Frequency Management Group

RCC 700-17

SPECTRUM MANAGEMENT GUIDELINES FOR NATIONAL AND SERVICE TEST AND TRAINING RANGES

ABERDEEN TEST CENTER
DUGWAY PROVING GROUND
REAGAN TEST SITE
REDSTONE TEST CENTER
WHITE SANDS MISSILE RANGE
YUMA PROVING GROUND

NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION
NAVAL AIR WARFARE CENTER WEAPONS DIVISION
NAVAL UNDERSEA WARFARE CENTER DIVISION, KEYPORT
NAVAL UNDERSEA WARFARE CENTER DIVISION, NEWPORT
PACIFIC MISSILE RANGE FACILITY

30TH SPACE WING
45TH SPACE WING
96TH TEST WING
412TH TEST WING
ARNOLD ENGINEERING DEVELOPMENT COMPLEX

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

This page intentionally left blank.

DOCUMENT 700-01

SPECTRUM MANAGEMENT GUIDELINES FOR NATIONAL AND SERVICE TEST AND TRAINING RANGES

July 2017

Prepared by

RANGE COMMANDERS COUNCIL
FREQUENCY MANAGEMENT GROUP

Published by

Secretariat
Range Commanders Council
U.S. Army White Sands Missile Range
New Mexico 88002-5110

This page intentionally left blank.

Table of Contents

This page intentionally left blank.

Preface

This document was prepared by the Range Commanders Council's (RCC) Frequency Management Group (FMG). It represents the culmination of FMG Task FM-039, *Update RCC 700-01 Frequency Management Guidelines for National and Service Test and Training Ranges*.

The FMG welcomes comments regarding this publication and requests that they be forwarded to the RCC Secretariat using the contact information below.

Secretariat, Range Commanders Council
100 Headquarters Ave
ATTN: CSTE-WS-RCC
White Sands Missile Range, NM 88002-5110
Telephone: (575) 678-1107; DSN: 258-1107
Fax: (575) 678-7519; DSN: 258-7519
Email: usarmy.wsmr.atec.list.rcc@army.mil

This page intentionally left blank.

Acronyms

ACMI	Air Combat Maneuvering Instrumentation
AFC	Area Frequency Coordinator
AOR	area of responsibility
C2	command and control
CIO	Chief Information Officer
CJCSM	Chairman, Joint Chiefs of Staff Manual
CRIIS	Common Range Integrated Instrumentation System
DoD	Department of Defense
EA	Electronic Attack
EL-CID	Equipment Location-Certification Information Database
EMC	electromagnetic compatibility
EMI	electromagnetic interference
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FMG	Frequency Management Group
FP	Frequency Panel
FRS	Flight Restriction System
FTS	Flight Termination System
GHz	gigahertz
GPS	Global Positioning System
ISM	Installation Spectrum Manager
JTIDS	Joint Tactical Information Distribution System
KMR	Kwajalein Missile Range
LMR	Land Mobile Radio
MC4EB	Military Command, Control, Communications, and Computers Executive Board
MHz	megahertz
MILDEP	Military Department
MRTFB	Major Range and Test Facility Base
NATO	North Atlantic Treaty Organization
NTIA	National Telecommunications and Information Administration
OSD	Office of the Secretary of Defense
RCC	Range Commanders Council
RDT&E	Research, Development, Test, and Evaluation
RFA	Radio Frequency Authorization
RF	radio frequency
T&E	test and evaluation
TACTS	Tactical Air Combat Training System
TSDF	Time Slot Duty Factor
TSPI	time-space-position information
UAV	unmanned aerial vehicle
US&P	United States and Possessions

This page intentionally left blank.

1. Purpose

This document provides the range user with guidance and information concerning the use of the radio frequency (RF) spectrum at the Major Range and Test Facility Base (MRTFB) installations. This document implements national spectrum policy set by the National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC), Title 47 of the US Federal Code of Regulations, the Combined Communications-Electronics Board,[1] and other applicable documents. The information contained in this document is meant to augment national spectrum policy and provide for the safe, efficient, consistent, and scheduled use of the RF spectrum.

2. Major Range and Test Facility Base

The MRTFB is a set of test installations, facilities, and ranges that are regarded as national assets. These assets are sized, operated, and maintained primarily for Department of Defense (DoD) test and evaluation (T&E) missions; however, the MRTFB facilities and ranges are also available on a reimbursable basis to other users, such as U.S. Government agencies (federal, state, and local), defense contractors, commercial entities, and allied foreign governments. Because of the wide variety of activities that may take place on the DoD ranges, often simultaneously, the functions performed by the Area Frequency Coordinator (AFC) are critical. Facilities comprising the MRTFB are listed below.

a. Department of the Army facilities

- White Sands Test Center, White Sands Missile Range, NM
- High Energy Laser Test Facility
- US Army Kwajalein Atoll (Ronald Reagan Ballistic Missile Defense Test Site)
- Yuma Test Center, Yuma Proving Ground, AZ
- Cold Regions Research and Engineering Laboratory (CRREL), Fort Greeley, AK
- Tropic Regions Test Center, Yuma Proving Ground, AZ (various)
- West Desert Test Center, Dugway, UT
- Aberdeen Test Center, Aberdeen Proving Ground, MD
- Electronic Proving Ground, Fort Huachuca, AZ

b. Department of the Navy facilities

- Naval Air Warfare Center-Weapons Division, Point Mugu, CA
- Naval Air Warfare Center-Weapons Division, China Lake, CA
- Naval Air Warfare Center-Aircraft Division, Patuxent River, MD
- Naval Undersea Warfare Center, Atlantic Undersea Test and Evaluation Center (AUTEC), Andros Island, Bahamas
- Pacific Missile Range Facility, Barking Sands, Kauai, HI

[1] Combined Communications-Electronics Board. "Guide to Frequency Planning." ACP 190 US SUPP-1(D). January 2015. May be superseded by update. Retrieved 12 July 2017. Available to RCC members with Private Page access at https://wsdmext.wsmr.army.mil/site/rccpri/Limited_Distribution_References/ACP190_US_SUPP-1D.pdf.

- Keyport Pacific Northwest Range Complex (Nanoose and Dabob Ranges), Keyport, WA

c. Department of the Air Force facilities

- Eastern Test Range (45th Space Wing), Patrick AFB, FL
- Western Launch & Test Range (30th Space Wing), Vandenberg AFB, CA
- Arnold Engineering Development Complex, Arnold AFB, TN
- Nevada Test and Training Range, Nellis AFB, NV
- 412th Test Wing, Edwards AFB, CA
- Utah Test and Training Range, Hill AFB, UT
- Eglin Test & Training Complex (96th Test Wing) Eglin AFB, FL

3. Responsibilities and Procedures

3.1 Range Commanders Council (RCC) Frequency Management Group (FMG)

The FMG works to recognize, confront, and resolve RF-related issues that impact the ability of the test and training ranges to perform their missions. Additionally it brings together the required expertise to address, but is not limited to, the following:

a. Regulating and protecting range electromagnetic spectrum assets;

b. Future range spectrum requirements;

c. Intra-/Inter-range frequency deconfliction/scheduling;

d. Spectrum monitoring, interference control, direction-finding, techniques/resources;

e. DoD electromagnetic spectrum loss/encroachment/sharing;

f. Developing and updating range spectrum usage documentation.

3.2 Department of Defense Area Frequency Coordinator

The DoD, in accordance with the Joint Chiefs of Staff, the Military Command, Control, Communications, and Computers Executive Board (MC4EB), and the military departments, established the DoD AFC system to ensure successful operation of the extensive communication-electronics equipment at the national and Service test and training ranges. The objectives are: to provide an area focal point for rapid, effective RF coordination for the ranges to minimize harmful interference; and to promote the DoD Electromagnetic Compatibility Program, while maximizing efficient radio spectrum frequency use.

In accordance with ACP-190, AFCs are responsible for the establishment of effective frequency coordination systems and processes at, among, and within line of sight of national and Service test and training ranges. This coordination is essential to ensure successful operation of extensive range and range-hosted spectrum-dependent systems. Range commanders will ensure that range and range-hosted spectrum-dependent systems comply with all spectrum-related national, joint, DoD, and Military Department (MILDEP) regulations, instructions, manuals, and policies. The range commanders are also responsible for the operational deconfliction of all spectrum-dependent assets under their purview with other spectrum users through established frequency management channels.

The MILDEPs are responsible for the coordination and assignment of frequencies in support of all military operations in the continental United States and for the coordination of military spectrum use among civil and federal agencies within the United States and Possessions (US&P). The DoD AFC is responsible for spectrum coordination in the areas that lie in, among, and within line of sight of any range or range-hosted spectrum-dependent system at a national and service test and training range or other designated complex as further defined herein. Although DoD AFCs are assigned by the MILDEPs, these coordinators are responsible to the Office of the Secretary of Defense (OSD)/Chief Information Officer (CIO), and thus, are responsible for complying with all provisions of this publication and all spectrum-related national, departmental, joint, and DoD spectrum-related regulations, instructions, manuals, and policies. The AFCs will communicate through proper MILDEP channels to establish a departmental position prior to presenting an issue or subject to the OSD/CIO, MC4EB Frequency Panel (FP), or national level. The AFCs and installation/range spectrum managers are responsible for the compliance of spectrum-dependent systems within their purview with national, joint, DoD and departmental procedures. Range commanders shall resource AFCs assigned by the MILDEPs at the range location where the AFC resides.

The AFCs are responsible to ensure that range and range-hosted spectrum-dependent systems comply with all spectrum-related national, joint, DoD, and department regulations, instructions, manuals, and policies. The AFCs are also responsible for the operational deconfliction of all spectrum-dependent assets under their purview with other spectrum users through established frequency deconfliction processes. The AFC will inform the range or center commander and the Installation Spectrum Manager (ISM) at the installation/locations at which they reside and to the commanders and the respective ISMs at other installations within the area of responsibility (AOR) of that AFC for all spectrum actions as noted above.

In addition to required spectrum coordination for military operations as specified above, NTIA requires coordination with designated DoD AFCs when federal operations are to take place either within radio line of sight or close enough to cause interference to their respective AORs in bands above 420 megahertz (MHz). Details for required coordination are contained in the NTIA manual,[2] Table 8.3.26 - DoD Test Ranges, Areas of Concern, and Applicable Coordination Note. The responsible MILDEP and the AFCs and DoD test ranges for which coordination is required by NTIA direction are listed in Appendix B for convenience; however, the NTIA manual is the definitive guidance document.

The MILDEPs will ensure coordination has been accomplished with the appropriate DoD AFC and cognizant base/installation spectrum manager prior to assignment of all frequencies or activation of any intended electromagnetic spectrum use within, among, or within line of sight of their respective AORs. Spectrum use shall not be authorized until permission is granted by the cognizant DoD AFC in coordination, as necessary, with all other DoD AFCs – and installation and range spectrum managers – that could be affected by any MILDEP activity. Coordination for ships and aircraft use at non-US instrumentation sites and within international waters will be accomplished by the cognizant MILDEP with the appropriate Combatant Commands through the MC4EB FP. The AFCs will function within the following terms of reference and procedures. Nothing in these terms of reference is intended to usurp the services and/or a commander's

[2] National Telecommunications and Information Administration. "Manual of Regulations and Procedures for Federal Radio Frequency Management." September 2015. May be superseded by update. Retrieved 23 March 2017. Available at https://www.ntia.doc.gov/files/ntia/publications/manual_sep_2015.pdf.

responsibilities in respect to frequency management; however, certain responsibilities for departmental activities in an AFC's AOR may be delegated to the AFC by the department concerned.

3.3 Range Spectrum Manager

The Range Spectrum Manager (RSM) is responsible for obtaining, managing, coordinating, and granting access to and maximum utilization of the electromagnetic spectrum resources at or near the national and Service test and training ranges. The RSM shall be the ISM as the installation will encompass the entire range complex and not just the cantonment areas, as with an installation without an associated range. (Specifically, the Eglin Test & Training Complex is such an area where the ISM is also the RSM.) The RSM will validate, control, protect, justify, account for, and defend the electromagnetic environment for all operations and is the single test and training range focal point for all range electromagnetic spectrum access requirements. The RSM provides technical guidance and resolves electromagnetic interference (EMI) and electromagnetic compatibility (EMC) issues. The RSM is also the single focal point for all internal/external coordination with the government and civil authorities that may be necessary to preclude or resolve test range EMI/EMC conflicts. The following is a list of RSM responsibilities.

a. Provides via the range commander's authority an RF coordination system and infrastructure for their service test and training range or test site. Adequate resources are required to train, staff, and sustain highly qualified individuals able to perform these functions.

b. Ensures that all current and future test range activities comply with all federal, civil, DoD, and local rules and laws regarding the use of the electromagnetic spectrum.

c. Ensures that current or proposed test range activities will not cause harmful interference to Federal Aviation Administration (FAA) safety of flight, civil public safety systems, or other crucial civil systems in proximity to the test range.

d. Obtains legal license through local, regional, national, and international channels as necessary for test and training range activities that require access to the electromagnetic spectrum.

e. Reviews and evaluates frequency assignment requests proposed for use within their AORs. The review and evaluation will establish the compatibility of proposed frequencies with national and Service test and training ranges and other military and non-military activities at or within line of sight of any range or range-hosted operation.

f. Maintains current records of all frequencies that have been coordinated and/or assigned for use in their AORs, especially a database of all test and training range infrastructure and program spectrum requirements and operating frequencies. Such records will include frequencies assigned to military activities, military contractors, and those federal and non-federal assignments being shared with test range activities.

g. Ensures that all test range projects and programs are following proper DoD procurement rules regarding acquisition of spectrum-dependent equipment, and that a valid JF-12 or DD Form 1494 or the NTIA's Equipment Location-Certification Information Database (EL-CID) has been submitted and approved.

h. Processes and coordinates Electronic Attack (EA, formerly EW/ECM/ECCM) requests through appropriate local and national channels in accordance with Chairman, Joints Chiefs of Staff Manual (CJCSM) 3212.02D[3] or CJCSM 3212.03A[4].

i. Ensures that every activity operating on flight test telemetry, command destruct, or flight termination frequencies are scheduled and coordinated in, among, and within line of sight of all other on and off-range spectrum activities before a flight or test can occur.

j. Advises their range commander of any electromagnetic issues impacting the range's mission (spectrum encroachment/reallocation, anticipated RF conflicts, etc.).

k. Maintains close liaison with all federal and civil frequency management offices within test range operations areas.

l. Maintains a cost accounting database of test range infrastructure costs and usage necessary to defend, justify, and respond to national spectrum reallocation efforts.

m. Provides guidance to test and training range customers on the proper use of the electromagnetic spectrum.

n. Provides test and training range customers with electromagnetic engineering services as necessary.

o. Provides test and training range customers with EMI/EMC spectrum monitoring, geo-locating, and interference control services as necessary to enforce spectrum access limitations and ensure test program objectives can be met. Will lead the detection, identification, and elimination of real-time harmful EMI to operations within their AOR.

3.4 Range Spectrum Scheduling

Because spectrum availability for test and training is limited, most ranges require scheduling to provide maximum utilization of the RF spectrum. All scheduling is done on a priority basis as determined by DoD, the range commander, or other priority schemes. The range spectrum scheduling/deconfliction office (RSS/DO) takes in range customer requirements, then deconflicts and passes this schedule on to the DoD AFC office for that geographic area with concurrence from the RSM. The DoD AFC then deconflicts the single range requirements with other ranges and AFCs as necessary to ensure interference-free operations at all the applicable test and training ranges in accordance with RCC Document 706-02.[5] It is the responsibility of the RSS/DO to inform the DoD AFC and RSM of missions that require coordination with multiple AFCs. Once notified, it is the responsibility of the AFC to deconflict the operation with other AFCs as appropriate.

[3] Joint Chiefs of Staff. "Performing Electronic Attack in the United States and Canada for Tests, Training, and Exercises." CSCSM 3212.02D. 31 December 2013. May be superseded by update. Available to users with appropriate credentials at https://jsportal.sp.pentagon.mil/sites/matrix/del/sitepages/home.aspx.
[4] Joint Chiefs of Staff. "Performing Tests, Training, and Exercises Impacting the Global Positioning System (GPS)." CJCSM 3212.03A. 8 November 2013. May be superseded by update. Available to users with appropriate credentials at https://jsportal.sp.pentagon.mil/sites/matrix/del/sitepages/home.aspx.
[5] Range Commanders Council. *Frequency Management Standard Operating Procedure for Frequency Deconfliction*. RCC 706-02. July 2002 (revised March 2003). May be superseded by update. Retrieved 21 March 2017. Available at http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx.

3.5 Range Users

As a range user, four requirements must be met prior to radiating in the electromagnetic spectrum: 1. Allocation; 2. Notification; 3. Assignment; and 4. Scheduling. Prior to operations, a Radio Frequency Authorization (RFA) letter must be obtained from the responsible RSM. The first step in obtaining an RFA is to contact the RSM responsible for that test location (see Appendix B). This requirement should be accomplished as soon as a test or training location has been selected as a candidate for testing. Certain spectrum access requirements may be difficult to secure at some test locations. Contacting the responsible RSM directly will ensure that test preparations go as smoothly as possible.

Spectrum certification, as required by OMB Circular A-11,[6] DoD, and civil regulations, must be submitted or obtained prior to operation of all spectrum-dependent equipment. Without a valid frequency allocation, granting electromagnetic spectrum access may be impossible and program test objectives will be in jeopardy. If a valid DD Form 1494/JF-12/EL-CID exists, the RSM can process a frequency assignment to authorize program access to the spectrum. Assignment processing time varies between agencies and with the complexity of the requirement. This assignment process may take three months to one year, but can usually be completed within six months. Under some conditions, access to the spectrum will be shared with other range or civil users. In these cases, scheduling and deconfliction with other users will be necessary. If a program is required to schedule operations through the RSS/DO, the proper points of contact and limitations will be stated on the program's RFA letter. If a program receives any harmful interference, the responsible RSM should be notified immediately. Under no circumstances is a program to make any attempt to resolve, track down, or identify an interference source. The RSM is the only entity with the authority to track down and resolve interference. Any deviation from this policy could lead to a serious breach in US national security.

It should be noted that some access requirements cannot be granted under any circumstances. The structure of spectrum management within the United States places authority over federal access to the electromagnetic spectrum under the Department of Commerce. As such, the DoD is only one of 19 Interdepartment Radio Advisory Committee federal agencies vying for access to the electromagnetic spectrum. The DoD does not have the ultimate authority over access to any portion of the electromagnetic spectrum, and can legally be denied access for any number of technical or political reasons. If proper national and DoD policies and guidelines have been followed through the procurement and development phases of a program, there should be few restrictions attached to granting the required access. For equipment that does not have an approved DD Form 1494/JF-12/EL-CID, it is the user's/program's responsibility to complete the required paperwork. The RSM will provide all the necessary administrative support in processing the paperwork through proper channels.

[6] Executive Office of the President Office of Management and Budget. "Preparation, Submission, and Execution of the Budget." Circular No. A-11. July 2016. May be superseded by update. Retrieved 12 July 2017. Available at https://www.whitehouse.gov/omb/circulars_a11_current_year_a11_toc.

APPENDIX A

Definitions

NOTE 	The following definitions of frequency management terms were extracted from international, national, and DoD regulations and directives. Where appropriate, the source is given in parentheses following each definition. For example, (RR) -- International Telecommunications Union Radio Regulations and (NTIA) -- National Telecommunications and Information Administration Manual of Regulations and Procedures for Federal Radio Frequency Management.

Allocation - Entry in the FCC's Table of Frequency Allocations[7] of a given frequency band for its use by one or more terrestrial or space radio communication services or the radio astronomy service under specified conditions. This term also applies to the frequency band concerned. (RR)

Assignment - Authorization given by an administration for a radio station to use an RF or RF channel under specified conditions. (RR)

Channeling plan - The plan by which the frequencies within a frequency band are to be assigned.

Electromagnetic Compatibility (EMC) - The condition that prevails when telecommunications equipment is performing its individually designed function in a common electromagnetic environment without causing or suffering unacceptable degradation due to unintentional EMI to or from other equipment in the same environment. (NTIA)

Electromagnetic Interference (EMI) - Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics or electrical equipment. Induction of EMI can be intentional as in some forms of electronic warfare, or unintentional as a result of spurious emissions and responses, intermodulation products, and the like. (JP 1-02)

Frequency assignment - See "assignment" (of an RF or RF channel).

Frequency assignment, temporary - An assignment effective for 90 days or less.

Harmful interference - Interference that endangers the functioning of a radio navigation service or other safety services, or that seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with the radio regulations. (RR)

Industrial, Scientific, and Medical applications - Operation of equipment or appliances designed to generate and use local RF energy for industrial, scientific, medical, domestic, or similar purposes, excluding applications in the field of telecommunications. (RR)

Interference - The effect of unwanted energy due to one or a combination of emissions, radiation, or induction upon reception in a radio communication system, manifested by

[7] Code of Federal Regulations, Table of Frequency Allocations, title 47, sec. 2.106.

any performance degradation, misinterpretation, or loss of information that could be extracted in the absence of such unwanted energy. (RR)

Low-power communication device - A restricted radiation device, exclusive of those employing conducted or guided RF techniques, used for the transmission of signs, signals (including control signals), writing, images, and sounds, or intelligence of any nature by radiation of electromagnetic energy. Examples: wireless microphone, phonograph oscillator, radio-controlled garage door opener, and radio-controlled models. All low-power devices must have an assigned FCC low-power authorization (as indicated on the device) per part 15 of Title 47 of the US Code of Federal Regulations.

NTIA Manual - Department of Commerce (DOC) National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Frequency Management.

Radio Frequency Authorization (RFA) - A written document signed by the cognizant frequency manager in charge of the area to be operating in that lists all of the frequencies on which a program is authorized to radiate. This document will specify all restrictions and conditions that must be adhered to during use of the frequencies authorized.

Radio Frequency Spectrum - The RF spectrum includes the frequencies from 3.0 kHz to 400 gigahertz (GHz). The presently allocated spectrum is from 9 kHz to 381 GHz.

Radio location - Radio determination used for purposes other than radio navigation. (RR)

Range Commander - In this publication, the commander of a test, tactical, or training range.

Range Spectrum Scheduling Office - Organization that handles daily scheduling of range frequencies. These frequencies must have been authorized by the responsible frequency manager for that area.

Restricted radiation device - A device in which the generation of RF energy is intentionally incorporated into the design, and in which the RF energy is conducted along wires or is radiated, exclusive of transmitters for which provisions are made under those parts of Chapter 7 of the NTIA manual other than Part 7.9, and exclusive of industrial, scientific, and medical equipment. (NTIA)

Spectrum-dependent system - Any equipment, system, or subsystem that intentionally uses the RF spectrum to fulfill its intended purpose, regardless of transmitted power, frequency, or purpose.

Spurious emission - Emission on a frequency or frequencies that is outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, but exclude out-of-band emissions. (RR)

Telecommunications - Any transmission, emission, or reception of signs, signals, writings, images, and sounds or information of any nature by wire, radio, visual, or other electromagnetic systems. (RR)

APPENDIX B

Selected (Facility, AFCS, & MILDEP) Range Spectrum Management Points of Contact

DoD WESTERN AREA FREQUENCY COORDINATOR (WAFC)
Mr. Jamie Heaton
130 Easy Rd STOP 3008 Bldg 31454, Room 230
China Lake, CA 93555-6109
NIPR: jamie.heaton@navy.mil
SIPR: jamie.heaton@navy.smil.mil
DSN: 437-6832
COM: 760-939-6832
FAX: 760-939-0384 DSN-437
STE: 760-939-0384 DSN-437

Mr. John (Matt) Szelog
China Lake, CA 93555-6109
NIPR: john.szelog@navy.mil
SIPR: john.szelog@navy.smil.mil
DSN: 437-6948
COM: 760-939-6948
CELL: 760-608-3586
FAX: 760-939-0384 DSN-437
STE: 760-939-0384 DSN-437

****

412th TEST WING EDWARDS AFB
Mr. James R. Littlefield
Chief, Spectrum Management
412 CS/SCOTS
300 Jones Road (South base)
Edwards AFB, CA 93524-0001
DSN: 527-4763, FAX: 527-8879
CELL: (After hours) 661-810-8694/4858
STU-III: 527-4765
COM: 661-277-4763
RIDLEY MONITORING STATION: 661-277-5939
ORGANIZATIONAL BOX: 412cs.spectrum.management@us.af.mil
NIPR: james.littlefield.1@us.af.mil
SIPRNET: james.r.littlefield.civ@mail.af.smil.mil

****

NAVAIR WARFARE CENTER WEAPONS DIVISION (NAWCWD) RANGES
Mr. Clinton W. Robbins
Head, Spectrum Management Branch

NAVAIR Weapons Division
CODE 52140MD/E
M/S 3008 130 Easy Road
China Lake, CA 93555
NIPR: clinton.robbins@navy.mil
SIPR: clinton.robbins@navy.smil.mil
China Lake DSN: 437-6085
China Lake COMM: 760-939-6085
Point Mugu DSN: 351-4854
Point Mugu COM: 805-989-4854
CELL: 760-382-8860

****

USN MID-ATLANTIC AREA FREQUENCY COORDINATION OFFICE (MIDLANT AFC)

USN Mid-Atlantic Area Frequency Coordinator
ATTN: Mr. Scott A. Hoschar
Naval Air Warfare Center Aircraft Division
Code 5.2.2.2, Unit 4, Bldg. 2118
Atlantic Test Ranges
23013 Cedar Point Road
Patuxent River, MD 20670-1883
Office: midlantafc_paxriver@navy.mil
NIPR: scott.hoschar@navy.mil
SIPR: scott.hoschar@navy.smil.mil
DSN: 342-9549/1194/1532
COM: 301-342-9549/1194/1532

****

DoD GULF AREA FREQUENCY COORDINATOR OFFICE (GAFC)

DOD Gulf Area Frequency Coordinator
201 W. Eglin Blvd., Ste. 207
Eglin Air Force Base, FL 32542-6829
Mr. Brian L. Franklin
NIPR: brian.franklin@us.af.mil
DSN: 872-5648, 875-7535 or 875-5982 (Unclassified)
COM: 850-882-5648, 850-883-7535 or 850-883-5982 Fax: 850-882-3523
COM: During Non-Duty Hours: 850-496-1867
FAX: DSN: 872-1244/COM: 850-882-1244
SIPRNET: brian.l.franklin10.civ@mail.smil.mil

****

DoD AREA FREQUENCY COORDINATOR, STATE OF ARIZONA (AFC AZ)

ATTN: SAIS-AOS-Z (58)
Building 85846, 2101 Arizona Street
Ft. Huachuca, AZ 85613-7043

http://www.army.mil/spectrum/coordination/arizona.htm
Mr. Mark Rossow
NIPR: mark.k.rossow.civ@mail.mil
COM: 520-538-6423 / Fax: 520-538-8525/ DSN: 879

Mr. Joseph Loposzko
NIPR: joe.loposzko@us.army.mil
COM: 520-538-6424 / Fax: 520-538-8525

Ms. Heather Davis
NIPR: heather.k.davis@us.army.mil
COM: 520-538-7156 / Fax: 520-538-8525

****

DoD AREA FREQUENCY COORDINATOR, WSMR
Area Frequency Coordinator - WSMR
ATTN: SAIS-AOS
White Sands Missile Range
Building 124, Room 330
NM 88002-5526
Telephone: (575) 678-5417
DSN: 258-5417
Email: usarmy.wsmr.imcom-central.list.dodafc@mail.mil

Mr. Richard Wyman
NIPR: richard.j.wyman2.civ@mail.mil
SIPR: richard.wyman2.civ@mail.smil.mil
DSN: 258-3417
COM: 575-678-3417

Mr. Gary Austin
NIPR: gary.l.austin.civ@mail.mil
SIPR: gary.l.austin.civ@mail.smil.mil
DSN 258-3311
COM: 575-678-3311

****

DoD EASTERN AREA FREQUENCY COORDINATOR (EAFC)
Air Force Space Command (AFSPC)
45th Space Wing
Cape Canaveral, FL 32920
E-Mail: 45sw.dodeafc.@us.af.mil
Telephone: 321-853-8426 (DSN 467)
Mr. Scott Connolley
SIPR: scott.d.connolley.civ@mail.smil.mil

****

DoD NEVADA AREA FREQUENCY COORDINATOR, NELLIS AFB

DoD Nevada Area Frequency Coordinator (NAFC)
Mr. Bryan Jones
99CS/NAFC
5870 Devlin Drive
Nellis AFB, NV 89191-7075
NIPR: bryan.jones.33@us.af.mil
SIPR: bryan.e.jones1.civ@mail.smil.mil
DSN: 679-0607
COM: (702) 679-0607
NIPR Org: dodafc@nellis.af.mil
SIPR Org: usaf.nellis.99-abw.mbx.dod-afc-org@mail.smil.mil

****

REAGAN TEST SITE, KWAJALEIN ATOLL REPUBLIC OF THE MARSHALL ISLANDS

U.S. Army Kwajalein Atoll (ASAKA)
Ms. Lisa M. Marks
DSN: 254-0748
COM: 805-355-0748
SIPRNET: lisa.marks@smdck.smdc.army.smil.mil
NIPR ORG BOX: krsfreqmgr@smdck.smdc.army.mil

****

JOINT FREQUENCY MANAGEMENT OFFICE, ALASKA

HQ Alaskan Command/J64 STE 310
Elmendorf AFB, AK 99506-2001
Mr. Timothy P. Woodall
NIPR: timothy.woodall.3@us.af.mil
DSN: (317) 552-8223
COMM: 907-552-8223 / Fax: 907-552-8120
http://www.elmendorf.af.mil/

****

ARMY FREQUENCY MANAGEMENT OFFICE (AFMO-US&P)

SAIS-AOS-A
2350 Stanley Road, Suite 32, Building 125
Fort Sam Houston, TX 78234-5034
COM: 210-221-2050
DSN: 312
FAX:2844
Office NIPR: usarmy.jbsa.hqda.mbx.afmo-conus@mail.mil
ASMO WEB: https://www.us.army.mil/suite/page/675123
EQT Spectrum Certifcation: https://www.us.army.mil/suite/page/620264
SXXI Lateral Coordination: AFMO US&P CONUS TEMP

Mr. Edwin Sanchez (Chief)
NIPR: edwin.sanchez1.civ@mail.mil

****

AIR FORCE SPECTRUM MANAGEMENT OFFICE
Area Frequency Coordinator

AFSMO/SQA
ATTN: AFSMO, 6910 Cooper Avenue
Ft. George G. Meade, MD 20755-7088
Mr. Mark Brushwood
NIPR: richard.work@pentagon.af.mil
DSN: 225-3741
COM: 301-225-3741
Office NIPR: mark.brushwood.1@us.af.mil
e-mail: afsmoccworkflow@us.af.mil

William R. Whittington, GS-15, DAF
Director, Spectrum Support (AFSMO/SQ)
Ft Meade, MD 20755
DSN: 225-3744
COM: 301-225-3744
NIPR: william.whittington.5@us.af.mil
SIPR: william.r.whittington4.civ@mail.smil.mil
JWICS: william.whittington@disa.ic.gov

****

NAVY-MARINE CORPS SPECTRUM CENTER
ATTN: NMSC SMO
Defense Systems Information Agency
6910 Cooper Ave.
Ft. George G. Meade, MD 20755-7901
NIPR: navyspectrum.fct@navy.mil
SIPR: navyspectrum@navy.smil.mil
Mr. Tom Downie (Director)
DSN: 225-3832
COM: 301-225-3832
EMAIL: tom.downie@navy.mil

This page intentionally left blank.

APPENDIX C

Range Common Systems

Range common systems are those systems common to nearly all test and training ranges. Their use is nearly identical at all the major test and training ranges, although there are some variations between ranges. These systems are for the most part put in place so that range users can move from range to range without incurring undue rechanneling delays and expenses. These common systems should prevent a range user from replacing equipment or procedures when transitioning between ranges.

C.1 Land Mobile Radio (LMR) (138 –150.8 MHz, 160 –174 MHz, 380.0 – 399.9 MHz, and 406 – 420 MHz)

The LMR band is broken down into four sub-bands: 138-150.5 MHz, 160-174 MHz, 380.0-399.9 MHz, and 406-420 MHz. All LMR bands were required to change from wideband 25-kHz channel spacing to narrowband 12.5-kHz spacing by years 2005 or 2008 with all new installations narrowband 12.5-kHz compliant. Federal LMR bands are 138-144 MHz, 148-148.9 MHz, 150.05-150.8 MHz, 162.0125-173.2 MHz, 173.4-174 MHz, 380.0-399.9 MHz, and 410-420 MHz. The 406.1-410 MHz band is shared with the FCC, with the primary basis to government non-military agencies. If a program or organization requires LMR devices for normal land mobile use, the range should be able to accommodate that requirement on the currently installed radio system. If a program's requirements cannot be accommodated on the existing radio system or these frequency bands are to be used for other than normal LMR purposes, contact the local ISM.

C.2 Fixed/Mobile/Aeronautical Mobile Communications for RDT&E, Tactical, & Training Operations (225 – 400 MHz)

This band is designated the single most critical spectrum resource of the DoD, both nationally and within the North Atlantic Treaty Organization (NATO) for Research, Development, Test, and Evaluation (RDT&E), training, and tactical applications. The band is devoted to both military and the FAA for air-to-air, air-to-ground, and ground-to-air communications including some of the following examples: air traffic control; satellite links for ground, air, surface, and subsurface users; position location networks; unmanned aerial vehicle (UAV) data links; command-and-control (C2); the Enterprise Land Mobile Radio Network; and the Aircraft Instrumentation Landing System.

C.3 UAV/Drone and Situational Awareness Data Link (PLRS/EPLRS/A-EPLRS, 420 – 450 MHz)

This band is utilized by UAVs, drones, and space and launch vehicles and missiles for critical safety-of-flight command-destruct and flight termination capabilities. In addition the Navy utilizes this band for long-range airborne early warning and target identification with airborne high-power synthetic aperture radar. The Army and the Air Force operate a land-based and airborne position location and reporting system called PLRS/EPLRS and A-EPLRS, respectively.

C.4 Intrinsically Safe Devices

Intrinsic safety prevents instruments and low-voltage circuits in hazardous areas from releasing sufficient energy to ignite volatile gasses. Radios and other electronic devices must be certified as intrinsically safe if they are to be used in the following areas:

a. hangars;

b. areas where a fuel spill may occur;

c. where volatile vapors may accumulate (such as a manhole);

d. within 10 feet of an aircraft being fueled;

e. in any Class 1 Division 1 or Class 1 Division 2 area;

f. additional areas designated by the fire chief.

C.5 Flight Termination System and Flight Restriction System

Of all common range systems, Flight Termination System (FTS) and Flight Restriction System (FRS) are the only ones specifically designed and used to destroy or crash a test vehicle. As such, FTS and FRS are afforded the highest protection available to any system operating at any test range. The following restrictions are placed upon operation of FTSs and FRSs at or near the test ranges.

a. No flight termination transmitter will radiate on any flight termination frequency without scheduling that use through range frequency scheduling and the appropriate AFC/RSM office. This scheduling includes all maintenance operations and pre- or post-mission tests.

b. All flights requiring flight termination will have their FTS/FRS frequencies deconflicted throughout the flight path and within line of sight of any systems capable of causing interference to the systems under test, regardless of area or location. This deconfliction will be accomplished through the appropriate RSMs and AFCs as necessary to ensure interference-free operations. Please note that frequencies 421, 425 and 428 MHz are standardized for flight termination/command destruct at all the ranges (see Section C.3); however, new digital systems are being developed for use in the 370-380 MHz band as well as the 420-450 MHz band. These systems are currently being tested and validated for operational use. Each range will be responsible for its own frequency selection in the 370-380 MHz band since common frequencies are not available.

c. Missions operating at altitudes or areas that require coordination with two or more AFCs must begin the notification and deconfliction process at least one week (depending on the range) prior to the required operation.

d. Maintenance or “systems check” operations should not under any circumstances be performed using a live tone set. Where possible, transmitter checks should be performed using no tones in a continuous-wave mode.

C.6 JTIDS and Navigation Aids (Tactical Air Navigation/Instrumented Landing System/Glideslope/Identify Friend or Foe, 960 – 1215 MHz)

The 960-1215 MHz band is a critical band used for aeronautical radionavigation systems, including Identification Friend or Foe systems, operated by the FAA and the DoD to control civilian and military aircraft in the National Air Space. The Distance Measuring Equipment system and its military version, the Tactical Air Navigation system operates in the 960-1215 MHz band. The FAA operates the Automatic Dependent Surveillance-Broadcast system, which generates onboard position information from onboard navigation systems, and transmits such position information to the ground. The FAA also operates the Mode Select, or Mode-S system, on 1030 MHz and 1090 MHz. Mode-S provides more accurate position information and minimizes interference, reducing the number of transmissions required to obtain the necessary data.

Utilization of navigation aids does not require special authorization or mention within an organization's RFA. These assets are licensed for the use of the entire installation without notification or scheduling. Jamming, meaconing, or spoofing of these systems is strictly forbidden under nearly all circumstances. If jamming/spoofing of navigation aids is required to meet program objectives, contact the RSM immediately to begin the justification coordination process as soon as possible.

The military agencies operate a communications system, the Joint Tactical Information Distribution System (JTIDS, also called Link-16) in this band. The JTIDS is a military system used by U.S. and NATO forces to provide tactical, secure, jam-resistant voice and data communications, transmitting data such as aircraft locations, velocities, headings of friendly and hostile aircraft, and general situation awareness information.

If the test range already has a JTIDS assignment in place, use should be approved quickly; as long as Time Slot Duty Factors (TSDFs) required for testing do not exceed existing assignment restrictions, there should be no bar to immediate program approval. If a program TSDF requirement exceeds current assigned parameters or an existing JTIDS assignment does not exist, a long and lengthy coordination process may be required. All JTIDS use must be deconflicted through the regional pulse-deconfliction server located at Fort McPherson, GA. Data entry into the deconfliction server can only be accomplished by an appointed deconfliction coordinator. If the combined TSDF of all missions conducted within an area exceeds the authorized TSDF for that area, one or more operations will have to be curtailed to comply with assignment limitations.

C.7 Global Positioning System (1227.6 MHz/L2, ± 12 MHz and 1575.42 MHz/L1, ± 12 MHz)

Many of the crucial functions (tracking, safety, timing, etc.) at the ranges are dependent upon exploitation of precise Global Positioning System (GPS) position, velocity, and time information. In addition, the test ranges conduct GPS RDT&E in laboratories, anechoic chambers, and at outdoor facilities. At the training ranges, the DoD conducts small- and large-scale force exercises to include local area GPS denial. This testing and training is necessary to: (1) facilitate development of doctrine and tactics for countering the threat to the GPS environment; and (2) ensure our armed forces have the equipment and training to operate in tactical situations where GPS interference may be present.

As per CJCSM 3212.02D and CJCSM 3212.03A, national level coordination for all range GPS denial radiations is required a minimum of 60 days prior to use. A Restricted Band Electronic Attack (EA) Frequency Clearance Proposal must be submitted through the Service's national-level Frequency Management Office to the Joint Staff in accordance with CJCSM 3212.02D and CJCSM 3212.03A. Compliance with these guidelines must be conducted through the responsible RSM. After technical evaluation by the Joint Spectrum Center, the final approval must be given by US Strategic Command that includes a CONCURRENCE from the HQ FAA Spectrum and Policy Management Office. Because of the sensitivity, criticality, and widespread usage of GPS, all GPS radiation approvals are expected to be highly conditional and restrictive.

C.8 Advanced Range Data System/Range Applications Joint Program Office and Common Range Integrated Instrumentation System, 1350 – 1390 MHz)

The Advanced Range Data System/Range Applications Joint Program Office data link systems exist at most of the test and training ranges. These GPS-based instrumentation systems provides dynamic time, space, and position aircraft information from an air-ground range of 120 miles.

The primary function of the next-generation Common Range Integrated Instrumentation System (CRIIS) is test data collection for land, sea, and airborne platforms. The CRIIS provides:

a. high-accuracy time-space-position information (TSPI) of system under test;

b. secure datalink(s) that transmit real-time TSPI and aircraft data: avionics, weapons targeting/status data, and aircraft status.

The CRIIS maximizes interoperability among the T&E ranges with potential use on training ranges. No special authorization is required for the use of these systems unless modification to the existing system layout is required. If the existing system must be altered in a way that changes the emission characteristics, increases coverage, or requires additional frequencies to fulfill program requirements, the RSM must be contacted.

C.9 Aeronautical Telemetry (1435 – 1525 MHz, 1755 – 1850 MHz, 2200 – 2290 MHz, 2310 –2320 MHz, 2345 – 2360 MHz, 2360– 2395 MHz, 4400 – 4940 MHz And 5091 – 5150 MHz)

The aeronautical telemetry bands are among the most highly utilized and critical assets required at the test and training ranges. They are used to research, develop, test, evaluate, and certify airborne platforms: manned/unmanned aircraft, missiles, and other payloads. These frequency bands provide real-time flight characteristics, video, flight research data, system status, and safety parameters (safety of life and property). They are heavily used by both government and government contractors (all major defense companies and subsidiaries) for this purpose. These bands are routinely employed for other important non-telemetering applications such as Tactical Targeting Network Technology, UAV data links, and UAV C2.

The use of these flight test bands is tightly controlled and in nearly all cases, use is scheduled in 15-minute increments. Congestion in these bands is reaching the critical stage. Consequently, all programs should make every effort to reduce bit rates and use tunable frequency transmitters to decrease the probability of mission cancellation due to unavailability of spectrum. Once a program has obtained a valid RFA from the RSM, the frequencies authorized

can be scheduled through the range scheduling office. Scheduling can be completed in near real time, but telemetry frequencies should be scheduled at least one week in advance.

C.10 Tactical Air Combat Training System/Air Combat Maneuvering Instrumentation (1755 – 1850 MHz)

The primary air combat training system at the ranges is the Tactical Air Combat Training System/Air Combat Maneuvering Instrumentation (TACTS/ACMI). Both systems provide real-time monitoring of aircraft combat operations and maneuvering, such as gun-scoring, no-drop bombing evasion, intercept tactics, and electronic warfare, during training exercises and records and plays back/displays maneuvers during pilot debriefing. (The TACTS is the Navy system designation and ACMI is the Air Force system designation.) The aircraft use Airborne Instrumentation System pods to send data to a ground remote Tracking Instrumentation Subsystem (TIS) station. This configuration consists of several remote stations that communicate with a single centrally located master TIS station. The TACTS/ACMI is being replaced with the Joint Tactical Combat Training System.

The use of TACTS/ACMI systems requires no special authorization unless alteration to the existing assignments is required. If the existing system must be altered in a way that changes the emission characteristics, increases coverage, or requires additional frequencies to fulfill program requirements, contact the RSM. Note that due to band reallocation to commercial usage no more DoD frequency assignments are being made in the 1755-1780 MHz band. The TACTS/ ACMI will complete its migration/compression into the 1780-1850 MHz band by August 2020.

C.11 Range Tracking Radars

Range tracking radars are in place for customer support at most of the test and training ranges. No special authorization is required for the use of these systems unless alteration to the existing assignments is required. If the existing system must be altered in a way that changes the emission characteristics, increases coverage, or requires additional frequencies to fulfill program requirements, contact the RSM. The C-Band tracking radars are susceptible to interference from current and future unlicensed public wireless communications systems and user equipment.

C.12 Electronic Attack

The test and training ranges, as well as other agencies, perform EA. These EA systems require broad use of large portions of the spectrum. All EA missions originating from the test range must comply with CJCSM 3212.02D, and in the case of GPS, CJCSM 3212.03A. Compliance with these manuals is accomplished through the RSM. Coordination for EA should be started as soon as the requirement is identified to ensure that the proper authorizations are secured in time to fulfill program requirements.

C.13 KU-Band Data Links (14.4 – 15.4 GHz)

Federal agencies (i.e., Navy) use this band for airborne downlink data transmissions and mobile air-to-air and air-to-ground data links, especially the (Tactical) Common Data Link. Federal agencies also use this band for fixed point-to-point microwave relay communications for voice, data, and video.

This page intentionally left blank.

APPENDIX D

Range-Specific Procedures

KWAJALEIN MISSILE RANGE

The frequency acquisition procedure at Kwajalein Missile Range (KMR) is unique because the range is located on foreign soil and the US State Department is heavily involved in the acquisition process. The KMR procedure has been co-authored with the Joint Frequency Management Office Pacific and Republic of the Marshall Islands and is contained as Annex L of the NTIA manual. Please note 21st Space Operations Squadron (21 SOPS, at Vandenberg Air Force Base) missile operations are not scheduled by the integrated Frequency Deconfliction System.

This page intentionally left blank.

APPENDIX E

Citations

Code of Federal Regulations, Table of Frequency Allocations, title 47, sec. 2.106.

Combined Communications-Electronics Board. "Guide to Frequency Planning." ACP 190 US SUPP-1(D). January 2015. May be superseded by update. Retrieved 12 July 2017. Available to RCC members with Private Page access at https://wsdmext.wsmr.army.mil/site/rccpri/Limited_Distribution_References/ACP190_US_SUPP-1D.pdf.

Executive Office of the President Office of Management and Budget. "Preparation, Submission, and Execution of the Budget." Circular No. A-11. July 2016. May be superseded by update. Retrieved 12 July 2017. Available at https://www.whitehouse.gov/omb/circulars_a11_current_year_a11_toc.

Joint Chiefs of Staff. "Performing Electronic Attack in the United States and Canada for Tests, Training, and Exercises." CSCSM 3212.02D. 31 December 2013. May be superseded by update. Available to users with appropriate credentials at https://jsportal.sp.pentagon.mil/sites/matrix/del/sitepages/home.aspx.

———. "Performing Tests, Training, and Exercises Impacting the Global Positioning System (GPS)." CJCSM 3212.03A. 8 November 2013. May be superseded by update. Available to users with appropriate credentials at https://jsportal.sp.pentagon.mil/sites/matrix/del/sitepages/home.aspx.

National Telecommunications and Information Administration. "Manual of Regulations and Procedures for Federal Radio Frequency Management." September 2015. May be superseded by update. Retrieved 23 March 2017. Available at https://www.ntia.doc.gov/files/ntia/publications/manual_sep_2015.pdf.

Range Commanders Council. *Frequency Management Standard Operating Procedure for Frequency Deconfliction*. RCC 706-02. July 2002 (revised March 2003). May be superseded by update. Retrieved 21 March 2017. Available at http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx.

*** * * END OF DOCUMENT * * ***