response to the second interrogation within the allotted number of frames, it shall proceed as indicated in 5.1.6.1.la or 5.1.6.1.1b. The DNCS shall be capable of extending the allowable response time for designated pickets to accommodate satellite or other special links. The extended allowable response time shall be in the range of 15 frames to 250 frames, in 1 frame increments, as an operator-selectable parameter. Designation of pickets for the extended time allowance in lieu of the normal 15 frames shall be under operator control. A manual action shall be required at the DNCS in order to stop the automatic Interrogation of the pickets. (See APPENDIX C for a description of the roll call mode.) The structure of the transmissions of the DNCS in the roll call mode shall be one of the following:

a. IM. The DNCS shall transmit a frame structure (FIGURE 4A) consisting of the preamble, phase reference, and address code of the next picket to be interrogated if the next station in the reporting sequence is not the DNCS and any of the following occurs:

1. A picket stop code is recognized after a start code is recognized.

2. Loss of signal presence (see 5.2.5) is determined.
3. A picket reply to the second interrogation is not received.

b. IWM. The DNCS shall transmit a frame structure (FIGURE 4C) consisting of the preamble, phase reference, start code, any number of data message frames, control stop code, and address code of the next picket to be interrogated if the next station in the reporting sequence is the DNCS and either of the following occurs:

1. A picket stop code is recognized after a start code is recognized.
2. Loss of signal presence (see 5.2.5) is determined.
3. A picket reply to the second interrogation is not received.

5.1.6.1.2 Roll call (picket). Upon recognizing its own address code, a picket in the roll call (see FIGURE 4B) mode shall automatically transmit a PRM which has the following structure:

a. Preamble and phase reference
b. Start code
c. Any number of message frames
d. Picket stop code

5.1.6.2 Short broadcast. After manual initiation, any station in the short broadcast (see FIGURE 4D) mode shall send a single transmission with the following structure:

a. Preamble and phase reference
b. Start code
c. Any number of message frames
d. Picket stop code.

5.1.6.3 Long broadcast. After manual initiation, any station in the long broadcast (see FIGURE 4E) mode shall send a series of short broadcast transmissions. After each picket stop code, the station shall automatically inhibit the transmitter output for a 2-frame interval. The station shall then automatically send another transmission with the same structure. Once set as a result of manual initiation of transmissions, the radio transmit keyline (see 5.2.8.1.5) shall remain set until the series of transmissions is terminated. A manual action shall be required to terminate the series of transmissions.

5.1.6.4 Net test. The net test (see FIGURE 4F) mode shall allow the DNCS to transmit a known test signal and shall allow all pickets to verify their equipment performance by comparing the transmitted signal with an identical locally generated signal. The net test transmission shall be initiated and terminated manually.

5.1.6.4.1 Net test (DNCS). After manual initiation, the DNCS in the net test mode shall send a transmission with the following frame structure:

a. Preamble and phase reference
b. Word sequence shown in TABLE IV. The transmitted sequence shall begin with word 1 and shall end with word 21. After word 21 is transmitted, the word sequence shall be repeated until the transmission is terminated.

5.1.6.4.2 Net test (picket). A picket in the net test mode shall remain in the receive state awaiting receipt of the net test signal from the DNCS. Receipt of the net test signal shall cause the picket to compare the received digital word sequence with a locally generated digital word sequence identical to the sequence shown in TABLE IV. A net test error indicator shall be provided to the operator when the received word sequence is at variance with the locally generated word sequence. In addition, a capability shall be provided to permit measurement of BER while receiving the net test signal.

5.1.6.5 Net sync (DNCS). After manual initiation, the DNCS in the net sync (see FIgURE-4G) mode shall continuously transmit preamble frames. A manual action shall be required to terminate transmission. A picket shall indicate receipt of the preamble frames as specified in 5.2.5.1.

5.1.6.6 Radio silence. In the radio silence (see FIGURE 4H) mode, the radio set keyline and the DTS audio output shall be inhibited. The receive capability shall not be degraded. The radio silence mode shall be manually initiated and terminated. If the DTS is placed in radio silence while it is in the transmit mode, the DTS shall respond as follows:

a. Upon receipt of radio silence command, the DTS shall immediately inhibit both the radio set keyline and the transmit audio output.
b. After receipt of radio silence command, the DTS shall continue with normal operation of the DTS-to-TDS computer interface (see 5.1.11 and APPENDIX Dl, D2, or D3 as applicable) until the in-process transmission sequence is terminated by the computer. The DTS shall then revert to normal receive operations.

5.1.7 Switching time. A time period shall be allocated to allow for the switching between the transmit and receive states. This switching shall be automatic and shall conform with the timing diagram illustrated in FIGURE 5.

a. Receive-to-transmit switching occurs when the picket recognizes its address code, the DNCS recognizes a picket stop code, or the DNCS detects loss of signal presence. When switching from the receive to transmit state, a silent period of 10 milliseconds shall be required during which the audio output from the DTS to the transmitter shall be inhibited. The audio composite signal shall be applied to the transmitter by the DTS within three frame intervals of the beginning of the silent period. The DTS shall apply the radio keyline a minimum of 7 milliseconds and a maximum of one frame

TABLE IV. Net test word sequence.

PU ADDRESS			Bit Locations																													
OCTAL	FRAME	Word Number	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
START (77)	1	1	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1
	2	2	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0
72	1	3	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0
	2	4	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1
25	1	5	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1
	2	6	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0
54	1	7	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0
	2	8	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1
46	1	9	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0
	2	10	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0
67	1	11	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1
	2	12	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0
72	1	13	1	0	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1
	2	14	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0
32	1	15	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0
	2	16	0	1	1	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0
22	1	17	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0
	2	18	1	0	0	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0
23	1	19	1	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1
	2	20	0	1	0	1	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	1	1	1
34	1	21	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	1	0	0	1	0	0	1	1	1	0	0

interval prior to the application of the audio composite signal. After application of the audio composite signal and radio set keyline, the transmitter RF output shall reach at least 90 percent of its rated power within 7.0 milliseconds.

b. Transmit-to-receive switching occurs at the end of the transmission, that is, the picket stop code or address code. When switching from the transmit to receive state, the transmitter RF output shall be reduced to the quiescent noise level of 0.1 microvolt (vV) or less in a 6 kHz bandwidth centered on the nominal carrier frequency, and the receiver shall be capable of maximum receive sensitivity within 23 milliseconds or less after reset of the radio set keyline.

5.1.8 Diversity operation. For a TADIL A net employing HF transmission, frequency diversity operation shall be obtained by transmitting identical signals simultaneously on the USB and LSB of the HF transmitter (ISB). At the receiver, both sidebands shall be separately and independently demodulated. A means shall be provided to allow operator selection of USB, LSB, or the diversity operating modes as described in 5.1.8a and 5.1.8b. For HF operation in the SSB mode or for UHF operation, only one sideband of the DTS is utilized.

a. DIV. Data words derived from the DIV combination of the USB and LSB shall be provided to the computer.

b. automatic. The receiving station shall automatically select the version that represents the best information available from the USB, LSB, or DIV version of the received data word. When the criteria do not establish a clear choice, the DIV version shall be selected. DIV operation is used to help combat multipath interference that can be very prevalent in the HF band.

5.1.9 Frame synchronization. The capability of the DTS to synchronize to a TADIL A signal shall be as specified in 5.2.6.

5.1.10 Doppler correction. The receiving DTS shall correct for Doppler frequency shifti resulting from relative motion between terminals, variations of the HF channel, and HF carrier frequency (fc) inaccuracy. The standards for Doppler frequency shift and rate of change are specified in 5.2.7.

5.1.11 DTS-to-TDS computer interface characteristics. The OTS-to-TDS computer interface shall be in accordance with tHe requirements of one of the following: APPENDIX D1 for the NTDS parallel interface, APPENDIX D2 for the ATDS Serial interface, or APPENDIX D3 for the MIL-STD-188-114 interface. If any device, for example, control or encryption, is inserted between the system and the tactical computer, consideration must be given by the device designer and the tactical software designer to time delays introduced by that device and its effects on the interface timing relationships.

5.1.12 Radio-to-RF distribution interface. The radio-to-RF distribution interface (for example, couplers, tuners, antennas, and so forth) shall satisfy the applicable HF and UHF radio requirements of 5.3.