

ARMY, NAVY, AIR FORCE, MARINE CORPS



AIR LAND SEA
APPLICATION
CENTER

AVIATION URBAN OPERATIONS

**MULTISERVICE PROCEDURES FOR
AVIATION URBAN OPERATIONS**

FM 3-06.1
MCRP 3-35.3A
NTTP 3-01.04
AFTTP (I) 3-2.29

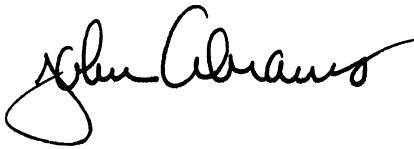
APRIL 2001

DISTRIBUTION RESTRICTION: Approved
for public release; distribution is unlimited.

MULTISERVICE TACTICS, TECHNIQUES AND PROCEDURES

FOREWORD

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



JOHN N. ABRAMS
General, U.S. Army
Commanding General
U.S. Army Training and Doctrine
Command



J. E. RHODES
Lieutenant General, USMC
Commanding General
Marine Corps Combat
Development Command



B. J. SMITH
Rear Admiral, USN
Commander
Navy Warfare Development
Command



LANCE L. SMITH
Major General, USAF
Commander
Headquarters Air Force
Doctrine Center

PREFACE

1. Scope

This publication is a tactical level document for planning and conducting aviation urban operations. This publication—

- Supplements established doctrine and tactics, techniques, and procedures (TTP).
- Provides reference material to assist aviation and ground personnel in planning and coordinating tactical aviation urban operations.
- Applies to any personnel planning and conducting aviation urban operations, including commanders, planners, aircrew, and ground personnel requiring aviation support.
- Promotes an understanding of the complexities of urban terrain.
- Incorporates lessons learned, information from real world operations and training exercises, and TTP from various sources applicable to the urban environment.

2. Purpose

This publication provides multiservice TTP (MTTP) for planning and executing fixed- and rotary-wing aviation urban operations.

3. Applicability

a. The audience for this publication is any element of a force planning and conducting aviation urban operations, including commanders, planners, aircrew, and ground personnel requiring aviation support. This publication can serve as a source document for developing Service and joint manuals, publications, and curricula, as supplementary documentation or as a stand-alone document.

b. This publication does not address all functions of airpower employment that may be used in urban operations (e.g. counterair, strategic attack, air interdiction, etc.), as these topics are addressed in other appropriate joint and Service publications.

4. Implementation Plan

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

Army. The Army will incorporate this publication in United States (US) Army training and doctrinal publications as directed by the Commander, US Army Training and Doctrine Command (TRADOC). Distribution is in accordance with Department of the Army (DA) Form 12-99-R.

Marine Corps. The Marine Corps will incorporate these procedures in US Marine Corps (USMC) training and doctrinal 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).

Navy. The Navy will incorporate these procedures in US Navy (USN) training and doctrinal publications as directed by the Commander, Navy Warfare Development Command (NWDC). Distribution is in accordance with the military standard requisitioning and issue procedure (MILSTRIP) Desk Guide and naval standing operating procedure (NAVSOP) Publication 409.

Air Force. The Air Force will validate and incorporate appropriate procedures in accordance with applicable governing directives. Distribution is in accordance with Air Force instruction (AFI) 33-360.

5. User Information

a. The TRADOC-MCCDC-NWDC-Air Force Doctrine Center (AFDC)-Air Land Sea Application (ALSA) Center developed this publication with the joint participation of the approving Service commands. ALSA reviews and updates this publication as necessary.

b. This publication reflects current Service and joint doctrine, command and control (C2) organizations, facilities, personnel, responsibilities, and procedures. Changes in Service protocol, appropriately reflected in Service and joint publications, will be incorporated.

c. We encourage 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 recommendation directly to one of the following services:

Army

**Commander
US Army Training and Doctrine Command
ATTN: ATDO-A
Fort Monroe VA 23651-5000
DSN 680-3153 COMM (757) 727-3153**

Marine Corps

**Commanding General
US Marine Corps Combat Development Command
ATTN: C42 (Director)
3300 Russell Road, Suite 318A
Quantico VA 22134-5021
DSN 278-6234 COMM (703) 784-6234**

Navy

**Commander
Navy Warfare Development Command
ATTN: N5
686 Cushing Road
Newport, RI 02841-1207
DSN 948-4201 COMM (401) 841-4201**

Air Force

**HQ Air Force Doctrine Center
ATTN: DJ
216 Sweeney Boulevard Suite 109
Langley AFB VA 23665-2722
DSN 574-8091 COMM (757) 764-8091
E-mail Address: 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**

FM 3-06.1
MCRP 3-35.3A
NTTP 3-01.04
AFTTP(I) 3-2.29

FM 3-06.1 US Army Training and Doctrine Command
Fort Monroe, Virginia

MCRP 3-35.3A Marine Corps Combat Development Command
Quantico, Virginia

NTTP 3-01.04 Navy Warfare Development Command
Newport, Rhode Island

AFTTP(I) 3-2.29 Headquarters Air Force Doctrine Center
Maxwell Air Force Base, Alabama

15 April 2001

AVIATION URBAN OPERATIONS

Multiservice Procedures for Aviation Urban Operations

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	viii
CHAPTER I OVERVIEW	
1. Introduction	I-1
2. Historical Lessons	I-2
3. Political and Civilian Considerations	I-6
4. Law of War (LOW)/Law of Armed Conflict (LOAC)	I-7
5. Rules of Engagement	I-8
6. Collateral Damage	I-9
7. Fratricide Prevention	I-9
8. Training Considerations	I-10
CHAPTER II URBAN CHARACTERISTICS	
1. Background	II-1
2. Size	II-1
3. Patterns	II-1
4. Characteristics	II-5
5. Population Density	II-6
6. Structural Density	II-6

7. Building Construction	II-10
8. Features of Special Consideration	II-11

CHAPTER III FLIGHT OPERATIONS

1. Background	III-1
2. Threat Considerations	III-1
3. Weather	III-2
4. Command, Control, and Communications	III-3
5. Airspace Control	III-4
6. Air-to-Ground Coordination	III-4
7. Maps and Charts—Selection and Preparation	III-4
8. Route Planning and Navigation	III-7
9. Night Vision Devices	III-9
10. Rotary-Wing Operations	III-11
11. Fixed-Wing Operations	III-12
12. Airfields	III-14
13. Helicopter Landing Zones (HLZ)	III-15
14. Special Use Areas	III-17

CHAPTER IV WEAPONS EMPLOYMENT

1. Introduction	IV-1
2. Weapons Selection	IV-1
3. Tactical Target Development	IV-2
4. Targeting Grids and Reference Techniques	IV-4
5. Target Marking and Friendly Positions	IV-6
6. Television/Electro-optical (TV/EO)	IV-8
7. Electronic Beacons	IV-8
8. Laser Designation	IV-9
9. Clearance to Drop/Fire for CAS Missions	IV-9
10. Fixed-wing Targeting and Engagements (AV-8B, A-10, O/A-10, F-14, F-15E, F-16, F/A-18, and F-117)	IV-10
11. Fixed-wing Targeting and Engagements (AC-130)	IV-13
12. Rotary-wing Targeting and Engagements (AH-1, AH-1W, AH-6, AH-64, MH-60, OH-58D, UH-1N)	IV-15
13. Artillery, Motars, and Naval Surface Fire Support (NSFS)	IV-18
14. Close Air Support	IV-20
15. Munitions Effectiveness	IV-20
16. Munitions Delivery	IV-21

APPENDIX A Air Mission Planning Guidelines

1. Mission Analysis	A-1
2. Conduct Risk Assessment and Management	A-1
3. Friendly Situation	A-1
4. Threat	A-1
5. Terrain Analysis	A-1
6. Weather	A-1
7. Route Planning and Navigation	A-2
8. Terminal Area Procedures	A-2
9. Communications	A-2

10. Airspace Control.....	A-2
11. Rules of Engagement	A-2
12. Weapons Selection and Employment.....	A-2
13. Contingencies	A-2
APPENDIX B Joint Intelligence Preparation of the Battlespace	B-1
1. Process.....	B-1
2. Resources and Products	B-2
3. Imagery	B-7
APPENDIX C Munitions	C-1
1. Laser Guided Bomb	C-1
2. Maverick (AGM-65 Block B/D/E/G/K)	C-1
3. Cluster Munitions	C-2
4. Joint Direct Attack Muniton (JDAM) (GBU-29, GBU-30, GBU-31, GBU-32).....	C-3
5. Tube launched, Optically tracked, Wire guided (TOW)	C-4
6. Hellfire	C-4
7. 20mm Cannon.....	C-7
8. 25mm Cannon.....	C-7
9. 30mm Cannon.....	C-7
10. 40mm Cannon	C-8
11. 105mm Cannon	C-9
12. Rockets.....	C-9
13. Medium/heavy Machine-guns (7.62mm and .50 caliber).....	C-10
APPENDIX D Personnel Recovery	D-1
1. Personnel Recovery	D-1
2. Evasion	D-1
3. Charts, Communications, and Signaling	D-2
4. Recovery	D-4
REFERENCES	References-1
GLOSSARY	Glossary-1
Part 1-Abbreviations and Acronyms.....	Glossary-1
Part 2-Terms and Definitions	Glossary-8
INDEX	Index-1
FIGURES	
II-1 Hub	II-2
II-2 Satellite	II-2
II-3 Network.....	II-2
II-4 Linear	II-3
II-5 Segment/Pie Slice	II-3
II-6 Rectangular	II-3
II-7 Radial	II-4
II-8 Concentric	II-4

II-9	Contour Conforming	II-4
II-10	Irregular	II-5
II-11	Planned Irregular	II-5
II-12	Type “A”	II-7
II-13	Type “B”	II-7
II-14	Type “C”	II-8
II-15	Type “D”	II-9
II-16	Type “E”	II-9
III-1	Ground Unit Control Measures	III-5
III-2	Network Route Structure	III-8
IV-1	Urban Grid	IV-4
IV-2	Bullseye Targeting	IV-5
IV-3	Objective Area Reference Grid	IV-5
IV-4	Target Reference Points	IV-5
IV-5	Running/Diving Fire Engagement	IV-17
IV-6	Hover Fire Engagement	IV-18
IV-7	View Along Street (Low angle possible)	IV-22
IV-8	Look-Down View (Greater angle required)	IV-23
IV-9	Look-Down Angle	IV-23
B-1	Combined UTOG/UTF Overlay (Simplified Example)	B-6
B-2	Roof Coverage	B-7

TABLES

I-1	20 th Century Urban Operations	I-3
IV-1	Target and Friendly Marking Methods	IV-7
IV-2	Fixed-wing Weapon Suites	IV-11
IV-3	AC-130H/U Weapons Suite	IV-14
IV-4	AC-130H/U Weapons Applicability	IV-15
IV-5	Rotary-wing Weapons Suites	IV-16
IV-6	Wall Thickness and Incidence of Occurrence of Building Types	IV-21
IV-7	Munitions and Delivery Techniques	IV-24
IV-8	Munitions Advantages and Disadvantages	IV-25
IV-9	Delivery Methods Advantages and Disadvantages	IV-26
IV-10	Airborne and Ground Designators Advantages and Disadvantages	IV-26
B-1	General Sources	B-2
C-1	Penetration Capabilities of the 7.62mm (Ball) Round	C-11
C-2	Rounds (Rds) Needed to Penetrate Reinforced Concrete Wall (At a 25-Degree Obliquity)	C-11

EXECUTIVE SUMMARY

Aviation Urban Operations

This publication–

- **Provides MTTP for tactical level planning and execution of fixed- and rotary-wing aviation urban operations.**
- **Provides reference material to assist aircrew and ground personnel in planning and coordinating tactical urban operations.**
- **Applies to all elements of a force planning and conducting aviation urban operations, including commanders, planners, aircrew, and ground personnel requiring aviation support.**
- **This publication does not address all functions of airpower employment that may be used in urban operations (e.g. counterair, strategic attack, air interdiction, etc.), as these topics are addressed in other appropriate joint and Service publications.**

Chapter I Overview

Chapter One provides an overview of aviation urban operations including lessons learned to show effective and ineffective techniques. This overview includes discussion of political and civilian considerations, law of war, rules of engagement, and collateral damage considerations. The chapter also addresses the importance of fratricide prevention measures.

Chapter II Urban Characteristics

Chapter Two describes characteristics of urban terrain including size, patterns, and features. It describes building construction, building types, street patterns, roof coverage, population density, and other features of special consideration.

Chapter III Flight Operations

Chapter Three includes discussions concerning threat considerations, effects of weather, command, control, and communications, and airspace control considerations. The chapter includes information on aviation capabilities and employment limitations. It discusses night vision devices, urban navigation, landing zone selection, and other flight operations considerations unique to aviation urban operations.

Chapter IV

Weapons Employment

Chapter Four focuses on tactical urban targeting, and weapons selection. It discusses target marking devices, friendly unit position marking, laser designation, and positive control measures. The information provided includes aerial weapons effects, ordnance delivery parameters, target tracking, and emergency close air support considerations.

PROGRAM PARTICIPANTS

Joint

Joint Warfighting Center Fenwick Rd Bldg 96, Fort Monroe, VA 23651-5000
HQ JSSA, Fort Belvoir, VA
HQ JCRA, Langley AFB, VA
Joint Combat ID Office (JCIDO), Washington, DC
HQ USSOCOM (SOOP-J/SORR-SCG), MacDill AFB, FL 33621-5323

Army

HQ TRADOC (ATDO-A), Ingalls Rd, Bldg 133 Room 7, Fort Monroe, VA 23651-5000
Combined Arms Center (CAC), Combined Arms Doctrine Directorate (CADD), Fort
Leavenworth, KS
US Army Infantry Center, Fort Benning, GA
CDR USAFAS, Fort Sill, OK
CDRUSAAVNCS, DOTDS, Fort Rucker, AL
101st Airborne Division (AASLT), Fort Campbell, KY
10th Mountain Division (Light), Fort Drum, NY
160th Special Operations Aviation Regiment (Abn)

Marine Corps

Marine Corps Combat Development Command, Joint Doctrine Branch (C427), 3300
Russell Rd, 3rd Floor Suite 318A, Quantico, VA 22134-5021
HQ US Marine Corps Strategy and Plans Division, Room 5D 616, Washington, DC
20380-1775
Marine Aviation Weapons and Tactics Squadron One (MAWTS-1), P.O. Box 99200,
Yuma, AZ 85369-9200
Second Marine Aircraft Wing, Cherry Point, NC

Navy

Navy Warfare Development Command/Det N3, 1540 Gilbert Street, Norfolk, VA 23511
Naval Strike and Air Warfare Center (NSAWC), Fallon NAS, NV
COMPHIBGRU TWO, NAB Little Creek, Norfolk, VA 23521

Air Force

HQ Air Force Doctrine Center, 155 N. Twining Street, Maxwell AFB, AL 36112
AFDC Detachment 1, 216 Sweeny Blvd. Ste 109, Langley AFB, VA 23665
HQ ACC/ XOIP/XODT, Langley AFB, VA 23665
HQ AMC/DO/DOK/XP/DOKT, Scott AFB, IL 62225
HQ USAF/XPXQ/XOOC, Washington DC
HQ USAFE/XPXD, Ramstein AFB, GE
HQ AFSOC/DO/DOXT/IN, Hurlburt Field, FL
USAFWS/WSR/WST, Nellis AFB, NV
AC2ISRC/C2S, Langley AFB, VA
57 WG/DTW, Nellis AFB, NV
AWFC/422 TES/CC/DOA, Nellis AFB, NV
720 STG/CC, Hurlburt Field, FL

Chapter I

OVERVIEW

1. Introduction

a. Background. Urban areas generally function as centers of social, economic, industrial, and political power. These areas facilitate formal and informal civilian and military interaction, and can offer ready access to important resources, such as labor, water, technology, and information. Historically, United States (US) Forces have operated within, or in close proximity to urban areas. Demographic and population trends indicate that, in the future, a majority of the world's population will reside in urban areas. Trends toward increased urbanization increase the potential for US forces to operate in urban areas.

b. Doctrine. US Army and US Marine Corps (USMC) doctrine recommends isolating and bypassing urban areas when possible due to the costs involved. Former Soviet Union doctrine also recommended avoiding large cities in favor of speed and maneuver. However, avoiding urban areas does not prevent an adversary from exploiting its defensive advantages. US Air Force (USAF) doctrine maintains that airpower's versatility and responsiveness allows the simultaneous application of mass and air maneuver, almost anywhere, from almost any direction. The speed, range, precision weapons, communications, command and control (C2), information gathering, and transportation capabilities of US military aircraft enable airpower to play a major, if not decisive, role in urban operations when proper tactics are employed. This is possible whether aviation operations are conducted independently, or in conjunction with the operations of friendly ground forces. Operations in Panama City, Baghdad, Mogadishu, Port Au Prince, Sarajevo, and Pristina, are a few examples where airpower has been influential in urban operations in the past.

c. Urban Considerations. Aviation urban operations can be planned and conducted across the range of military operations. The two dominant characteristics affecting aviation urban operations are the existence of manmade construction and the presence of noncombatants. These operations may be conducted on or against objectives on a complex urban topology and its adjacent natural terrain. The compressed battlespace in the urban environment creates unique considerations for planning and conducting aviation operations. These include:

- (1) operations in urban canyons,
- (2) deconfliction in confined airspace,
- (3) restrictive rules of engagement (ROE),
- (4) difficulty in threat analysis,
- (5) an overload of visual cues,

- (6) the presence of noncombatants,
- (7) the potential for collateral damage, and
- (8) the increased risk of fratricide.

These considerations and others, as well as some historical lessons will be discussed in this publication.

2. Historical Lessons

a. Background. Urban operations have been conducted many times in the 20th century. See Table I-1. Familiarity with historical lessons is fundamental to understanding the difficulties associated with conducting aviation urban operations. In many conflicts throughout the 20th century, aviation (air power) has played an important and sometimes decisive role in isolating and interdicting the flow of the defender's supplies and reinforcements into the urban areas. Advancements in aircraft design and precision munitions in conjunction with specific training for urban operations have increased effectiveness of these operations. For example, the Israel Defense Forces (IDF) during operations in Beirut, successfully used aviation in a compressed urban battlespace through bombing by fixed-wing aircraft, ground attack by helicopters, and aerial medical evacuation of wounded personnel.

b. Tactical Challenges. Employment of aviation assets in urban operations presents important tactical challenges. For example, one tactic used successfully by both attackers and defenders for protection against air and artillery attack has been to keep one's forces deployed in close proximity to the enemy; thus deterring enemy air or artillery support. This "hugging" tactic, whether by design or as a consequence of close combat, was often effectively used in many modern urban battles.

c. Planning and Conducting Operations. Due to the complexities and increased challenges involved in conducting aviation urban operations, the following are some of the important areas of consideration when planning for and conducting operations in this environment.

(1) Physical limitations. Urban areas offer defenders several advantages. These include the availability of obstacles, cover, concealment, and potential strongpoints. City layouts limit traditional methods of military operations. The vertical nature of this environment and subterranean infrastructure limit line of sight (LOS).

(2) Surprise. Surprise can help shift the balance of combat power by overcoming other disadvantages and may be critical to success in urban operations. Surprise was achieved by the attacker at Aachen and Ban Me Thout and by the defender at Suez City. Without the element of surprise, friendly forces may encounter strong, well-prepared defenses without adequate warning. Rapid, accurate, intelligence analysis and dissemination is a key to the element of surprise.