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TASK LISTING: VISUALLY ASSISTED AND VISUALLY  
DEPENDENT TASKS FOR FIGHTER AIRCRAFT

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## SUMMARY

This document provides a detailed listing of the visual tasks that are trained in Air Force fighter and attack aircraft. The task listing distinguishes between visually assisted tasks (i.e., visual cues are not needed but will enhance performance) and visually dependent tasks (i.e., visual cues are mandatory). The listing also indicates whether the tasks are trained under both day and night conditions or specifically in daylight or at night. Instrument-related flight tasks are not included in the list. The tasks were compiled from Air Force training manuals and other source materials, and experienced instructor pilots were interviewed to verify the listing. The list covers 11 major training areas: (a) takeoff and landing, (b) aerobatics, (c) aircraft handling maneuvers, (d) stalls, (e) basic formation, (f) navigation, (g) air refueling, (h) tactical formation, (i) air-to-air combat, (j) low-altitude maneuvers, and (k) surface attack.

## PREFACE

The present listing of visually assisted and visually dependent flight tasks was originally drafted for use in a series of flight simulator visual system evaluations. The listing merits separate publication because it is amenable to a broader range of pilot training and research endeavors. The effort was accomplished under the University of Dayton Research Institute flying training research support contract, No. F33615-84-C-0066, Work Unit 1123-03-79, which was sponsored by the Air Force Human Resources Laboratory, Operations Training Division (AFHRL/OT). The author wishes to express his appreciation for the professional support of the following individuals:

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# TASK LISTING: VISUALLY ASSISTED AND VISUALLY DEPENDENT TASKS FOR FIGHTER AIRCRAFT

## I. INTRODUCTION

### Background

This document provides a comprehensive listing of the visual tasks that are trained in Air Force fighter aircraft. The task listing was originally developed for use in a proposed series of flight simulator evaluations, which will focus on the training effectiveness of the visual system technologies. Because of the unique requirements of these evaluations, the task listing was compiled to encompass the range of tasks from standard airfield operations to tactical combat. Additionally, the listing identifies the tasks that comprise the major tactical training missions; namely, counter air, air interdiction, close air support, reconnaissance, and surveillance.

The task listing has a number of potential applications to military flight training and research, due to its broad coverage of tasks. For this reason, the listing is published as an independent document.

### Scope

In the compilation of the task listing, a distinction was made between visually assisted tasks and visually dependent tasks. The operational definitions of these task categories are as follows:

Visually Assisted Tasks. Outside visual references are not required to perform the tasks; but the appropriate visual cues may assist, or enhance, pilot performance.

Visually Dependent Tasks. Task-related, external visual cues are mandatory. The tasks cannot be performed solely with instruments.

The listing also indicates whether the tasks are trained under both day and night conditions or specifically in daylight or at night. The tasks performed exclusively with instruments are not included in the list.

## II. METHOD

The task listing was compiled in two consecutive phases: (a) a training manual review phase and (b) a pilot interview phase. The specific coverage in each of these phases is described below.

### Training Manual Review

The first phase entailed a review of the Air Force training manuals that are currently used in the training squadrons for undergraduate pilot training, fighter and attack aircraft training, and low-level flight training. From

this review, a preliminary task listing was drafted. In addition, figures were collected from the training manuals and assembled into a booklet to illustrate the flight maneuvers contained in the task listing. The fighter and attack aircraft addressed in the review were the F-15, F-16, F-5, and A-10. The source materials from which the training tasks were extracted are identified in the appendix.

### Pilot Interviews

In the second phase, seven instructor pilots (IPs) were interviewed to validate the task listing. At least one pilot was interviewed for each of the weapon systems that was represented in the review of the training manuals. Whenever it was possible to interview two pilots from a squadron, the pilots were interviewed simultaneously. The IPs were requested to carefully examine the listing for task omissions and redundancies, as well as the inadvertent inclusion of nonvisual tasks. The booklet containing the illustrations of the various flight maneuvers was provided to each of the pilots. Following each interview, the task listing was revised to incorporate the recommended changes. The revised task listing was then used in the next interview. The specifics of the pilot interviews are presented in Table 1.

Table 1. Instructor Pilot Interviews

Interview sequence	Number of pilots	Aircraft represented	Squadron	Location
1.	1	F-5	425th Tactical Fighter Training Squadron	Williams AFB, AZ
2.	2	A-10	355th Tactical Training Squadron	Davis-Monthan AFB, AZ
3.	2	F-16	422nd Technical Evaluation Squadron	Luke AFB, AZ
4.	1	F-15	426th Tactical Fighter Squadron	Luke AFB, AZ
5.	1	F-16	162nd Tactical Fighter Group	Tucson, AZ

### III. TASK LISTING

	Visually assisted		Visually dependent	
	day	night	day	night
1.0 <u>Takeoff and Landing</u>				
1.1 Taxi			<u>D</u> <sup>a</sup>	<u>N</u> <sup>b</sup>
1.2 Takeoff (To transition from VMC to IMC) <sup>c</sup>			<u>D</u>	<u>N</u>
1.3 VMC Recovery	<u>D</u>	<u>N</u>		
1.4 VMC Pattern Entry				
1.4.1 Normal Overhead Pattern			<u>D</u>	<u>N</u>
1.4.2 Straight-In Approach			<u>D</u>	<u>N</u>
1.4.3 Closed Traffic Pattern			<u>D</u>	<u>N</u>
1.4.4 Pattern Re-entry			<u>D</u>	<u>N</u>
1.5 IMC Pattern Entry (After transition to VMC)				
1.5.1 Precision Approach			<u>D</u>	<u>N</u>
1.5.2 Nonprecision Approach			<u>D</u>	<u>N</u>
1.5.3 Circling Approach			<u>D</u>	<u>N</u>
1.6 Landing			<u>D</u>	<u>N</u>
1.7 Post-Landing Taxi			<u>D</u>	<u>N</u>
2.0 <u>Aerobatics</u>				
2.1 Loop	<u>D</u>			
2.2 Immelmann	<u>D</u>			
2.3 Split S	<u>D</u>			
2.4 Cloverleaf	<u>D</u>			
2.5 Aileron Roll	<u>D</u>			
2.6 Barrel Roll	<u>D</u>			
2.7 Cuban Eight	<u>D</u>			
2.8 Lazy Eight	<u>D</u>			
2.9 Chandelle	<u>D</u>			

<sup>a</sup>D = Day.

<sup>b</sup>N = Night.

<sup>c</sup>VMC = Visual Meteorological Conditions; IMC = Instrument Meteorological Conditions.

	Visually assisted		Visually dependent	
	day	night	day	night
3.0 <u>Aircraft Handling Maneuvers</u>				
3.1 Vertical Recovery	U	-	-	-
3.2 Reversals	U	-	-	-
3.3 Rolling Maneuver	U	-	-	-
3.4 Steep Turn	U	-	-	-
3.5 Pitchback	U	-	-	-
3.6 Sliceback	U	-	-	-
4.0 <u>Stalls</u>				
4.1 1G Level Stall	U	-	-	-
4.2 Accelerated Stall	U	-	-	-
5.0 <u>Basic Formation (Wingman)</u>				
5.1 Taxi	-	-	U	N
5.2 Formation Takeoff	-	-	U	N
5.3 Fingertip Formation	-	-	U	N
5.4 Crossunder	-	-	U	N
5.5 Route Formation	-	-	U	N
5.6 Echelon Formation	-	-	U	N
5.7 Chase Formation	-	-	U	N
5.8 Fighting wing	-	-	U	N
5.9 Lead Change	-	-	U	N
5.10 Pitchout and Rejoin				
5.10.1 Straight-Ahead Rejoin	-	-	U	N
5.10.2 Turning Rejoin	-	-	U	N
5.11 Overshoot and Rejoin				
5.11.1 Straight-Ahead Rejoin	-	-	U	N
5.11.2 Turning Rejoin	-	-	U	N

	Visually assisted		Visually dependent	
	day	night	day	night
5.12 Lost wingman Procedures	-	-	<u>D</u>	<u>N</u>
5.13 Formation Recovery	-	-	<u>D</u>	<u>N</u>
5.14 Formation Pattern Entry				
5.14.1 Pitchout to Overhead Pattern	-	-	<u>D</u>	<u>N</u>
5.14.2 Formation Straight-In Approach	-	-	<u>D</u>	<u>N</u>
5.14.3 Formation Missed Approach	-	-	<u>D</u>	<u>N</u>
5.15 Formation Landing	-	-	<u>D</u>	<u>N</u>
5.16 Post-Landing Taxi	-	-	<u>D</u>	<u>N</u>
6.0 <u>Navigation</u>				
6.1 Pilotage (with night references)				
6.1.1 Locate Checkpoints	-	-	<u>D</u>	<u>N</u>
6.1.2 Distinguish Terrain References	-	-	<u>D</u>	<u>N</u>
6.2 Instrument Navigation (with night references)				
6.2.1 Dead Reckoning	<u>D</u>	<u>N</u>	-	-
6.2.2 Course Guidance	<u>D</u>	<u>N</u>	-	-
7.0 <u>Air Refueling</u>				
7.1 Rendezvous				
7.1.1 KC-10	<u>D</u>	<u>N</u>	-	-
7.1.2 KC-135	<u>D</u>	<u>N</u>	-	-
7.2 Observation Position	-	-	<u>D</u>	<u>N</u>
7.3 Precontact Position	-	-	<u>D</u>	<u>N</u>
7.4 Contact Position	-	-	<u>D</u>	<u>N</u>
7.5 Maintain contact	-	-	<u>D</u>	<u>N</u>
7.6 Breakaway (in VIC)	-	-	<u>D</u>	<u>N</u>
7.7 Disconnect	-	-	<u>D</u>	<u>N</u>
7.8 Reform	-	-	<u>D</u>	<u>N</u>

3.0 <u>Tactical Formation</u>	<u>Visually assisted</u>		<u>Visually dependent</u>	
	<u>day</u>	<u>night</u>	<u>day</u>	<u>night</u>
8.1 Two-Ship Formation				
8.1.1 Straight-Ahead Formation (wingman)	--	--	<u>D</u>	--
8.1.2 Formation Turns				
8.1.2.1 Delayed 45 <sup>0</sup> Turn (wingman)				
8.1.2.1.1 Turns into wingman	--	--	<u>D</u>	--
8.1.2.1.2 Turns away from wingman	--	--	<u>D</u>	--
8.1.2.2 Delayed 90 <sup>0</sup> Turn (wingman)				
8.1.2.2.1 Turns into wingman	--	--	<u>D</u>	--
8.1.2.2.2 Turns away from wingman	--	--	<u>D</u>	--
8.1.2.3 In-Place 180 <sup>0</sup> Turn (wingman)	--	--	<u>D</u>	--
8.1.2.4 Cross Turn				
8.1.2.4.1 Leader	--	--	<u>D</u>	--
8.1.2.4.2 wingman	--	--	<u>D</u>	--
8.1.2.5 Check Turn (wingman)				
8.1.2.5.1 Turns into wingman	--	--	<u>D</u>	--
8.1.2.5.2 Turns away from wingman	--	--	<u>D</u>	--
8.1.2.6 Weave (Shackle)				
8.1.2.6.1 Leader	--	--	<u>D</u>	--
8.1.2.6.2 wingman	--	--	<u>D</u>	--
8.1.3 Radio Silent Turns (wingman)	--	--	<u>D</u>	--
8.2 Three or More Aircraft in Formation (wingmen)				
8.2.1 Wedge/Formation				
8.2.1.1 Straight-Ahead Formation	--	--	<u>D</u>	--
8.2.1.2 Formation Turns	--	--	<u>D</u>	--

	<u>Visually assisted</u>		<u>Visually dependent</u>	
	<u>day</u>	<u>night</u>	<u>day</u>	<u>night</u>
8.2.2 Arrowhead Formation				
8.2.2.1 Straight-Ahead Formation	--	--	<u>D</u>	--
8.2.2.2 Formation Turns	--	--	<u>D</u>	--
8.2.3 Box (4-ship) Formation				
8.2.3.1 Straight-Ahead Formation	--	--	<u>D</u>	--
8.2.3.2 Formation Turns	--	--	<u>D</u>	--
9.0 <u>Air-to-Air Combat</u>				
9.1 Weapons Employment				
9.1.1 Guns				
9.1.1.1 Guns Tracking	--	--	<u>D</u>	--
9.1.1.2 Snapshot	--	--	<u>D</u>	--
9.1.2 Missiles				
9.1.2.1 AIM-9				
9.1.2.1.1 Boresight Shot	--	--	<u>D</u>	--
9.1.2.1.2 Off-Boresight Shot	<u>D</u>	--	--	--
9.1.2.2 AIII-7 (No radar lock-on)	--	--	<u>D</u>	--
9.2 Offensive BFM <sup>d</sup>				
9.2.1 Visual Threat Assessment				
9.2.1.1 Visual Identification (VID)	--	--	<u>D</u>	--
9.2.1.2 Range	--	--	<u>D</u>	--
9.2.1.3 Aspect Angle	--	--	<u>D</u>	--
9.2.1.4 Angle-Off	--	--	<u>D</u>	--
9.2.1.5 Closure Rate	--	--	<u>D</u>	--
9.2.1.6 Relative Energy State	--	--	<u>D</u>	--

<sup>d</sup>BFM = Basic Fighter Maneuvers.

	Visually assisted		Visually dependent	
	day	night	day	night
9.2.2 Acceleration Maneuver	D	-	-	-
9.2.3 Low Yo-Yo	-	-	D	-
9.2.4 High Yo-Yo	-	-	D	-
9.2.5 Quarter Plane Maneuver	-	-	D	-
9.2.6 Barrel Roll Attack	-	-	D	-
9.2.7 Lag Roll	-	-	D	-
9.2.8 Immelmann Attack	-	-	D	-
9.2.9 Pure Pursuit	-	-	D	-
9.2.10 Lead Pursuit	-	-	D	-
9.2.11 Lag Pursuit	-	-	D	-
9.2.12 Lag Corner	-	-	D	-
9.2.13 Separation	D	-	-	-
9.3 Neutral BFM				
9.3.1 Lead Turn	-	-	D	-
9.3.2 Two-Circle Fight	-	-	D	-
9.3.3 Single-Circle Fight	-	-	D	-
9.4 Counteroffensive BFM				
9.4.1 Extension	D	-	-	-
9.4.2 Break Turn	-	-	D	-
9.4.3 Hard Turn (Sustained)	-	-	D	-
9.4.4 Reversal	-	-	D	-
9.4.5 Scissors	-	-	D	-
9.5 Last Ditch Maneuvers				
9.5.1 Gun Break Turn	-	-	D	-
9.5.2 High-G Roll Over The Top	-	-	D	-
9.5.3 High-G Roll Underneath	-	-	D	-
9.5.4 Jinkout	-	-	D	-
9.6 Air Combat Maneuvers (ACM)				
9.6.1 Offensive ACM				
9.6.1.1 Engaged	-	-	D	-
9.6.1.2 Supporting	-	-	D	-

	Visually assisted		Visually dependent	
	day	night	day	night
9.6.2 Defensive ACM				
9.6.2.1 Engaged	-	-	D	-
9.6.2.2 Supporting	-	-	D	-
9.7 Air Intercepts (Transition from Radar to Visual)	-	-	D	-
9.8 Deployable Airborne Retrievable Target (DAKT) Attack				
9.8.1 Visual Acquisition	-	-	D	-
9.8.2 Guns Tracking	-	-	D	-
9.8.3 Snapshot	-	-	D	-
9.8.4 Reposition Maneuver	-	-	D	-
10.0 <u>Low-Altitude Maneuvers</u> (Terrain Clearance Tasks)				
10.1 Straight-and-Level	-	-	D	-
10.2 Level Turns	-	-	D	-
10.3 Unloaded Roll	-	-	D	-
10.4 Loaded Roll	-	-	D	-
10.5 Wings-Level Pull	-	-	D	-
10.6 Wings-Level Sunt	-	-	D	-
10.7 Inverted Turning Pull	-	-	D	-
10.8 Inverted Pull	-	-	D	-
10.9 Climbing Turn	-	-	D	-
10.10 Maximum Recovery Maneuver	-	-	D	-
10.11 Wings-Level Dive and Recovery	-	-	D	-
10.12 Descending Turn	-	-	D	-
10.13 Vertical Snake	-	-	D	-
10.14 Horizontal Snake	-	-	D	-
10.15 Vertical Jinks	-	-	D	-
10.16 Oblique Jinks	-	-	D	-
10.17 Reversals	-	-	D	-
10.18 Ridge Crossing	-	-	D	-

	Visually assisted		Visually dependent	
	day	night	day	night
11.0 <u>Surface Attack</u>				
11.1 Controlled Range Procedures				
11.1.1 Box Pattern	-	-	<u>D</u>	<u>N</u>
11.1.2 Curvilinear Pattern	-	-	<u>D</u>	<u>N</u>
11.1.3 Pop-Up Pattern	-	-	<u>D</u>	-
11.1.4 Bump-Up Maneuver	-	-	<u>D</u>	-
11.1.5 Fly-Up Attack	-	-	<u>D</u>	-
11.2 Surface Attack Tactical				
11.2.1 Terrain Masking	-	-	<u>D</u>	-
11.2.2 Initial Point (IP) to Target	-	-	<u>D</u>	-
11.2.3 Ground Target Acquisition	-	-	<u>D</u>	-
11.2.4 Curvilinear Attack	-	-	<u>D</u>	-
11.2.5 Pop-Up Attack	-	-	<u>D</u>	-
11.2.6 Bump-Up Maneuver	-	-	<u>D</u>	-
11.2.7 Offset Wheel Pattern	-	-	<u>D</u>	-
11.2.8 Random Wheel Pattern	-	-	<u>D</u>	-
11.2.9 Random Attack	-	-	<u>D</u>	-
11.2.10 Reattacks (Strafe)				
11.2.10.1 Bump-Up Reattack				
11.2.10.1.1 Restricted	-	-	<u>D</u>	-
11.2.10.1.2 Random	-	-	<u>D</u>	-
11.2.10.2 Pop-Up Reattack				
11.2.10.2.1 Restricted	-	-	<u>D</u>	-
11.2.10.2.2 Random	-	-	<u>D</u>	-
11.2.11 Egress Target Area	-	-	<u>D</u>	-

	<u>Visually assisted</u>		<u>Visually dependent</u>	
	<u>day</u>	<u>night</u>	<u>day</u>	<u>night</u>
11.3 Weapons Employment				
11.3.1 Dive Bombing	-	-	<u>D</u>	<u>N</u>
11.3.2 Low-Angle Bombing	-	-	<u>D</u>	<u>N</u>
11.3.3 Low-Angle Low Drag	-	-	<u>D</u>	<u>N</u>
11.3.4 Level Bombing	-	-	<u>D</u>	<u>N</u>
11.3.5 Dive Toss Bombing	-	-	<u>D</u>	<u>N</u>
11.3.6 Lateral Toss Bombing	-	-	<u>D</u>	<u>N</u>
11.3.7 High-Angle Strafe	-	-	<u>D</u>	<u>N</u>
11.3.8 Low-Angle Strafe	-	-	<u>D</u>	<u>N</u>
11.3.9 Long-Range Strafe	-	-	<u>D</u>	-
11.3.10 Two-Target Strafe	-	-	<u>D</u>	-
11.3.11 Rocket Delivery	-	-	<u>D</u>	-
11.3.12 Delivery with Ground Markers		-		<u>N</u>
11.3.13 Delivery with Flares		-		<u>N</u>
11.3.14 "Hit" Assessment	-	-	<u>D</u>	<u>N</u>

#### IV. APPLICATIONS

The present listing encompasses the visual tasks that are trained in both fighter and attack aircraft, as well as the tasks that comprise the major Air Force tactical training missions. Because of this broad coverage, the task listing has practical utility in a variety of flight training and research settings. Representative applications of the task listing are described in the following paragraphs.

##### Syllabus Development

Training syllabuses are used to ensure that trainees receive standardized practice on the training events. These syllabuses prescribe the individual tasks to be trained and the sequence of events that are practiced. In the development of a syllabus for either flight training or research, the task listing could be used to establish the visual flight maneuvers the pilots must perform.

##### Performance Measurement

Pilot performance measures developed for one set of tasks may not be relevant for another set of tasks. For example, bomb miss distance is an informative measure of bombing performance; but it is irrelevant to formation training. Because some measures of performance are clearly task-specific, the task listing could be utilized to distinguish between training events for the development of task-related performance criteria.

## Simulation System Evaluations

The task listing could be used to identify the specific training capabilities of a flight simulator visual system, as follows:

<u>Flight Tasks</u>	<u>Simulation</u>	
	<u>Day</u>	<u>Night</u>
Landing	x	x
Formation	-	-
Air Refueling	x	x
Air-to-Air Combat	-	-
Surface Attack	x	x

The task listing could also be used to compare the training capabilities of alternative visual simulation system configurations on a common set of tasks. An example of this application is provided below:

<u>Flight Tasks</u>	<u>Simulator A</u>		<u>Simulator B</u>	
	<u>Day</u>	<u>Night</u>	<u>Day</u>	<u>Night</u>
Landing	x	x	x	x
Formation	x	x	-	-
Air Refueling	-	-	x	x
Missile Employment	x	x	-	-
Offensive BFM	x	x	-	-
Pop-Up Pattern	x	x	x	x

## Visual System Requirements

The task listing could have practical applications in flight simulator acquisition and engineering development programs for determining (a) what tasks require visual imagery for training and (b) which tasks require both day and night visual simulation. Simulator procurement managers could use this information to write training system design specifications that will provide simulation capabilities consistent with Air Force training requirements. The engineers, on the other hand, could profit from the task listing in the identification of, say, the visual databases required to simulate the tasks.

## V. PRECAUTIONARY NOTES

Several precautions should be observed in the use of the task listing; to wit:

1. The task listing does not represent a specific aircraft or training mission.
2. Primary flight instruments (e.g., attitude, altitude, and airspeed) are required for the tasks, even though the tasks are vision related.

3. Some of the pilots based their judgments on a generic aircraft configuration, which does not have the specialized cockpit avionics they are accustomed to operating. In the absence of this equipment, they would rely on visual cues.

4. Air Force regulations stipulate visual meteorological conditions for training various tasks, although the tasks could theoretically be performed on instruments alone. These regulated tasks were treated as vision related.

It is recommended that qualified pilots and the relevant training manuals be consulted whenever the task listing is implemented in training and research. The specific training operations can be determined from the manuals, and the pilots can validate the training tasks.

## APPENDIX: SOURCE MATERIALS

The task listing was compiled using the following unclassified source materials, which are organized on the basis of the aircraft or area they represent.

### Undergraduate Pilot Training

Department of the Air Force (1982, December). Primary flying, jet (AFC Manual 51-4). Randolph AFB, TX: Headquarters Air Training Command.

### F-16

Department of the Air Force (1986, October). Air-to-air phase manual, F-16A/B. Tucson, AZ: 162nd Tactical Fighter Group.

Department of the Air Force (1986, October). Conversion phase manual, F-16A/B. Tucson, AZ: 162nd Tactical Fighter Group.

Department of the Air Force (1986, October). F-16A formal flying training, air-to-surface phase manual. MacDill AFB, FL: 56th Tactical Training Wing.

### F-15

Department of the Air Force (1985, July). F-15 formal flying training, air-to-air training manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1984, May). F-15 formal flying training, conversion training manual. Luke AFB, AZ: 405th Tactical Training Wing.

### A-10

Department of the Air Force (1986, June). USAF upgrade training course A-10, surface attack tactical training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, September). USAF upgrade training course A-10, transition/instruments training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, August). USAF upgrade training course A-10, air refueling training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, August). USAF upgrade training course A-10, surface attack training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, May). USAF upgrade training course A-10, BFH/BAM training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, May). USAF upgrade training course A-10, dissimilar defensive maneuvering training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, May). USAF upgrade training course A-10, formation training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1985, May). USAF upgrade training course A-10, night operations training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

Department of the Air Force (1984, January). USAF upgrade training course A-10, low level operations training manual. Davis-Monthan AFB, AZ: 355th Tactical Training Wing.

#### F-5

Department of the Air Force (1981, January). USAF/MAP advanced fighter courses F-5, air intercept phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1980, May). USAF/MAP advanced fighter courses F-5, ground attack phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1980, April). USAF/MAP advanced fighter courses F-5, air combat phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1980, April). USAF/MAP advanced fighter courses F-5, transition phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1980, January). USAF/MAP advanced fighter courses F-5, night flying phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1979, September). USAF/MAP advanced fighter courses F-5, PART phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1979, August). USAF/MAP advanced fighter courses F-5, formation phase manual. Luke AFB, AZ: 405th Tactical Training Wing.

Department of the Air Force (1979, January). USAF/MAP advanced fighter courses F-5, instruments phase manual. Luke AFB, AZ: 58th Tactical Training Wing.

### Low-Altitude Training

Toldy, M.E., & Miller, M.J. (1985). Low altitude training for pilots: Test course (AFHRL-TP-85-17, AD-B096 160L). Williams AFB, AZ: Operations Training Division, Air Force Human Resources Laboratory.

### General References

Gunston, B., & Spick, M. (1983). Modern air combat. New York: Crescent Books.

Sweetman, B., Gething, M.J., Richardson, D., Spick, M., & Gunston, B. (1987). The great book of modern warplanes. New York: Portland House.

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