ARMY, MARINE CORPS, NAVY, AIR FORCE

HAVE QUICK

MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR HAVE QUICK RADIOS

AIR LAND SEA APPLICATION CENTER

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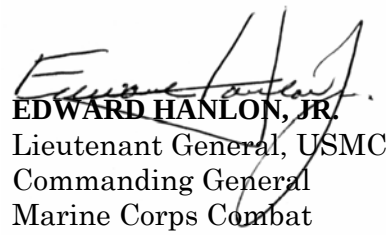
MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES

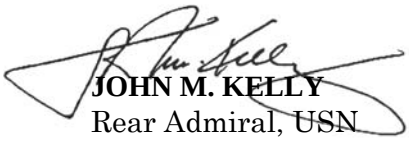
FOREWORD

This publication has been prepared under our direction for use by our respective commands and other commands as appropriate.

ROBERT W. MIXON, JR.
Major General, US Army
Deputy Director/Chief of Staff
Futures Center
US Army Training and Doctrine
Center



EDWARD HANLON, JR.
Lieutenant General, USMC
Commanding General
Marine Corps Combat
Development Command



JOHN M. KELLY
Rear Admiral, USN
Commander
Navy Warfare Development
Command

DAVID MacGHEE, JR.
Major General, USAF
Commander
Headquarters Air Force
Doctrine Center

PREFACE

1. Purpose

The HAVE QUICK (HQ) multi-Service tactics, techniques, and procedures (MTTP) publication will provide Service personnel essential information and guidance in the employment of HQ radio systems.

2. Scope

This publication is a consolidated guide for basic HQ radio operations. The content of this document focuses on--

a. HQ operational prerequisites, radio configurations, and operational capabilities.

b. HQ planning requirements.

c. Related net management requirements.

d. Secure operations.

HQ MTTP is directed at the operator level and does not delve into technical aspects of HAVE QUICK operations beyond that necessary for effective tactical use of the equipment. The target audience for this publication is the wide array of HQ radio users throughout the Services.

3. Applicability

a. This MTTP simplifies planning and coordination of HQ radio procedures and responds to the lack of HQ tactics, techniques, and procedures throughout the Services. Additionally, it provides HQ operators information on multi-Service HQ communication systems while conducting home station training or in preparation for interoperability training.

b. The United States (US) Army, Navy, Marine Corps, and Air Force approved this MTTP publication for use.

4. Implementation Plan

Participating Service command offices of primary responsibility will review this publication, validate the information and reference, and incorporate it in Service manuals, regulations, and curricula follows.

Army. Upon approval and authentication, this publication incorporates the procedures contained herein into the US Army Doctrine and Training Literature Program as directed by the Commander, US Army Training and Doctrine Command (TRADOC). Distribution is in accordance with applicable directives.

Marine Corps. The Marine Corps will incorporate the procedures in this publication in US Marine Corps training and doctrine publications as directed by the Commanding General, US Marine Corps Combat Development Command (MCCDC). Distribution is in accordance with the Marine Corps Publication Distribution System (MCPDS).

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Navy. The Navy will incorporate these procedures in US Navy training and doctrine publications as directed by the Commander, Navy Warfare Development Command (NWDC)[I5]. Distribution is in accordance with Military Standard Requisition and Issue Procedure Desk Guide (MILSTRIP Desk Guide) Navy Supplement Publication-409 (NAVSUP P-409) and NTTP 1-01, The Navy Warfare Library.

Air Force. The Air Force will incorporate the procedures in this publication in accordance with applicable governing directives. Distribution is in accordance with Air Force Instruction (AFI) 33-360.

5. User Information

a. Training and Doctrine Command, Marine Corps Combat Development Command, Navy Warfare Development Command, Air Force Doctrine Center, and the Air Land Sea Application (ALSA) Center developed this publication with the joint participation of the approving Service commands. ALSA will review and update this publication as necessary.

b. This publication reflects current joint and Service doctrine, command and control organizations, facilities, personnel, responsibilities, and procedures regarding HQ radio operations. Changes in Service protocol, appropriately reflected in joint and Service publications, will likewise be incorporated in revisions to this document.

c. ALSA encourages recommended changes for improving this publication. Key your comments to the specific page and paragraph and provide a rationale for each recommendation. Send comments and recommendations directly to—

Army

Commander
US Army Training and Doctrine Command
ATTN: AFTC-RD
Fort Monroe, VA 23651-5000
DSN 680-3951 COMM (757) 788-3951
E-mail: doctrine@monroe.army.mil

Marine Corps

Commanding General
US Marine Corps Combat Development Command
ATTN: C42
3300 Russell Road, Suite 318A
Quantico, VA 22134-5021
DSN 278-6233/6234 COMM (703) 784-6234
E-mail: deputydirectordoctrine@mccdc.usmc.mil

Navy

Commander
Navy Warfare Development Command
ATTN: N5
686 Cushing Road
Newport, RI 02841-1207
DSN 948-1164/4189 COMM (401) 841-1164/4189
E-mail: alsapubs@nwdc.navy.mil

Air Force

HQ AFDC/DJ
155 North Twining Street
Maxwell AFB AL 36112-6112
DSN 493-7442 Comm: (334) 953-7442
E-mail: afdc.dj@langley.af.mil

ALSA

ALSA Center
ATTN: Director
114 Andrews Street
Langley AFB, VA 23665-2785
DSN 575-0902 COMM (757) 225-0902
E-mail: alsa.director@langley.af.mil

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HAVE QUICK
MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR HAVE QUICK RADIOS

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(Overview)

Joint Vision (JV) 2020, a conceptual template for America's armed forces, will guide the application of combat power in the information age. JV 2020 predicts that joint and, where possible, combined operations will be paramount in defeating postulated threats in the future. The key to effective employment of joint and/or combined forces lies in the JV 2020 tenet of information dominance superiority to achieve full spectrum dominance. This concept envisions using modern communications capabilities and computers to enable commanders, planners, and shooters to acquire and share information rapidly. The enhanced ability to share information improves the ability to find and target the enemy quickly and precisely.

Joint and combined operations mandate the requirement for the exchange of voice information among and between forces. The fielded capabilities of the HAVE QUICK (HQ) radio have been effective in providing securable, low probability of intercept/electronic attack voice communications in the anti-jam mode for the implementing forces. For effective use of the HQ radios on the modern battlefield, planners must develop a communications plan that ensures successful employment of the HQ radio in a joint environment. This publication provides an overview of the doctrinal procedures and guidelines for using HQ radios on the modern battlefield. This manual serves as a reference document for employing HQ radios as a secure, low probability of intercept/electronic attack anti-jam communications. This manual also provides operators and supervisors with basic guidance and reference to operating instruction. It gives the system planner the information necessary to plan the HQ network, including interoperability considerations and equipment capabilities. This manual does not replace current field manuals or technical manuals governing tactical deployment or equipment use.

PROGRAM PARTICIPANTS

The following commands and agencies participated in the development of this publication:

Joint

Joint Staff, Director for C4 Systems, J6

Army

US Army Training and Doctrine Command, Futures Center (AFTC-RD), Fort Monroe, Virginia

Marine Corps

Marine Corps Combat Development Command, Quantico, Virginia

Marine Aviation Weapons and Tactics Squadron One, Yuma, Arizona

Navy

Navy Warfare Development Command (Norfolk Detachment), Norfolk, Virginia

Commander, Naval Air Forces/Atlantic, Norfolk, Virginia

VAW-125, Norfolk, Virginia

USS Reagan, Newport News, Virginia

VAW-120, Norfolk, Virginia

Air Force

Air Force Doctrine Center, Detachment 1, Langley Air Force Base, Virginia

Air Combat Command/SCCF, Langley Air Force Base, Virginia

Chapter I
INTRODUCTION

1. Purpose

This manual provides planning information for the employment of HAVE QUICK (HQ) jam resistant ultra high frequency (UHF) radio systems in support of a joint task force (JTF). Addressed herein are the following topics:

a. Joint HQ operations and training.

b. Time-of-day (TOD) distribution and use.

c. Secure voice operations.

2. Types of HQ Radios

The HQ system refers to all HQ radios, to include Basic HQ, HAVE QUICK II (HQ II), and SATURN. The term HAVE QUICK is used only in generic cases. See paragraph 6 for details of HQ evolution.

a. Basic HQ, sometimes called HAVE QUICK I (HQ I), refers to single-channel UHF radios modified to incorporate a slow frequency-hopping capability.

b. HQ II refers to an upgraded HQ I system that incorporates an improved frequency-hopping capability and expanded hop-sets to operate within.

c. SATURN (HQ IIA) refers to a second generation HQ mode of operation that supports faster hop rates, frequency modulation, and digital capabilities.

3. HQ Operational Prerequisites

a. The following three parameters are required to ensure that netted HQ radios can interoperate:

(1) Word-of-Day (WOD). WOD is a worldwide 36-digit transmission security (TRANSEC) key inserted into the radio by the operator to establish a specified system hopping pattern, rate, and dwell time.

(2) TOD. A second prerequisite for HQ active operation is synchronizing netted radio timing sources within specified tolerances. Initialization of HQ radios with TOD, a synchronizing signal derived from a highly stable timing standard or a designated master clock source, provides the required clock alignment. TOD may be acquired directly over the air from global positioning system (GPS) satellites, a timing source such as the AN/TRC-187, or a designated HQ radio acting as a master clock. TOD can also be inserted into the HQ radio through a hardware interface from a local timing source. HQ planners must establish TOD distribution procedures that ensure the necessary synchronization. The primary TOD distribution source needs to be from a single master radio frequency (RF) source. In today's global environment, GPS is the most accurate of available sources. Upon arrival in the operational area, ascertain a TOD update with GPS to improve HQ communication availability. In the absence of GPS Airborne Warning and Control System (AWACS), the Joint Surveillance Target Attack Radar System (JSTARS) is the preferred choice for a TOD source in an

operatrional area. If HQ communication begins to degrade (normally due to time drift), perform a timing synchronization (mickey) from the primary TOD source (beacon).

(3) Net Number Assignment. The net number assigns several radios using the same WOD and TOD to a net and establishes the hop set starting frequency. Assignment of unique net numbers eliminates self-interference by guaranteeing interlaced operation between all of the available nets. Planners must determine how many nets are required in a theater and allocate resources according to the total available allotment. Accomplish the assignment of net numbers for command and control (C2) platforms supporting multiple radio nets in a specified manner to maintain proper radio operation and frequency separation. Employ the replication of net number assignments, for other nets, based upon geographical separation, when requirements exceed allotment. However, minimizing the number of nets with the same net number in the same geographical area reduces the probability of interference.

4. HQ Modes of Operation

a. All HQ radios provide the standard single frequency UHF channel capabilities required for normal base and airspace operations. The differences between the active, anti-jam (AJ) mode features of basic HQ and the evolving generations of HQ II and SATURN are listed below:

(1) Basic HQ. The Basic HQ radio active mode of operation provides the following capabilities:

(a) Slow frequency hopping.

(b) Three types of active mode nets (A-, B-, and sectionalized A-nets) and one type of training net (T-net).

(c) Only accommodates a single WOD.

(2) HQ II. The HQ II radio active mode of operation provides the following capabilities:

(a) Uses the same frequency-hopping rates as the Basic HQ system.

(b) Includes a larger set of frequencies for increased jam resistance.

(c) Provides Frequency Management A-nets (FMA-net) for both North Atlantic Treaty Organization (NATO) and non-NATO operations.

(d) Frequency Management Training nets (FMT-nets).

(e) Automatically provides for active mode conferencing through WOD insertion.

(f) HQ II provides for the loading of multiple WODs (MWOD). The transceiver can accomodate up to six WODs. HQ II radios, and a portion of the HQ I to HQ II upgraded radios, include hardware and firmware provisions to load MWOD by means of an electronic fill device. Manual loading of MWOD is required for those HQ II radios that have not been modified with this feature or for those situations where an electronic fill device is not available or required.

(3) SATURN. SATURN includes all the features of HQ II in addition to the following capabilities:

(a) Fast-frequency-hopping nets (FFH-nets) and FFH training nets (FFHT-nets), with a digital waveform and frequency-shift keying.

(b) Slow-hopping HQ frequency modulation nets (HQFM-nets) and HQFM training nets (HQFMT-nets).

(c) Narrower receiver channelization in the HQFM mode.

(d) 20 watts of power are provided for fast frequency hopping (FFH) and HQFM modes.

5. HQ Interoperability

a. Table I-1 is a summary of interoperable HQ modes of operation and features. It shows technical interoperability potential only; it must meet certain operational conditions to actually achieve interoperability. For instance, the table shows that any HQ radio can communicate with standard UHF radios; however, for this to occur, the HQ radios must be placed in the same operational mode. Similarly, a radio set up in the Basic HQ active mode can communicate only with another radio operating in the same Basic HQ active mode. Planners must be aware that it makes no difference whether or not both radios are SATURN capable; if one is active in Basic HQ mode of operation, the other must also be active in Basic HQ mode of operation in order to interoperate.

b. Table I-1 also illustrates the backward compatibility which each succeeding generation of HQ radios possess.

Table I-1. Summary of Interoperable HAVE QUICK Modes of Operation and Features

Modes/Features	Capability	RADIO			
		Standard UHF	Basic HAVE QUICK	HAVE QUICK II	SATURN
Operating Modes	UHF single channel	X	X	X	X
	Guard channel	X	X	X	X
	Basic HAVE QUICK nets		X	X	X
	HAVE QUICK II FMA-nets, NATO/non-NATO			X	X
	FFH-nets				X
	HQFM-nets				X
Training Modes	T-nets (5 frequencies)		X	X	X
	FMT-nets (16 frequencies)			X	X
	HQFMT-nets (16 frequencies)				X
	FFHT-nets (40 frequencies)				X
Operating Features	Conferencing		X	X	X 1/
	Improved hopping algorithm			X	X
	MWOD storage/erase			X	X
	20-watt output power				X

"X" denotes interoperability.

1/ Conferencing is available with HQFM-nets; however, for FFH-nets, a break-in is used.

6. HQ Radio Evolution Summary

The basic HQ radio was introduced in the early 1980s. It is a single channel UHF radio system modified to include a slow-frequency-hopping capability to counter jamming threats. During the mid to late 1980s, HQ II evolved as a minimal cost modification of the basic HQ (or HQ I) that provided additional AJ protection, improved frequency hopping algorithms, and expanded hopsets. With an anticipated increase in jamming threats in the late 1980s, and in an effort to refine the system's capabilities, the development of HQ IIA was initiated. HQ IIA was designed to provide faster frequency hopping rates, additional hopsets capability, resulting from narrower channel bandwidth, and support for the transmission of digital data. HQ IIA was designated as the second-generation AJ tactical UHF radio for NATO (SATURN) upon being accepted as the NATO standard, Standard Agreement 4372. Although the United States (US) supports the Standard Agreement 4372, SATURN remains an unfunded requirement and is not presently part of the radio inventory; however, the SATURN waveform is funded under the Joint Tactical Radio System development program.

Chapter II
HAVE QUICK PLANNING REQUIREMENTS

1. Scope.

This chapter contains communications planning considerations unique to HQ. It is intended to be a general guide to joint communications planning for HQ only.

2. Planning Requirements

a. Communications planners, from the unified command to the operating unit level, play an important role in ensuring the interoperable employment of HQ systems. Although their roles in the planning process differ, planners at all levels must address, in some form, each of the following considerations:

(1) The type(s) of HQ system(s) employed.

(2) WOD acquisition and distribution.

(3) TOD acquisition, distribution, and synchronization.

(4) HQ net number assignment.

(5) Cryptographic material acquisition and distribution.

(6) Administrative and backup communications channels.

(7) Data communications and interoperability with data communications terminals and data transfer devices.

(a) Planning actions with respect to these considerations vary not only with the planner's organizational level, but also with time. A planner must perform certain actions well in advance of an operation, and other actions just before and during the operation. Table II-1 is a chronological matrix of HQ planning actions that communications planners perform at unified commands, Service components or intermediate joint headquarters (such as a JTF), and operating units. The matrix is condensed and serves as a quick reference for HQ planners. Appendix A and B offer supporting details.

Table II-1. HAVE QUICK Planning Actions

PLANNING ACTION	*UNIFIED COMMAND*	*SERVICE COMPONENT 1/ OR JTF 2/*	*OPERATING UNIT*
IN ADVANCE OF THE OPERATION: For each operation or contingency plan: Identify: 1. Probable HQ participants and their platforms. 2. Those HQ participants who must interoperate and group them into nets. Include net diagrams in the Communication Annex (Annex K) to the operation or contingency plan. 3. HQ systems that will be used in each net. Identify platforms with multiple HQ systems operating in two or more nets.	X X X	X	X
Establish a mode of operation for each net. It should be the newest mode supported by every HQ radio in the net. Annotate each HQ net diagram with the appropriate mode.	X		
Determine: 1. All Services obtain WOD from the National Security Agency through communications security (COMSEC) channels. The controlling authority for HQ WOD is the Joint COMSEC Management Office (MacDill Air Force Base, Florida 33621-5504; message address: JOINT COMSEC MANAGEMENT OFFICE MACDILL AFB FL; phone: DSN: 968-2461), COMM: 813-828-2461 2. Whether the HQ systems in the net are wired to permit securing the system. If so, identify; the nets that will be secure, the number of different VINSON key lists required, and the controlling authority for the key lists. Publish in Annex K.	X X		
Requisition WOD and VINSON keying material through the Joint Staff Intertheater COMSEC Package manager or Service chain of command.	X		X
Define procedures for extracting WOD and VINSON key at operating unit level.		X	X
Identify the time-base stations available, including those that will accompany operation participants and those already in theater.	X	X	X
Generate a map overlay for Annex K that shows locations, based on expected disposition of forces, of all time-base stations.		X	
Select specific time-base stations as the primary and alternate time sources for each participant. The time-base station map overlay in Annex K will be useful in selecting sources for participants without organic time-base stations.		X	
Assign primary, secondary, and, if possible, tertiary - channel frequencies to each net for over-the-air (OTA) single time distribution. These frequencies can also be used for net administration and control, and as emergency backup when active mode communications cannot be established. Publish in the communications-electronics operating instructions (CEOI).	X		
Establish and coordinate procedures for obtaining time updates from the primary or alternate source as required due to communication degradation. When sources for other than OTA distribution become available, include procedures for using them. Publish in unit standard operating procedure.		X	X
Determine how units will receive their timing updates and what methods will be used. Consider using silent			

PLANNING ACTION	*UNIFIED COMMAND*	*SERVICE COMPONENT 1/ OR JTF 2/*	*OPERATING UNIT*
methods.			X
Establish leap-second compensation and WOD changeover procedures. Identify which HQ systems are capable of using the secure mode. Publish in the joint CEOI.	X		
Assign net numbers to each joint net. Use an assignment scheme that maximizes frequency separation among geographically adjacent nets, particularly those whose stations share the same platform. Publish in the joint CEOI.	X		
Issue remaining net numbers to Service components for subsequent reassignment to single Service nets. Retain an appropriate quantity (5%) of net numbers to be issued during the operation should interference problems arise. Publish in Annex K.	X		
Assign net numbers to single-Service nets.		X	X
Update plans periodically to reflect changes in participants, HQ systems, timing sources, etc.	X	X	X
JUST PRIOR TO THE OPERATION: Confirm participants and types of HQ systems. Confirm whether these HQ systems are wired to permit securing the systems. Change net modes of operation as required. Use reserve numbers where possible. Maximize frequency separation for adjacent nets while minimizing changes to net numbers assigned previously. Update CEOI with new assignments and distribute to operating units.	X	X	X
Confirm availability of designated WOD and VINSON keying material. Shortages should be identified early in the planning stage.	X	X	X
Confirm operational readiness of time-base stations. Designate replacement time sources for those not ready.	X	X	X
Conduct operator reviews of procedures for WOD changeover, TOD acquisition, net number insertion, use of single-channel backup frequencies, etc.			X
DURING THE OPERATION: Issue WOD and VINSON keying material. Assign net numbers to unplanned participants.	X	X	
Reassign net numbers, as necessary, to deconflict frequencies.	X	X	
Employ emergency self-start procedures when a TOD update is required but no source is available. A self-started net has a unique time reference, and no station (other than those in the net when self-started) can enter it. Therefore, find a time source and update TOD as soon as possible.		X	X
Track information about HQ that would be appropriate for a lessons learned report.	X	X	X

Chapter III
HAVE QUICK NET MANAGEMENT REQUIREMENTS

1. General

a. Net number, WOD, and TOD settings separate users into distinct nets.

b. Net number prefixes are always "A, " except for SATURN, which can be "A, B, or C. "

c. Net numbers are in the form XX.XYY (prefixed by "A, B, or C") where Xs range from 0-9 and YY is chosen from the set (00, 25, 50, 75). The available modes for both training and operational usage are illustrated in Tables III-1 and III-2 respectively.

2. Basic HQ I Nets

a. Net Types. The four types of active mode operations available in Basic HQ are:

(1) A-nets.

(2) Sectionalized A-nets.

(3) B-nets (do not confuse with "B" prefixes used by SATURN radios).

(4) T-nets.

Note: Only T-nets are discussed in the following subparagraphs: A-nets, sectionalized A-nets, and B-nets are discussed in Chairman of the Joint Chiefs of Staff Manual 6230.05-01, Joint HAVE QUICK Planners' Guide - Joint Employment Guidance.

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b. T-nets (Table III-1). Training exercises in the active mode use T-nets, which do not expose the system's full jam-resistance capability. T-nets operate differently from other nets. The T-net frequencies form a part of a training WOD that are loaded into preset channels 15 through 19. The final element is 300.0YY that is loaded into preset channel 20, where YY is the hop rate 00, 25, 50, or 75. For each complete T-net WOD, five independent non-interfering T-nets are available. The assigned net numbers are A00.0 through A00.4.

c. Only those systems with the same training WOD, TOD, and Net numbers entered in the same sequence in preset channels 15 through 20 will be able to communicate with each other in the active mode.

d. Each of the five training frequencies provide a minimum of four megahertz (MHz) separation to preclude cosite interference on C2 platforms supporting multiple radio nets.

Table III-1. Training Nets

Net Number	*Value of X*	*Number of Frequencies Loaded*	*Frequency Table*	*Net Type*
A00.X00	0-4	5	-	HQ-T
A00.500-A99.900	-		-	invalid
A0X.X25	0.0-1.5	16	-	FMT (AM)
A01.625-A99.925	-		HQ II NATO	HQ II
AXX.X50	00.0-99.9		HQ II and non-NATO	HQ II-T non-NATO
A00.X75	0-4	40	Special FFH-NATO	NATO FFH-T
A00.575-A49.975	-		-	Invalid
A50.X75	0-4	40	Special FFH-non-NATO	FFH-T non-NATO
A50.575-A99.975	-		-	Invalid
BXX.X00	00.0-99.9		FFH-NATO	FFH-SB-T NATO
BXX.X25	00.0-99.9		FFH-NATO	FFH-FB-T NATO
BXX.X50	00.0-99.9		FFH non-NATO	FFH- FB-T non-NATO
BXX.X75	00.0-99.9		FFH non-NATO	FFH-SB-T non-NATO
C0X.X00	00.0-1.5	16	-	FMT (FM) 25
CXX.X00	01.6-99.9		HQ II-NATO	SH-FM-T (FM) 25 NATO
C0X.X25	0.0-1.5	16	-	FMT (FM) 6 1/4
CXX.X25	01.6-99.9		HQ II NATO	SH-FM-T (FM) 6 1/4 NATO
CXX.X50	00.0-99.9		HQ II non-NATO	SH-FM-T (FM) 6 1/4 non-NATO
CXX.X75	00.0-99.9		HQ II non-NATO	SH-FM-T (FM) 25 non-NATO

Note: Shaded areas indicate availability only in SATURN-capable radios.

Table III-2. Operational Net/Frequency Table Selection

Last 5 Digits of Net Number XX.XYY	Net Type/Frequency Table		
	First Digit of Net Number		
	A	B	C
XX.X00	HQ/HQ	FFH-SB NATO	SH-FM-25 kHz/ HQ II NATO
XX.X25	HQ II-FMA/HQ II NATO	FFH-FB NATO	SH-FM-6 1/4 kHz/ HQ II NATO
XX.X50	HQ II-FMA/HQ II non-NATO	FFH-FB non-NATO	SH-FM-6 1/4 kHz/ HQ II non-NATO
00.075-49.975 --- 50.075-99.975	FFH-FB NATO --- FFH-FB non-NATO	FFH-SB non-NATO	SH-FM-25 kHz/HQ II non-NATO

Note: Shaded areas indicate availability only in SATURN-capable radios.

3. HQ II Nets

Net Types. HQ II has all of the Basic HQ nets, as well as the following two nets: (Both types of nets use a larger set of frequencies for increased jam resistance.)

a. FMA-nets.

b. Frequency Management Training Nets (FMT-nets).

(1) FMA-Nets. FMA-nets are divided into two groups: NATO nets and non-NATO nets. Each group has 1,000 nets, divided into 50-net blocks, arranged to guarantee minimum frequency separation. They have equal jam resistance and should allow the communications planner to minimize cosite interference when several HQ II radios are operated on a single platform. NATO nets are reserved for exclusive use in NATO countries. The net numbers are in the form AXX.XYY. The XX.X designates the net number (000-999). The YY designates the frequency table entry that is used. See Table III-1 entry listings for:

(a) "00" selects a Basic HQ net, sectionalized A-net, or B-net.

(b) "25" selects a HQ II NATO net.

(c) "50" selects a HQ II non-NATO net.

(2) The FMA-net structure is illustrated in Figure III-1. HQ II uses only the A-prefix shown. SATURN, discussed in more detail later, uses A-, B-, and C-prefixed groups to select various modes of operation as defined in Table III-2. As noted in Figure III-1, there are diagonal boxes in which no frequency separation is guaranteed. There is no guaranteed frequency separation between different modes of operation (e.g. single channel and A-nets, sectored A-nets and A-nets, FFH and slow hop aplitude modulaion (AM), etc.) and different frequency tables even when using the same mode of operation (i.e. HQ II operation using NATO and non-NATO tables). This figure chart is helpful in maximizing frequency separation among adjacent nets. For example, any net number assigned from 1 of the first 16 50-net blocks in Figure III-1 is separated by at least 4 MHz from any net number in the other 15 blocks. To maintain the recommended 12

MHz separation between eight collocated radios, each of the eight nets is assigned from a different block of the first (or second) group of eight blocks in Figure III-1. Do not assign any two radios on a platform nets from the same block. Doing so would defeat the frequency separation scheme, and result in cosite interference. Frequency separation is not maintained at the expense of jam resistance; all nets hop over the entire hopset.

c. FMT-Nets. HQ II provides 16 FMT-nets in addition to the 5 basic HQ T-nets. The the 16 FMT-nets (HQ II training) should not be operated at the same time unless the selected frequencies between the 2 modes are widely separated; this minimizes cosite interference on C2. The FMT-nets are numbered A00.025 through A01.525 and they do not repeat. The user must select all six characters in the net designator. Set the last two digits at 25. Each of the 16 FMT-nets use the same set of 16 frequencies. The 16 authorized training frequencies (Table III-3) are loaded into the radio's permanent memory and are reloaded only if the authorized training frequencies change. (Make a check with the local frequency manager for frequency changes.) The following list of 16 frequencies guarantees 4 MHz minimum separation. The frequencies are approved for use exclusively within the continental United States (CONUS) FMT-nets. These frequencies are in the order suggested for use throughout CONUS by all HQ-equipped radios. They will be used in this order for all training by the Air Combat Command. In other theaters, major commands are responsible for obtaining approved frequencies. The T-net numbers for HQ II are the same as in the basic HQ system, except that six digits are now read instead of four. The T-nets are numbered A00.000 through A00.400. The last two digits must be 00.

Note: To use the FMT-Nets, the entire training WOD is not required. Loading ONLY the channel 20, training WOD (300.0XX), channel 14, effective day of WOD (3XX.000) and channel 01, current day (3XX.000) elements will enable use of the sixteen FMT-Nets (A0X.X25). This will allow rapid reloading of the WOD to expedite use for training activity or when a complete WOD reload in not practical. There are two sets of T-nets available in HQ II FMT-nets; the T-nets are not interoperable.

Table III-3. Training Frequencies

Channel Number	*Frequency (MHz)*
Preset Channel 20:	235.050
Preset Channel 19:	225.150
Preset Channel 18:	252.925
Preset Channel 17:	239.950
Preset Channel 16:	271.950
Preset Channel 15:	267.850
Preset Channel 14:	262.450
Preset Channel 13:	257.250
Preset Channel 12:	314.450
Preset Channel 11:	308.750
Preset Channel 10:	303.275
Preset Channel 9:	298.650
Preset Channel 8:	293.550
Preset Channel 7:	289.050
Preset Channel 6:	284.150
Preset Channel 5:	279.750

4. SATURN Nets

a. Net Types

(1) The most important type of net is the FFH net, which uses a faster hopping rate and transmits digitized voice, as opposed to analog voice in basic HQ and HQ II modes of operation. SATURN has all of the HQ II and basic HQ nets, as well as the following types of nets:

(a) HQFM-nets.

(b) HQFMT-nets.

(c) FFH-nets.

(d) FFHT-nets.

(2) The net numbers are in the form A/B/C XX.XYY where: A/B/C specifies active mode operation in one of several modes as defined in Table III-2 (i.e., HQ II [slow hop AM], slow hop frequency modulation with 6-1/4 channel, etc.). XX.X specifies 1,000 possible net numbers (i.e., 00.0-99.9), and YY defines the frequency table in use.

(3) The SATURN radio has the capability to store 40 training frequencies. Only the first 16 frequencies are used for HQ II FMT-nets and for SATURN HQFMT-nets. SATURN FFHT-nets use all 40 frequencies.

b. HQFM-Nets. The NATO and non-NATO frequency tables are used with HQFM-nets. HQFM-nets use the same frequency partitioning shown in Figure III-1 for HQ II FMA-nets. Frequency assignments are as specified for FMA-nets with offsets of 0, ± 6.25 kilohertz (kHz), and ± 12.5 kHz (i.e., 6-1/4 channel or standard 25 kHz channel). Designation of CXX.X25/50 provides the HQFM-net 6.25-kHz channel spacing (as compared to the normal 25-kHz channel spacing) and creates more frequencies on which to hop. Jam resistance to certain types of jamming increases. HQFM-nets are not interoperable with the HQ II NATO and non-NATO nets due to differences in their channel spacing and modulation formats.

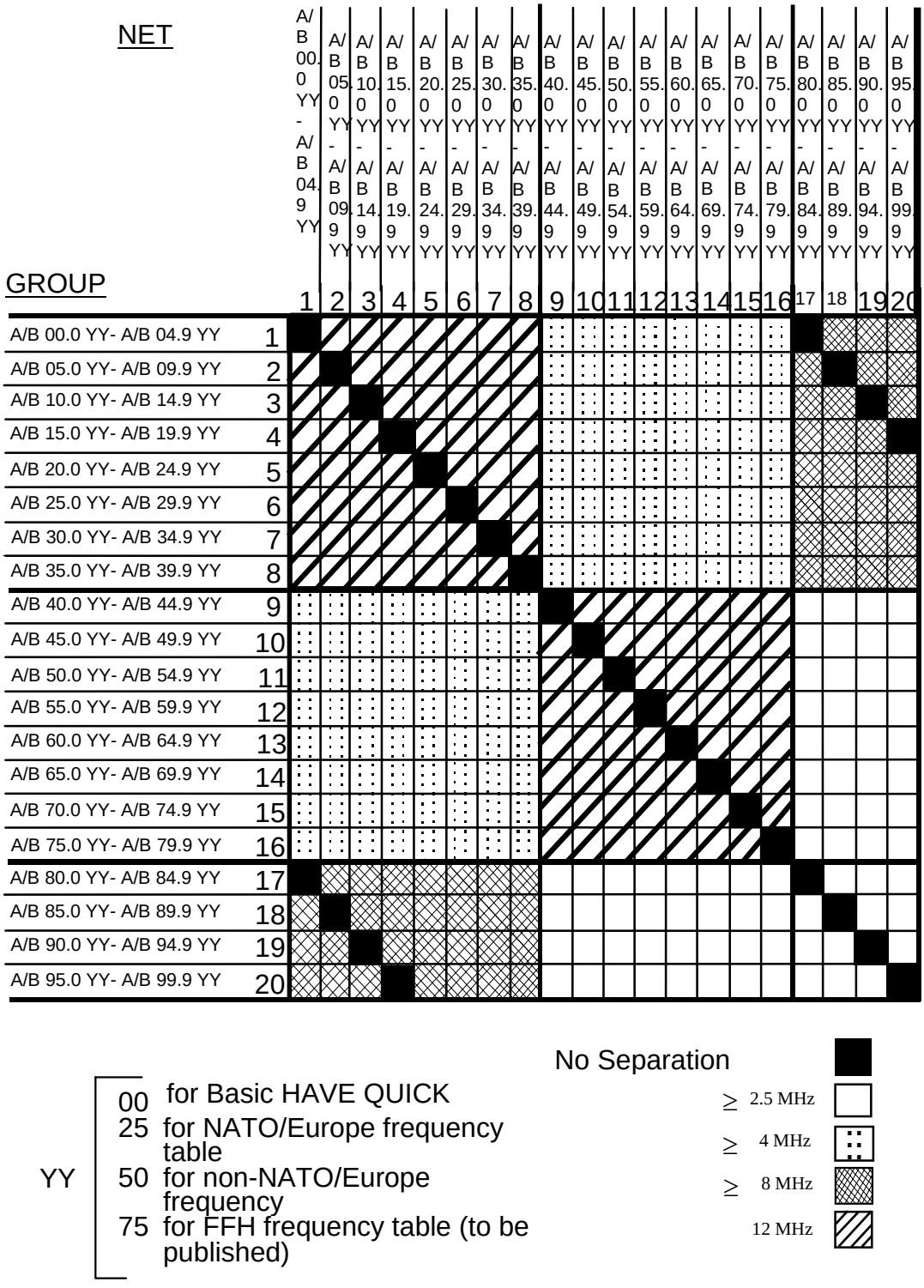

Figure III-1. Net Structure and Frequency Separation

c. HQFMT-Nets. A total of 16 frequencies is assigned to an HQFMT-net. There are 16 such nets, each using the same 16 frequencies, are available for use. The

HQFMT-nets employ frequency modulation with a 6.25-kHz resolution and are selected by net numbers shown in Table III-1. Although HQFMT-nets use the same frequencies as HQ II FMT-nets, they are not interoperable.

d. FFH-Nets. FFH-nets use continuous phase, frequency-shift keying modulation. The radio converts analog voice into a 16-kilobites per second (kbps) digital stream using continuous variable slope delta modulation. As noted in Table III-2, FFH operations are designated with both A and B prefixes (AXX.X75 and BXX.XYY). Nets BXX.X00 and BXX.X25 use the NATO frequency table and are interoperable for the same net number (i.e., XX.X must be the same). Nets BXX.X00 provide a FFH capability for C2 platforms requiring special cosite operation (designated SB for sub-band operation). Nets BXX.X50/75 provide similar operation using the non-NATO frequency table. Nets A00.075-A49.975 provide an additional 500 FFH-nets using the NATO frequencies while the remaining 500 FFH-nets (>=A50.075) operate using the non-NATO frequency table.

e. FFHT-Nets. There are two types of T-nets provided for FFHT-nets operation:

(1) The first type of T-net is a programmable set of 40 frequencies. One set of 5 nets (A00.075-A00.475) is provided using the NATO special training frequency allocation of 40 frequencies. A second set of 5 nets (A50.075-A50.475) is also provided that operates using the non-NATO special allocation of 40 frequencies.

(2) The second type of T-net is a subset of the entire NATO or non-NATO FFH allocations. These nets are selected from the appropriate net number designations listed in Table III-1.

5. Network Interoperability Matrix

a. Table III-4 summarizes HQ interoperability as a function of net number type. For each type of net number, the table lists the following:

(1) Applicable frequency table.

(2) Corresponding type of network supported.

(3) HQ radios that can participate.

Table III-4. Network Interoperability Matrix

Net Number	***Frequency Table***	***Net Type***	***Applicable Radio Types***
AXX.X00	Basic HQ	Basic HQ	I, II, SATURN
BXX.X00	Basic HQ	Basic HQ	SATURN 1/
AXX.X25	NATO	HQ II	II, SATURN
BXX.X25	NATO	HQ FM	SATURN
AXX.X50	Non-NATO	HQ II	II, SATURN
BXX.X50	Non-NATO	HQ FM	SATURN
AXX.X75	FFH	FFH	SATURN
BXX.X75	FFH	FFH	SATURN 1/

1/ The B-prefix is ignored and treated as an A prefix.

Chapter IV
SECURE OPERATION

1. General

VINSON COMSEC devices are used with the HQ radios for secure transmissions in both the normal and active HQ modes of operation. When the radio is operating in the active mode, a momentary interruption of the transmission occurs as the radio shifts (hops) to a new frequency. When a frequency hop occurs during the transmission of the VINSON synchronizing preamble, it can disrupt the synchronization process. However, the VINSON terminal will continue to acquire synchronization using its embedded, non-redundant procedure. The delay experienced before the channel is available for voice transmissions may be reduced on some equipment by placing the radio controller in a delayed push-to-talk mode of operation. This mode of operation delays the transmission of the VINSON initialization preamble until the radio has settled upon its new frequency. The radio hopping transients will cause no significant disturbances to the encrypted voice transmissions when the VINSON terminal has acquired synchronization.

2. Secure Mode Operation

Operation of VINSON with HQ systems is much the same as with other radio systems. However, planners should note the following exceptions:

a. Users cannot conference HQ nets in the secure (cipher-text) mode.

b. Users cannot transmit TOD updates by HQ radios whose VINSON is in the cipher-text mode. Because of plain-text override, HQ radios can receive TOD updates when their VINSONs are in the cipher-text mode. Since TOD is so critical to successful HQ operation, this point is worth mentioning in joint CEOIs.

3. VINSON Keying Material

a. Joint planners must determine whether the intertheater communications security package (ICP) or other communications security (COMSEC) channels are the more appropriate source of VINSON keying material for an operation.

b. Operating unit COMSEC custodians must include HQ requirements in their requisitions for VINSON keying material.

Chapter V
TECHNICAL DATA

1. Word-of-the-Day

a. General. WOD is a 36-digit TRANSEC code inserted in the radio by an operator. It is stored in the radio and programs the system with the hopping pattern, hopping rate, and conferencing selection. WOD is provided on mylar tape issued in canisters containing a 35-day allotment. Four additional tapes provide an input to SATURN capable radios that a leap second event (i.e., 30th or 31st of the month, and + or -1 second correction) will occur at midnight. Planners must direct the use of these tapes when notified by the US Naval Observatory (note that users of older HQ II equipment will still have to manually request time after a leap second correction to update system time). The National Security Agency produces and distributes WOD through COMSEC channels. The tapes provided are KAL-9200 and KAL-269.

(1) KAL-9200, "HQ Worldwide Electronic Counter-Countermeasures Settings," is used outside CONUS, as defined by Joint COMSEC Management Office. All combat units should order this item. Due to potential interference with Federal Aviation Administration safety of flight functions, do not use KAL-9200 within line-of-sight of CONUS facilities.

(2) KAL-269, (CONUS WOD), is used in CONUS, as defined by the Joint COMSEC Management Office. Ordering instructions are contained in COMSEC Material System-21.

b. Ordering and Reproducing WOD.

(1) Order WOD canisters through the supporting COMSEC custodian per COMSEC Material System-21. Units must store and maintain sufficient WOD materials for their operations. WOD materials are not required for system checkout or maintenance.

(2) KAL-9200 is distributed in the quantities needed to support units equipped with HQ radios. The controlling authority for KAL-9200 is: Joint COMSEC Management Office, MacDill Air Force Base (AFB), Florida. For an electrical message, address message as JOINT COMSEC MANAGEMENT OFFICE MACDILL AFB FL.

(3) The following policies apply to reproducing the KAL-9200 WOD segment:

(a) Only HQ users with flying missions may reproduce it locally by a method authorized for classified material. Limit quantities to mission requirement.

(b) Forward requests for local reproduction from non-flying units through COMSEC channels to the controlling authority. Requests must explain why the unit cannot meet WOD requirements with a small number of canisters.

(c) Control original extracted WOD segments according to Service COMSEC directives.

(d) Special control procedures, such as hand receipts and copy counts, are not required for reproduced copies of the daily extracted WOD segment. Treat the

current day's segment and the next day's segment as unclassified. Control the complete canister as CONFIDENTIAL material according to Service directives.

(4) The following policies apply to distributing, reproducing, and using KAL-269 WOD segments:

(a) KAL-269 is distributed through COMSEC channels. After reaching the unit level, treat the KAL-269 in accordance with Service regulations. Reproduce KAL-269 as necessary at the unit level. The controlling authority for KAL-269 is: Joint COMSEC Management Office, MacDill Air Force Base, Florida 33621-5504.

c. WOD Dissemination. Generally, WOD is given to users one segment (day) at a time. It is changed periodically, normally once a day. WOD may be issued as current plus following day. The segment in use always has a date that matches the current Zulu date. Those operators who anticipate mission requirements exceeding one day must take the next day's WOD also. Some users may require the entire canister. The AN/CYZ-10, with the correct update software, can load MWOD information.

2. Time-of-Day

a. General: HQ radios require accurate timing systems and a precise time reference, TOD, in order to maintain synchronization while frequency hopping in the active mode of operation. Timing systems integral to the HQ radios provide frequency and timing requirements for standard and frequency hopping radio operation. Coordinated Universal Time (UTC) serves as the precise time reference that is used to initialize and align all HQ radio timing systems to a common time base. Alignment and accuracy of HQ timing sources ensures users of synchronized operation within their respective nets and precludes interference with and by other HQ nets.

(1) HQ radio timing systems are configured with temperature controlled quartz crystal oscillators, as is typical of tactical systems. This system provides sufficient stability to maintain TOD accuracy. Operational experience has proven that frequent TOD updates improve HQ communication reliability.

(2) The TOD reference signal used to initialize and synchronize all HQ radio operation is provided in the form of UTC and is either transmitted to the radio or manually inserted into the radio. TOD is transmitted to a radio either by another HQ radio, over-the-air (OTA), or provided through an electrical bus or interface from an external TOD reference source. When transmitted to the radio, UTC is presented in a digital format.

b. TOD Sources. TOD initialization and updating of HQ radio may be obtained from a variety of sources. The primary TOD distribution source needs to be from a single master RF source. In today's global environment, GPS satellites serve as the primary master RF source. The selected method of updating a HQ radio with TOD may be dictated by the HQ platform capability or based upon mission expediency.

(1) AWACS/JSTARS/RIVET JOINT. In the absence of GPS, an AWACS, JSTARS, or RIVET JOINT aircraft is the preferred choice for TOD in an operational area. These aircraft are equipped with GPS receivers and rubidium oscillators. Platforms such as these can provide accurate TOD OTA to any HQ radio in the absence of GPS for a period of up to 30 days. Time Signal Sets, such as the AN/TRC-187, can also serve as a primary TOD source. The AN/TRC-187 contains a GPS receiver, HQ

radio, and other interfacing circuitry to support the transmission and reception of TOD data. In addition, the AN/TRC-187 can also receive accurate time from another Time Signal Set via telephone lines. It can pass TOD OTA to any HQ radio. AN/TRC-187s are normally installed at forward and rear tactical air control facilities. (Note: In some instances it may be more practical for a land-based unit such as a control and reporting center, sector air operations center, etc. to act as the TOD source since the land based units in theater usually operate around the clock as opposed to airborne platforms which have limited on-station time.)

(2) GPS. GPS receivers are installed or affiliated with most ships, aircraft, tactical air control system shelters, vehicles, and man pack units. The deployment of GPS receivers with an HQ TOD output interface has established it as a means of initializing and updating HQ radios with TOD. It is also the most accurate of the available sources, since GPS contains a combination of cesium beam and rubidium oscillators whose output signals are constantly monitored and referenced to US Naval Observatory UTC. The initially fielded GPS receivers are linked to the HQ radios either directly, by means of a cable, or through an electrical bus arrangement. Where system design warrants, future HQ systems will contain embedded GPS receivers.

Note: Many radios equipped with GPS TOD receivers have no way to indicate if a valid TOD was received via GPS (no audible tone as in a TOD OTA transfer) other than to ops-check it with another collocated radio or another user.

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(3) HQ radios. Operators can use HQ radios that have recently received a TOD update from a single master RF source as a TOD source. The time will be most accurate immediately after the radio has received the update.

(4) Emergency Time Start. Use emergency time start as a last resort if no UTC source is available as an emergency activation procedure. If synchronization is lost and an accurate timing source is not available, users within a net may synchronize themselves. One HQ radio can self-generate an arbitrary TOD and then act as a master clock to synchronize all other radios on the net. Other radios with the proper TOD will not be able to communicate with the self-started net in the active mode, and nets with different TODs may receive mutual interference if they are within range. Make every effort to acquire TOD from GPS, AWACS/JSTARS/RIVET JOINT, or HQ radios before using the emergency activation procedure.

c. TOD and Day-of-Month (DOM). In addition to requiring TOD, HQ II radios also require the current DOM so that the correct MWOD segment can be loaded from internal memory to initialize the radio for that day's operation. Users can acquire DOM information in a time update from a HQ II radio already loaded with the current DOM or users can enter it manually.

(1) If this date information is not available, the user can enter the current DOM manually and then self-start the radio's clock.

(2) For HQ II radios to transmit DOM after an emergency self-activation, enter the DOM before the TOD, or else only the TOD will be transmitted. SATURN radios do not have this restriction. Operators can make either entry first, and both DOM and

TOD will be transmitted. There is no manual input for Day-of-Year. The only way to receive Day-of-Year is when the original TOD is received from GPS.

d. TOD Procedural Considerations

(1) TOD Initialization. Although the principal means of initializing and updating HQ radios will be by means of a single master RF source, there are, as previously noted, additional facilities/terminals available to provide TOD. The appropriate initialization method for a particular situation depends on the tactical environment and only the commander can make that determination. There are, however, several planning considerations to remember when selecting TOD initialization methods. Operators must receive initial TOD in the normal mode on a single UHF frequency. When operating in the active mode, operators can only receive TOD updates from radios operating in the same net.

(a) Designation of alternate frequencies and beacon sources for transmitting initial and updated TOD to net members is another important consideration. Without an alternate, enemy jamming of the primary frequency can cripple a HQ net by disrupting time synchronization. If the primary time source fails, then two-way transfer of TOD responsibilities to an alternate source must occur. Likely alternate sources are: control and reporting center, tactical air operations center (USMC), aicraft carriers, etc. Finally, in the case of loss of the RF beacon frequency, all platforms will revert to individual platform GPS until an alternate RF beacon is established.

(2) Leap Second Planning. Twice a year, at midnight UTC on 31 December and 30 June, the UTC advance or retard by 1 second. This is known as a leap second. Leap seconds are used, when needed, to compensate for variations in the earth's rotation rate and to keep UTC aligned with astronomical time (Universal Time 1).

(a) The Leap-Second Rollback Problem. At midnight, when a leap second occurs, a net composed of radios relying on different sources of time (i.e., GPS and non-GPS) have the potential of being non-interoperable after a leap second event if the radios are commanded to receive a new TOD. Since existing HQ II radios do not have the provision for manual input of an expected leap second or for automatic rollback at the designated time, operators must take the following measures:

- A leap second occurrence is identified several months prior to its occurrence. For HQ II equipment, the appropriate operational procedure is to require all active units, operating through midnight on those days, to command their radios to accept a new TOD message from an identified GPS-based timing source. SATURN capable radios will automatically adjust their time (i.e., without an external command) based on the information specified in the KAL 9200 WOD.

- GPS automatically corrects for the leap second and continuously provides accurate UTC to GPS-equipped radios. Most aircraft are equipped with GPS receivers to synchronize their HQ radios with UTC. Operators can use radios that have a source of GPS time available to accept a corrected TOD after a leap second event and thereby maintain proper radio operation. It is the responsibility of the platform, operator, or pilot to initiate this sequence.

- Units that do not have GPS receivers will continue to operate on time that has not been corrected for the leap second. TOD re-initialization of non-GPS-

clocked radios by a GPS-clocked radio is required at this point in order to begin operation with time that has been corrected for the leap second.

3. Net Identification Number

The net identification number, a three-digit number, is manually entered into the radio similar to the manual assignment of a single frequency. The number assigns the net type and group on which a given radio net will operate. The net number also provides an offset in the hopping sequence that radios in that net will initiate their hop sequence upon. The net number interlaces the nets which precludes self-interference among the nets since all systems possess the same WOD and TOD. Net number assignments are made by planners based upon the number of nets accommodated by WOD in a geographical region. Operators may apply net number replication when sufficient geographical separation permits.

Chapter VI
SECURITY CLASSIFICATION GUIDANCE

Table VI-1 provides guidance for the HQ program and its elements. "The HQ II/SATURN Security Classification Guide" has instructions for downloading and declassification.

Table VI-1. Security Classification Guide

SECRET	CONFIDENTIAL
Classify the following performance characteristics and capabilities as SECRET: 1. Hopping rates. 2. WOD specifics. 3. Number of frequencies in operational nets. 4. Specifics of code generation operation. 5. Specific operating frequencies. 6. Signal characteristics. Performance parameters will be classified SECRET when the performance characteristics of the entire system can be determined from such data. Classify any vulnerabilities, weaknesses, or limitations as SECRET. Classify all test data, test reports, analyses, and conclusions that reveal operational limitations, weaknesses, or vulnerabilities of the HQ system as SECRET. Classify all procedures (that could reveal operational concepts, objectives, or system capabilities and limitations) for monitoring the status of individual HQ system units as SECRET.	When HQ radios are used with cryptographic equipment, classify those cryptographic techniques CONFIDENTIAL.

Appendix A
HAVE QUICK Tactical Platform Availability Matrix

1. Planning and Employment

a. This enclosure contains information that supports HQ communications planning and employment:

Table A-1. HAVE QUICK Tactical Platform Availability Matrix – Air Force

Tactical Platform	***Radio***	***Capability 1/***			***Remarks***
		HQ I	***HQ II***	***Saturn***	
A/OA-10	AN/ARC-164(V)	Y	Y	TBD	
AC-130	AN/ARC-164(V)	Y	Y	TBD	
B-1B	AN/ARC-164(V)	Y	Y	TBD	
B-2	AN/ARC-	Y	FY-02	TBD	HQ II in Airborne Integrated Terminal
B-52H	AN/ARC-164(V)	Y	Y	TBD	
C-5	AN/ARC-164(V)	Y	Y	TBD	
C-17	AN/ARC-164(V)	Y	Y	TBD	
C-130	AN/ARC-164(V)	Y	Y	TBD	
C-130 (SENIOR SCOUT)	AN/ARC-210(V)	Y	Y	TBD	
C-141A/B	AN/ARC-164(V)	Y	Y	TBD	
E-3(AWACS)	AN/ARC-171(V) AN/ARC-204(V)	N Y	N Y	 TBD	AN/ARC-171 is used for TOD beacon only
E-4B	AN/ARC-210(V)	Y	Y	TBD	
E-8A,C	AN/ARC-225(V)	Y	Y	TBD	
EC-130H (COMPASS CALL)	AN/ARC-164(V)	Y	Y	TBD	
EC-135K	AN/ARC-164(V)	Y	Y	TBD	
F-15	AN/ARC-164(V)	Y	Y	TBD	
F-16	AN/ARC-164(V)	Y	Y	TBD	
F-117A	AN/ARC-164(V)	Y	Y	TBD	
HC-130	AN/ARC-164(V)	Y	Y	TBD	
HH/UH-1	AN/ARC-164(V)	Y	Y	TBD	
HH-53	AN/ARC-164(V)	Y	Y	TBD	
KC-10	AN/ARC-164(V)	Y	Y	TBD	
KC-135	AN/ARC-164(V)	Y	Y	TBD	
MC-130E,H,P	AN/ARC-164(V)	Y	Y	TBD	
MH-53	AN/ARC-164(V)	Y	Y	TBD	
HH/MH-60	AN/ARC-164(V)	Y	Y	TBD	
RC-135	AN/ARC-210 AN/ARC-231	Y	Y	TBD	Baseline 7 upgraded RC-135 V/Ws have ARC-210s and ARC-231 (the ARC-231 will be replaced by ARC-234 (TBD)). RC-135S and RC-135U aircraft still have ARC-164s. However, they will be phased out by ARC-210s as they cycle into Greenville, TX for Programmed Depot Maintenance. Last ARC-164 scheduled to be replaced NLT 2007.
TR-1/U-2	AN/ARC-164(V)	Y	Y	TBD	
UH-60	AN/ARC-164(V)	Some	Some	TBD	See HH/MH-60
U-2R/U-2S	AN/ARC-164(V)	Y	Y	TBD	
AN/GRC-206	AN/VRC-83(V)3	Y	Y	TBD	
AN/MRC-144	AN/VRC-83(V)3	Y	Y	TBD	AN/GRC-206 mounted in M998 (HMMWV)
AN/PRC-113	RT1319B	Y	Y	TBD	
AN/PSC-5D	AN/PSC-5D	Y	Y	TBD	

Tactical Platform	Radio	Capability 1/			Remarks
		HQ I	HQ II	Saturn	
Manpack Radio	AN/PRC-117F	Y	Y		Used by SOF
AN/TPS-75	AN/ARC-164(V)		Y1005	TBD	Control and Reporting Center
AN/TRC-187	AN/ARC-164(V)	Y	Y	TBD	Time signal set
Modular Control System	AN/VRC-83	Y	Y	TBD	Control and Reporting Center
AN/TRC-176	RT-1319B	Y	Y	TBD	
AN/TSQ-23	AN/GRC-171B(v)4	Y	Y		Modular Control Equipment
AN/VRC-83	RT1319B	Y	Y	TBD	
ASOC/TACP/CCT	AN/GRC-206(V)3	Y	Y	TBD	RT-1319B. (Air Support Operations Center Tactical Air Control Party) (Combat Control Team)
M106E=2A	AN/URC-98A	Y	Y	TBD	Air Force Communications Control
MISC	AN/GRC-171B(V)4	Y	Y	TBD	Joint surveillance system regional operations control center / training ranges and other fixed sites

1/ Status: Y=Currently employed N=Not employed or under consideration at this time

Table A-2. HAVE QUICK Tactical Platform Availability Matrix – Army

Tactical Platform	Radio	Capability			Remarks
		HQ I	HQ II	Saturn	
AH-1E,F,S	AN/ARC-164(V)	Y	Y	TBD	
AH-64A,D	AN/ARC-164(V)	Y	Y	TBD	
CH-47D	AN/ARC-164(V)	Y	Y	TBD	
EH-1H,X	AN/ARC-164(V)	Y	Y	TBD	
EH-60A	AN/ARC-164(V)	Y	Y	TBD	
EO-5B	AN/ARC-164(V)	Y	Y	TBD	
MH-60K	AN/ARC-164(V)	Y	Y	TBD	
OH-6A	AN/ARC-164(V)	Y	Y	TBD	
OH-58A,C,D	AN/ARC-164(V)	Y	Y	TBD	
TH-67A	AN/ARC-164(V)	Y	Y	TBD	
UH-1H,V	AN/ARC-164(V)	Y	Y	TBD	
UH-60A,L	AN/ARC-164(V)	Y	Y	TBD	
C-12	Commercial*	N/Y	N/Y	TBD	*Some CONUS aircraft have on RT-1505/ARC-164(V) radio installed. Those radios sent back for depot repair are being replaced with the ARC-164 radio.
RC-12D,H	AN/ARC-164(V)	N	N	TBD	
RC-12K,N,P,Q	AN/ARC-164(V)	Y	Y	TBD	
AN/ASC-15B	AN/ARC-182	Y	Y	TBD	
	AN/ARC-210	Y	Y		
AN/GRC-240	AN/VRC-83(V)3	Y	Y	TBD	Vehicle (HMMWV) mounted AN/VRC-83s used by Aviation Command Post
Manpack	AN/PRC-117F	Y	Y		Used by SOF
Manpack, vehicle, fixed station	AN/PSC-5	Y	Y		Used by SOF
AN/TSC-61B	AN/ARC-164(V)	Y	Y	N	The Tactical Air Space Integration System replaced the Flight Control Center in FY 02.
AN/TSQ-71	AN/ARC-164(V)	Y	Y	N	The Air Traffic Navigation Integration Coordination System replaced the Landing Control Central in FY 00.
AN/TSQ-132	AN/VRC-83(V)3	Y	Y	TBD	JOINT STARS Ground Station Module/Common Ground System
AN/TSQ-168	AN/VRC-83(V)3	Y	Y	TBD	JOINT STARS Ground Station Module/Common Ground System
AN/TSQ-178	AN/VRC-83(V)3	Y	Y	TBD	JOINT STARS Ground Station Module/Common Ground System
AN/TSQ-179	AN/VRC-83(V)3	Y	Y	TBD	JOINT STARS Ground Station Module/Common Ground System

		Capability			
AN/TSQ198	AN/GRC-240	Y	Y	TBD	Tactical Terminal Control System mounted in vehicle (HMMWV) for air traffic control.
AN/TSW-7A	AN/ARC-164(V)	Y	Y	N	The Air Traffic Control Central will not be upgraded. Mobile Tower System will replace facility in FY-02.

1/ Status: Y=Currently employed N=Not employed or under consideration at this time

Table A-3. HAVE QUICK Tactical Platform Availability Matrix – Navy

Tactical Platforms	*Radio*	*Capability 1/*			*Remarks*
		HQ I	*HQ II*	*SATURN*	
R/M/CH-53	AN/ARC-210	Y	Y	TBD	
CH-60	AN/ARC-210	P01	P01	TBD	
E-2C	AN/ARC-182	Y	Y	TBD	AN/ARC-182 with C-11984 or ARC-210
	AN/ARC-210	Y	Y	TBD	
F-14	AN/ARC-182	Y	Y	TBD	AN/ARC-182 with C-11984
F/A-18A/B	AN/ARC-182	N	N	TBD	
F/A-18C/D	AN/ARC-210	Y	Y	TBD	100% Complete after lot 12
F/A-18E/F	AN/ARC-210	P02	P02	TBD	
Ships					
CG-47	AN/WSC-3	N	Y	TBD	
CVN	AN/WSC-3	N	Y	TBD	
DDG-51 (thru –84)	AN/WSC-3	N	Y	TBD	
DDG-51 (-85 and up)	AN/ARC-210	Y	Y	TBD	
LHA	AN/WSC-3	N	Y	TBD	
LHD	AN/WSC-3	N	Y	TBD	
Manpack	AN/PRC-117F	Y	Y		Used by SOF

1/ Status: Y=Currently employed N=Not employed or under consideration at this time

Table A-4. HAVE QUICK Tactical Platform Availability Matrix – Marine Corps

Tactical Platforms	*Radio*	*Capability*			*Remarks*
		HQ I	*HQ II*	*SATURN*	
AH-1W	AN/ARC-210	Y	Y	TBD	Complete installation FY01
AH-1Z (4 BLADE)	AN/ARC-210	P01	P01	TBD	
AV8B	AN/ARC-210	Y	Y	TBD	
EA-6B	AN/ARC-210	Y	Y	TBD	
F/A-18A/B	AN/ARC-210	Y	Y	TBD	
F/A-18C/D	AN/ARC-210	Y	Y	TBD	
K/C-130	AN/ARC-210	P99	P99	TBD	
M/R/CH-53D/E	AN/ARC-210	Y	Y	TBD	
MV-22	AN/ARC-210	P00	P00	TBD	
UH-1N	AN/ARC-210	Y	Y	TBD	
UH-1Y (4 BLADE)	AN/ARC-210	P01	P01	TBD	
Ground Facility	AN/GRC-171B(V)4	Y	Y	TBD	Air Defense Sector/Control and Reporting Center/ Control and Reporting Post
Manpack	AN/PRC-113	Y	Y	TBD	
Manpack	AN/PRC-117F	Y	Y	TBD	
Vehicle	AN/VRC-83(V)3	Y	Y	TBD	
DASC	AN/GRC-171B(V)4	Y	Y	TBD	
TAOC	AN/GRC-171B(V)4	Y	Y	TBD	
TACC	AN/GRC-171B(V)4	Y	Y	TBD	
MACS ATC	ARC-210 & RT-1319B	P99	P99	TBD	Complete installation FY05

1/ Status: Y=Currently employed N=Not employed or under consideration at this time

Appendix B
HAVE QUICK Operator Manuals

Table B-1. HAVE QUICK II Operator Manuals

Service	***Radio***	***Document Number***
Air Force	AN/ARC-164	12R2-2ARC-164-91
	AN/ARC-171	12R2-2ARC-171-21/-31/-41
	AN/ARC-204	TO 1E-3A-43-1-1
	AN/ARC-210	
	AN/ARC-215	TO 1B2A-1
	AN/ARC-225	See AN/ARC-164 manual
	AN/GRC-171B(V)4	31R2-2GRC-171-62
	AN/GRC-206(V)3	31R2-2GRC-206-1,-1-1,-2-1
	AN/GRC-240	TM-11-5820-1148-13,-13P
	AN/PRC-113	31R2-2PRC-113-1&-1-1
	AN/PSC-5D	31R2-2PSC5-2
	AN/TRC-176	31R2-2TRC-176-1,-2,-1-1,-2-1
	AN/TSQ-198	TM-11-5826-1568-14
	AN/URC-98A	12R2-2URC-102 12R2-2URC-101-1
	AN/URC-99A	12R2-2URC-102
	AN/VRC-83(V)3	31R2-2VRC-83-1& -1-1
Army	AN/ARC-164	TM-11-5821-356-23,-23P
	AN/ARC-210	
	AN/GRC-171A(V)4	523-0775328-001611
	AN/GRC-240	TM-11-5820-1148-13,-13P
	AN/PRC-113	31R2-2PRC-113-1&-1-1
	AN/TSQ-198	TM-11-5826-1568-14&-24P
	AN/VRC-83(V)3	TM 11-5820-1149-14&P TM 11-5820-1147-13&P-1&P-2
Navy	AN/ARC-182	NA 16-35C11128-1 I level for C-11984/ARC
	AN/ARC-210	NA-16-35C11898-1 I level manual for C-11896/ARC, C-11897/ARC & C-11898/ARC
	AN/WSC-3(V)11	TO 31RS-2WSC-3-1 EE131-BM-SUP-010
Marine Corps	AN/ARC-182	NA 16-35C11128-1 I level for C-11984/ARC
	AN/ARC-210	NA-16-35C11898-1 I level manual for C-11896/ARC, C-11897/ARC & C-11898/ARC
	AN/GRC-171A(V)4	523-0775328-001611
	AN/GRC-171B(V)4	31R2-2GRC-171-62
	AN/PRC-113	31R2-2PRC-113-1&-1-1
	AN/PRC-117F	10515-0109-4000
	AN/VRC-83(V)	31R2-2VRC-83-1&-1-1

Appendix C
USN CVW 17 HAVE QUICK II REFERENCE CARD USING AN/ARC-182 RADIO

1. HAVE QUICK II T-Net Operation

a. Loading Training Nets.

(1) Preset 40.

(2) Read.

(3) Enter 220.025.

(4) Load.

(5) Return to Preset (Display 1.1).

(6) Determine WOD and frequency based on date calendar.

Table C-1. WOD and Frequency Based on Date Calendar

WOD	*DATE TAG*					
1	1	7	13	19	25	31
2	2	8	14	20	26	
3	3	9	15	21	27	
4	4	10	16	22	28	
5	5	11	17	23	29	
6	6	12	18	24	30	

(7) Select X.1 where X = WOD.

(8) Read.

(9) Enter Frequency.

(10) Load.

(11) Enter remaining WOD components using preset, read, enter, load procedures.

(12) Multiple WODs (MWODs) can be entered to operate over several days or 0000 Zulu.

Table C-2. Multiple WODs Entered to Operate Over Several Days or 0000 Zulu

	WOD					
PRESET	**1**	**2**	**3**	**4**	**5**	**6**
X.1	300.025	300.050	300.000	300.025	300.050	300.000
X.2	275.500	225.025	327.025	256.000	254.000	235.025
X.3	315.750	362.050	258.050	258.025	322.025	232.050
X.4	240.000	235.050	356.000	235.050	299.050	333.000
X.5	255.550	300.000	357.050	360.000	358.000	232.025
X.6	325.000	285.250	285.000	366.025	324.005	315.050

(13) Return to Preset, select X.7 where X = WOD.

(14) Read.

(15) Enter 2 digit WOD date tag.

(16) Load.

(17) Return to Preset, select 8.1.

(18) Read.

(19) Enter current 2 digit date (current date must match an entered WOD and date tag.

(20) Load.

b. Operation.

(1) Manual or Preset Button to prebriefed Time of Day (TOD)/Mickey frequency.

(2) Toggle to receive for at least one second (gives a 60 second window to receive Mickey).

(a) To self start (i.e. no Mickey available) toggle to RCV until decimal flashes and then toggle to send until you hear tone.

(3) To send Mickey, toggle to send until you hear the TOD go out approximately 1 second.

(4) Manual.

(5) Set frequency to correct net.

(6) Select AJ.

(7) Display should read A00.X00 where X = 0 to 4 (Proper Training Net format).

c. Trouble Shooting.

(1) Function selector in Manual.

XX.XXX	Invalid MWOD and Date
?XX.XXX	Invalid net frequency
XXX.XXX	No TOD

(2) Function selector in Preset

X.X	Invalid MWOD and date
?X.X	Invalid net frequency
X.X	No TOD

2. HAVE QUICK II Anti-Jam Operation

a. Loading Combat Nets.

(1) Preset 40.

(2) Read.

(3) Enter 220.025.

(4) Load.

(5) Return to Preset (Display 1.1).

(6) Determine WOD and frequency based on date calendar.

Table C-3. WOD and Frequency Based on Date Calendar

WOD	*FREQS*	*DATE TAG*					
1	6 CMS	1	7	13	19	25	31
2	6 CMS	2	8	14	20	26	
3	6 CMS	3	9	15	21	27	
4	6 CMS	4	10	16	22	28	
5	6 CMS	5	11	17	23	29	
6	6 CMS	6	12	18	24	30	

(7) Select X.1 where X = WOD.

(8) Read.

(9) Enter first CMS frequency.

(10) Load.

(11) Continue entering CMS frequencies in order in X.2 through X.6 using present, read, enter, load procedures.

(12) Return to preset, select X.7 where X = WOD.

(13) Read.

(14) If it is desired to load multiple days, repeat Steps 7-12.

(15) Load.

(16) Multiple WODs must be entered to operate over several days or 0000 Zulu.

(17) Return to Preset, select 8.1.

(18) Read.

(19) Enter current 2 digit current date (current date must match an entered WOD and date tag).

b. Operation.

(1) Manual or Preset Button to prebriefed Time of Day (TOD)/Mickey frequency.

(2) Toggle to receive for at least one second (gives a 60 second window to receive Mickey).

(a) To self start (i.e. no Mickey available) toggle to RCV until decimal flashes and then toggle to send until you hear tone.

(3) To send Mickey, toggle to send until you hear the TOD go out approximately 1 second.

(4) Manual.

(5) Set frequency to correct net (delineated in optask comm and should be 3XX.XAA) where XX.X = any # and AA = 00 (HQ I), 25 (NATO), 50 (non NATO).

(6) Select AJ.

(7) Display should read AXX.X00 (HQ I), AXX.X25 (NATO), or AXX.X50 (non NATO) for proper HQ anti-jam nets.

c. Trouble Shooting.

(1) Function selector in Manual.

XX.XXX	Invalid MWOD and Date
?XX.XXX	Invalid net frequency
XXX.XXX	No TOD

(2) Function selector in Preset.

X.X	Invalid MWOD and date
?X.X	Invalid net frequency
X.X	No TOD

d. Clearing CMS.

(1) Return to manual, select Preset 40.

(2) Read.

(3) Enter 220.050.

(4) Load.

(5) Display will go blank indicating WODs have been erased.

3. HAVE QUICK II FMT Operation

a. Loading Training Nets.

(1) Preset 40.

(2) Read.

(3) Enter 220.025.

(4) Load.

(5) Return to Preset (Display 1.1).

(6) Determine WOD and frequency based on date calendar.

Table C-4. WOD and Frequency Based on Date Calendar

WOD	*FREQ*	*DATE TAG*					
1	300.025	1	7	13	19	25	31
2	300.050	2	8	14	20	26	
3	300.000	3	9	15	21	27	
4	300.025	4	10	16	22	28	
5	300.050	5	11	17	23	29	
6	300.000	6	12	18	24	30	

(7) Select X.1 where X = WOD.

(8) Read.

(9) Enter Frequency.

(10) Load.

(11) Return to Preset, select X.7 where X = WOD (for FMT, X.2 to X.6 do not matter).

(12) Read.

(13) Enter a valid 2 digit date WOD date tag.

(14) Load.

(15) Multiple WODs must be entered to operate over several days or 0000 Zulu.

(16) Return to Preset, select 8.1.

(17) Read.

(18) Enter 2 digit current date Enter current 2 digit date (current date must match an entered WOD and date tag).

(19) Load.

(20) Return to Manual, select Preset 40.

(21) Read.

(22) Enter 220.075.

(23) Load.

(24) Enter FMT frequencies in 7.01 through 7.16 via preset, read, enter, load procedures.

Table C-5. FMT frequencies in 7.01 Through 7.16 Via Preset, Read, Enter, Load Procedures

7.01	235.050	7.09	314.450
7.02	225.150	7.10	308.750
7.03	252.925	7.11	303.275
7.04	239.950	7.12	298.650
7.05	271.950	7.13	293.550
7.06	267.850	7.14	289.050
7.07	262.450	7.15	284.150
7.08	257.250	7.16	279.750

b. Operation.

(1) Manual or Preset Button to prebriefed Time of Day (TOD)/Mickey frequency.

(2) Toggle to receive for at least one second (gives a 60 second window to receive Mickey).

(a) To self start (i.e. no Mickey available) toggle to RCV until decimal flashes and then toggle to send until you hear tone.

(3) To send Mickey, toggle to send until you hear the TOD go out approximately 1 second.

(4) Manual.

(5) Set frequency to correct net (30X.X25) where X.X = 0.0 to 1.5.

(6) Select AJ.

(7) Display should read A0X.X25 where X.X = 0.0 to 1.5 (Proper FMT Training Net format).

c. Troubleshooting.

(1) Function selector in Manual.

XX.XXX	Invalid MWOD and Date
?XX.XXX	Invalid net frequency
XXX.XXX	No TOD

(2) Function selector in Preset

X.X	Invalid MWOD and Date
?X.X	Invalid net frequency
X.X	No TOD

Appendix D
USN LESSONS LEARNED

1. USN Lessons Learned

USN Lessons Learned is a classified appendix and can be found on the SIPRNET at http://wwwacc.langley.af.smil.mil/alsa/havequick.htm.

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GLOSSARY

PART 1 -- ACRONYMS AND ABBREVIATIONS

A

AFB	Air Force Base
AJ	anti-jam
AM	amplitude modulation
AWACS	Airborne Warning and Control System

C

C2	command and control
CEOI	communications-electronics operating instructions
CG	guided missile cruiser
CMS	cryptographic material security
COMSEC	communications security
CONUS	continental United States
CVN	aircraft carrier, nuclear
CVW	carrier air wing

D

DASC	direct air support center
DDG	guided missile destroyer
DOM	day of month

F

FFH	fast frequency hopping
FFH-net	fast-frequency-hopping net
FFH-SB-T	
FFH-T	fast-frequency-hop training
FFHT-net	fast-frequency-hopping training net
FMA-net	frequency management A-net
FMT (AM)	frequency management training net (AM mode)
FMT-net	frequency management training net

G

GPS	global positioning system

H

HMMWV	high mobility multipurpose wheeled vehicle
HQ	HAVE QUICK

HQ I	HAVE QUICK I
HQ IIA	HAVE QUICK IIA (also referred to as SATURN)
HQ II	HAVE QUICK II
HQFM	HAVE QUICK frequency modulation
HQFM-net	HAVE QUICK frequency modulation net
HQFMT-net	HAVE QUICK frequency modulation training net
HQ-T	

I

ICP	intertheater communications security (COMSEC) package

J

JCEOI	joint communications-electronics operating instructions
JFC	joint force commander
JSTARS	Joint Surveillance Target Attack Radar Systems
JTF	joint task force
JV	Joint Vision

K

kbps	kilobits per second
kHz	kilohertz

L

LHA	amphibious assault ship (general purpose); amphibious assault ship (multi-purpose)

M

MACS ATC	Marine Air Control Squadron Air Traffic Control
MC	MC-130E Combat Talon I and MC-130H Combat Talon II
MHz	megahertz
MWOD	multiple word-of-day

N

NATO	North Atlantic Treaty Organization

O

OTA	over-the-air

R

RF	radio frequency

S

SATURN	second generation anti-jam tactical UHF radio for NATO

SB	side-band
SH-FM-T	
SOF	special operations forces
SOP	standard operating procedure

T

TACC	tactical air control center
TACP	tactical air control party
TAOC	tactical air operations center
TBD	to be determined
TCXO	temperature controlled quartz crystal oscillators
TM	technical manual
T-net	training-net
TOD	time-of-day
TRANSEC	transmission security

U

UHF	ultra high frequency
US	United States
UTC	Coordinated Universal Time

V

VINSON	encrypted ultrahigh frequency communications system

W

WOD	word-of-day

PART II -- TERMS AND DEFINITIONS

active mode - The frequency-hopping mode of operation for HAVE QUICK radios.

conferencing - The receiver's ability to accept two simultaneous transmissions on the same net while avoiding the beat note or side tone that is typically present under normal operation, preventing the listeners from understanding either transmission.

Coordinated Universal Time - (DOD) An atomic time scale that is the basis for broadcast time signals. Coordinated Universal Time (UTC) differs from International Atomic Time by an integral number of seconds; it is maintained within 0.9 seconds of UT1 (see Universal Time) by introduction of Leap Seconds. The rotational orientation of the Earth, specified by UT1, may be obtained to an accuracy of a tenth of a second by applying the UTC to the increment DUT1 (where DUT1 = UT1 - UTC) that is broadcast in code with the time signals. Also called UTC.

hopset - The specific set of frequencies that HAVE QUICK radios use in the active mode.

hop rate - The rate at which HAVE QUICK radios switch from one frequency of the hopset to the next.

hopping pattern - The specific order in which HAVE QUICK radios switch from one frequency of the hopset to the next.

net number - A number that selects the specific group of frequencies over which HAVE QUICK radios will hop. It ensures that users on different nets do not hop onto the same frequency at the same time.

normal mode - The single-channel UHF mode of operation for HAVE QUICK radios.

time-of-day (TOD) - a signal that synchronizes HAVE QUICK radios to a common time base for active mode operation.

word-of-day (WOD) - A transmission security (TRANSEC) variable that defines the sequence of frequencies, the dwell times, and the hopping rates for HAVE QUICK radios in the active mode.

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NTTP 6-02.7
AFTTP(I) 3-2.49

7 May 2004

By Order of the Secretary of the Army:

Official:

PETER J. SCHOOMAKER
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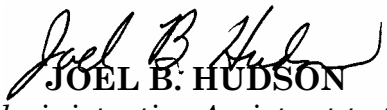
Chief of Staff



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0414101

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