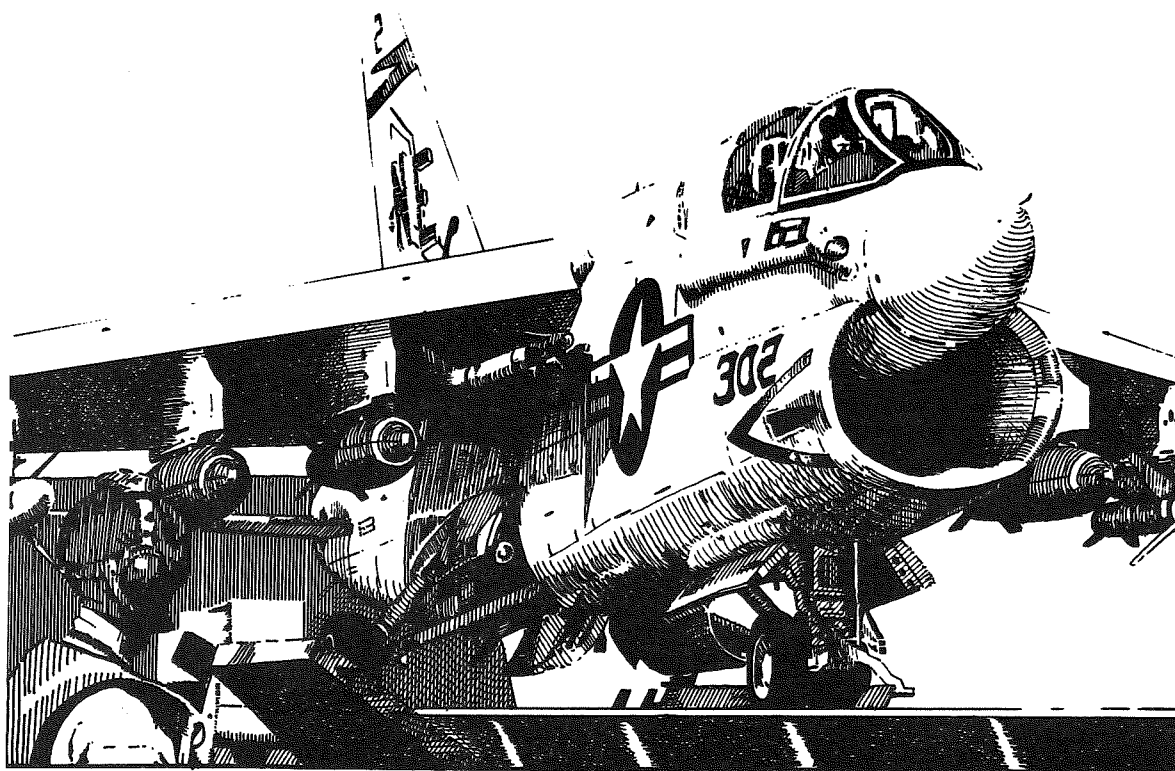


AIR POWER

Standard Rules

First Edition



A Clash of Arms Game

AIR POWER

"FIGHT TO FLY, FLY TO FIGHT, FIGHT TO WIN!"

Motto of the U.S. Navy Fighter Weapons School
"Top Gun"

DEDICATION

To all those who so patiently awaited this and especially to Rex "Van" Vandeboe, a good friend who tragically died of a heart attack at age 36. Truly a great guy, and a fun competitive gamer who was among the best I ever matched wits with. Van; this one's for you bud.

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(Thanks guys, you did a great job! Sorry if I missed anyone).

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CHAPTER 1 — IN THIS GAME

This chapter introduces the **Air Power** game system and its components.

1.1 — THE GAME SYSTEM

The **Air Power** game system allows you to control one or more jet fighters in scenarios reflecting the actual life and death situations faced by fighter pilots in modern air combat. These rules provide the procedures for simulating jet fighter combat on a game board. As players, you must provide the brains, the strategy, and the tactics that will allow your jets to survive combat and win the various game scenarios.

Note: The **Air Power** system is a derivative of the game system I used in GDW's **Air Superiority** games (now out of print), and as a result the data cards and most of the information tables used in the **Air Superiority** games are fully compatible with this game system and may be used with it.

1.2 — GAME SCALE

- Each game turn represents 12 seconds of real time.
- Each map hex covers a distance of 1/3 a statute mile.
- Each altitude level represents 1,000 feet of height.
- Each altitude band is 8,000 to 10,000 feet thick.
- Each aircraft speed point equals 100mph of speed.
- Each aircraft counter represents a single jet.

1.3 — LEARNING THE GAME SYSTEM

Read The Basic Rules First. You should read only the rules that appear prior to any "Advanced Rules" header within each chapter. Skip the advanced rules and read on into the next chapter. Keep reading until you are instructed to play a Training Scenario. Take a break, then set up the scenario, and play it out. All of the Training Scenarios are designed for solitaire play. When you have finished, return to where you left off and continue reading. Do this until you've been exposed to all the basic rules and played all training scenarios.

Read The Advanced Rules If Desired. Advanced rules are optional in nature and allow you to raise the level of detail and realism contained in the game. Using the advanced rules will increase the complexity of play but rewards you with a more accurate depiction of modern air combat. All, some, or none of the advanced rules may be learned and used as agreed upon by the players. The training scenarios may be replayed with advanced rules for practice.

Be Patient and Have Fun! Don't expect to learn all the rules in a single seating. Take your time and enjoy yourself. After playing several of the training scenarios, you will begin to get the hang of the system. Don't forget, this is a game. Play it for its entertainment value, and have a good time as you strive to master the intricacies of modern air combat.

1.4 — GAME COMPONENTS

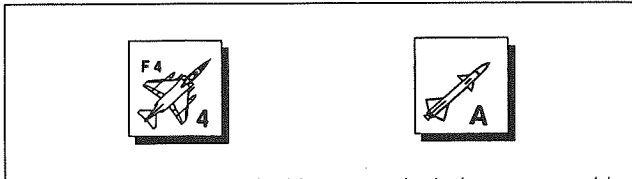
Like most simulation games, those in this system have the following basic types of components:

1. Game Rules. This set of rules defines how aircraft, missiles, and ground units move, detect enemies, and fight. It is not necessary to memorize the rules. Play aid sheets summarizing the key points of the rules are provided.

Once familiar with the rules, you should be able to play the game referring to the play aid charts alone; returning to the rules booklet only to clarify questions. There are two different levels of rules: Basic, and Advanced. Basic rules are all that are necessary to play any scenario in the game.

2. Game Charts. Game charts distill large amounts of information into easily used tables. Players use the charts to determine specific capabilities of their aircraft and weapons, and to resolve combat. Charts in this system include: Flight and combat rules summaries, weapons data tables, aircraft data cards, and aircraft logsheets.

3. Game Counters. The die-cut cardboard counters are the game pieces used to represent the aircraft, missiles, and ground units involved in play. Some of the counters represent information (such as target hits) rather than objects. Usually less than 20 pieces will be required for the play of any scenario. The counters shown here represent a fighter and an air to air missile. Each has a distinctive silhouette and color scheme that lets players recognize them easily.



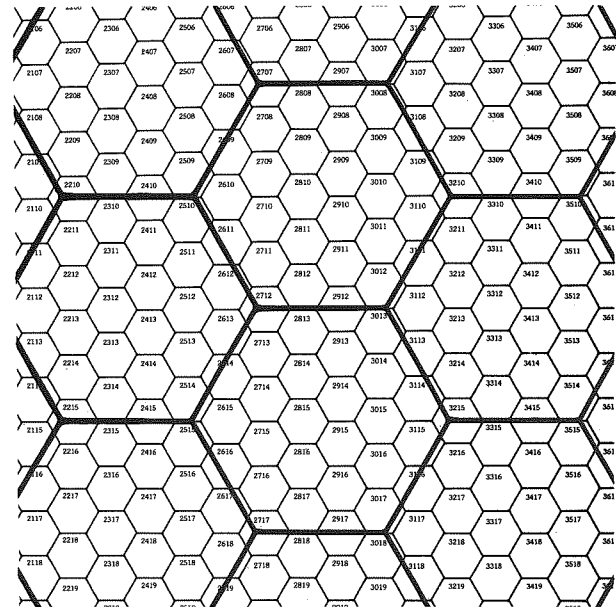
4. Dice. Each game in this system includes one ten-sided die as a random number generator. **Air Power** uses the die to resolve events of chance during play. The die is marked with ten digits: 0 to 9. When rolled, it produces numbers from 0 to 9; the top-most number on the die is the one read. The 0 is always read as a 10. Thus, when the ten-sided die is rolled, it will produce a number from 1 to 10.

Die usage example: if a game chart indicates that a certain missile will hit its target 80% of the time when it attacks. A player must use the die and roll 8 or less in order to hit. That die roll represents the 80% probability of hitting. In this case, a miss would occur if a 9 or 10 was rolled.

5. Game Maps. The game maps are the surface over which the playing pieces will be moved. Though several are provided, sometimes only a few will be used in a scenario. The hexagon grid on each map provides spaces in which players place and move their counters. Like a chessboard, the hexagons help to clearly define where a counter is. Distance between counters (range) is determined by counting the number of hexes between them.

For example, as each hex represents 1/3 of a mile of distance, and as the two aircraft counters shown in the diagram below are 6 hexes apart, they are a scale two miles apart. Notice the large shaded hex outlines on the map. These are termed "megahexes". Each megahex is 5 regular hexes

across and allows players to determine long ranges and distances easier by letting them count by fives.



CHAPTER 2 — THE GAME TURN

This chapter describes game turns and how they are divided into phases to regulate play.

In **Air Power**, a scenario is played out in game turns (often just called turns). Each game turn represents 12 seconds of real time. A game turn is a tool used to regularize the movement and combat actions of the playing pieces. Within each turn, all aircraft and weapons in flight will get to move a scale distance equal to that which could be moved in 12 seconds of real time.

2.1 — PHASES WITHIN A TURN

More than movement takes place in a turn. Air combat is a confusing affair in which opposing pilots are hotly engaged in sorting, tracking and attacking their enemies. This all happens in a continuous, rapid, dynamic and fluid manner. To keep the game manageable, the various actions pilots are concerned with, such as sighting the enemy or using radar etc., have been defined and given specific times during the game turn, called "phases", in which they will be attended to. Each aircraft in play may participate in each phase dependant on the ability of the aircraft to function in those phases (i.e., an aircraft without a radar, would not participate in the radar phase). The order in which the phases are accomplished is termed the "Sequence of Play" (SOP).

The **Air Power** SOP is shown below and must be followed exactly in each game turn. However, phases which are not applicable to the scenario or current situation can be skipped over to speed play. Often, the scenarios are simply air combat ones not involving ground units. In those scenarios, the AAA, SAM, and Ground Unit interaction phases can be ignored.

SEQUENCE OF PLAY

1. AAA Interaction Phase.
2. SAM Interaction Phase.
3. Stalled Aircraft Phase.
4. Visual Sighting Phase.
5. Aircraft Decisions Phase.
6. Order of Flight Determination Phase.
7. Flight Phase.
8. Air To Air Missile Phase.
9. Air Radar Lock-on Phase.
10. Ground Unit Interaction Phase.
11. Aircraft Admin Phase.
12. End of Turn Admin Phase.

There are reasons for the specific order of the phases. Visual sighting comes before the flight and missile launch phases because the rules require targets to be sighted before attacks can be made on them. The sighting phase also comes before the order of flight phase since determining which aircraft moves first is largely dependant on who sees who.

EXPANDED SEQUENCE OF PLAY. In the play aids to these rules, there is an expanded SOP chart which fully details each of the actions players will be concerned with in each phase of the game-turn.

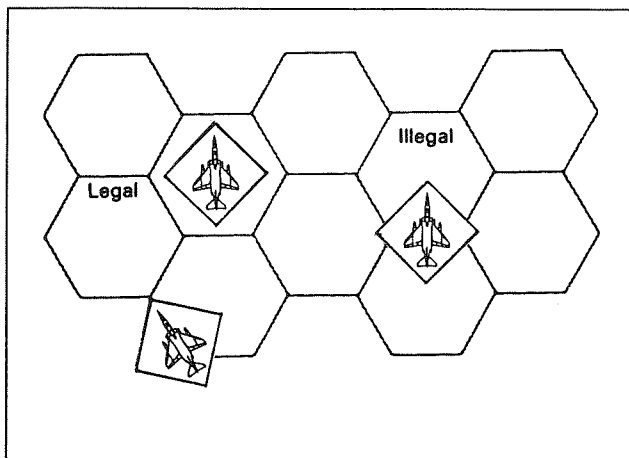
CHAPTER 3 — POSITIONING GAME COUNTERS

This chapter describes how the map hexes are utilized to position counters during play. The game map is used to show exactly where aircraft, missiles, and other units, are located in relationship to each other. Every game counter must be placed on the maps so that its position is clear to all players.

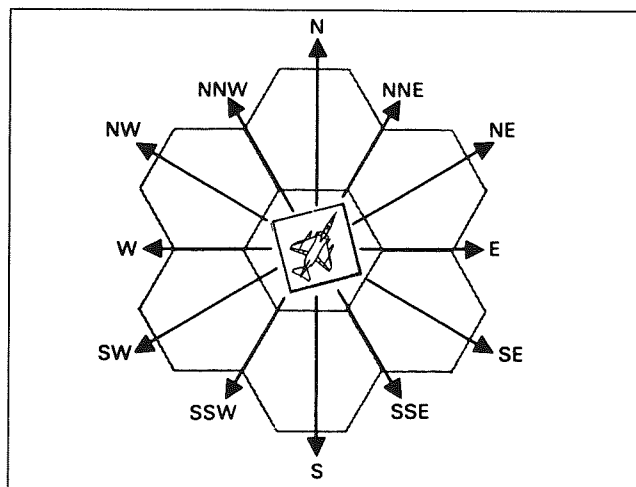
3.1 — BASIC ELEMENTS OF POSITION

Aircraft And Missile Counters. Each aircraft and missile counter has a position which is defined by its map location, facing, and altitude.

• **Map Location:** with respect to the hexgrid, aircraft and missiles may be located wholly within a hex or on one of the lines between two hexes (Commonly called a hexside). When located on a hexside, the game counter must face parallel to that hexside as illustrated below.



• **Facing:** This is the horizontal direction in which an aircraft or missile is flying. Use the silhouette on the counter to show facing by pointing the nose of the aircraft or missile in one of the twelve possible directions. Each direction differs by 30 degrees and has a corresponding compass heading associated with it, (i.e. N= North, SSE= South South-East, etc.). In the scenario booklets, next to the map layout diagrams, there will be a compass arrow indicating which direction relative to the hexgrid that is North. See diagram below.



• **Altitude:** An aircraft or missile's altitude is kept track of on the aircraft's log sheet in terms of numbered levels. Each altitude level represents 1000 feet of height thus the number of a level corresponds to the altitude in thousands of feet (i.e., level 24 = 24,000 feet). Altitude levels are further grouped into named bands as described later in the rules. Aircraft and missile performance may vary in each altitude band as shown on an aircraft's data card and in the missile flight tables.

Ground And Naval Unit Counters. Ground combat units and naval units have their positions defined simply by map location. They are always placed wholly within hexes and never on hexsides. Ground units never consider facing but large naval units must be faced in specific directions as for aircraft and missiles.

3.2 — STACKING

It is allowed, within the limits given below, for more than one counter to be in the same position on the map at the same time. When counters end up on top of other counters at the end of a turn, they are considered stacked. Stacking restrictions apply only at the end of a turn after all moves are completed.

In The Air. Aircraft and missiles may freely fly through hexes or hexsides containing other game counters. They may freely stack on top of ground and naval units. They may freely stack with other aircraft and missiles that are not at the same altitude level. However, no more than two friendly aircraft may safely end up stacked together at the same altitude level (unless in Close Formation). Aircraft from opposing sides may not stack together at the same altitude safely. If these last two situations occur, you must check for collisions.

Exception: Up to four aircraft may be stacked together and may safely fly together at the same altitude while in a close formation. See advanced rule 5.6.

On The Ground. No more than four ground unit counters

may ever stack in the same ground terrain hex. No more than four small naval unit counters may ever stack in the same water, coastal, or river terrain hex. No more than two large naval unit counters may ever stack in the same water hex. When taxiing on the ground, up to four aircraft may move together in a stack.

3.3 — AIRCRAFT COLLISIONS

Collisions are possible during the Flight Phase whenever an aircraft executes a head-on gun attack at range zero. Collisions are also possible at the end of a game-turn in the following situations:

- If an aircraft is stacked at the same altitude level with any enemy aircraft, and/or
- if an aircraft is stacked with two or more friendly aircraft and not in Close Formation.

Collision Resolution: For each potential collision, the player who last moved into the position must roll the die. On a roll of 1, his aircraft collides with one of the others. Determine which aircraft it collides with randomly. Both aircraft immediately roll on the 10 column of the Damage table to determine their damage.

Collision Exceptions. There are two exceptions to the Potential Collision rule.

- 1) An aircraft tailing another will not collide with that aircraft.
- 2) An aircraft which is flying in close formation will not collide with other aircraft in that formation.

CHAPTER 4 — AIRCRAFT DATA CARDS

This chapter discusses the Aircraft Data Cards (ADCs) and the information presented on them. Each aircraft used in play has its flight and combat capabilities fully defined in game terms in its ADC. A sample ADC is shown on the following pages. It is divided into two major panels: the Flight Characteristics panel and the Combat Characteristics panel.

4.1 — FLIGHT CHARACTERISTICS PANEL

The Flight Characteristics panel is the top half of the ADC and it contains information which defines the flying capabilities of the aircraft. This panel is divided into the following sections:

1. Aircraft Type. The upper right corner contains the name most commonly used to identify that type of aircraft. It also shows the number of crew positions on the aircraft.

2. Three-View. The 3-view drawing is included to familiarize the player with the appearance of the aircraft. The top view will be similar to that used on a corresponding game counter.

3. Basic Data. The center of the panel contains the basic information chart which includes:

- **Cruise Speed:** This is the cruise speed of the aircraft shown in Flight Points (FPs).
- **Climb Speed:** The optimum climb speed of the aircraft shown in FPs.
- **Visibility:** This is a visibility rating number referenced for sighting attempts against the aircraft.

• **Size:** This is the size modifier used as an enemy "to hit" die roll modifier in combat.

• **Vulnerability:** This is the vulnerability modifier used as a damage die roll modifier.

• **Restricted Arc:** This defines the aircraft's angle-off arc into which it can sight enemies only with difficulty.

• **Blind Arc:** This defines the aircraft's angle-off arc into which it cannot sight enemies.

• **Internal Fuel:** This is the maximum quantity of internal fuel, in terms of points, that can be carried by the aircraft.

• **Ata Refuel:** The yes or no indicates whether or not the aircraft can refuel from aerial tankers in flight.

• **Ejection Seat:** This lists the type of egress system carried by the aircraft; either none, early, standard or advanced ejection seats.

4. Maneuver Costs. The Maneuver Costs Chart shows the cost, in terms of Flight Points and Decel Points, to perform lag rolls, displacement rolls, and vertical rolls. The cost is paid each time one of these maneuvers is performed.

5. Power Chart. The Power Chart indicates the maximum number of Accel Points available to the aircraft in a single game turn when a specific power setting is selected for the aircraft's engines. Three columns appear, one for each possible configuration of the aircraft. Also shown is the speed loss (in FPs) for selecting idle power and/or speedbrakes, and the fuel points used at each power setting.

Note: The dots to the right of the Power Chart heading indicate the number of engines the aircraft has.

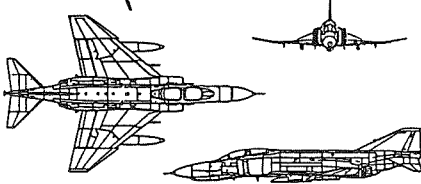
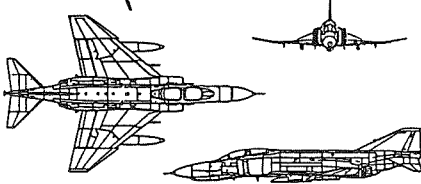
6. Minimum-Maximum Velocity Chart. The Minimum-Maximum Velocity Chart shows the minimum and maximum allowed speeds of the aircraft (in terms of Flight Points) in each altitude band by configuration. The Dive Speed column indicates the maximum speed (in Flight Points) allowed regardless of aircraft's configuration after a turn of Diving flight. The maximum ceiling, in altitude levels, that can be climbed to in each configuration is also indicated here.

7. Turn Drag Chart. The Turn Drag Chart shows the decel points received by an aircraft each game turn when using one of the listed turn rates. Three columns appear, one for each possible configuration. Appropriate notes are shown for the Turn Drag Chart if necessary.

8. Climb Capability Chart. The Climb Capability Chart (CCC) shows the number of altitude levels an aircraft can gain in a single game turn at the Sustained Climb decel rate while in afterburner power or any other power in each altitude band for each possible configuration.

Note: The game terms; "configuration", "accel point", "decel point", "flight point", and "angle-off arcs" may seem foreign to you at this moment. Do not be alarmed, each term will be clearly explained and its game function defined in upcoming chapters. Please read on.

4.2 — COMBAT CAPABILITIES PANEL

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<div><div>F-4E/J Phantom II</div><div>Crew: Pilot, Radar Officer</div><div><div>Power Chart (Accel) **</div><table><tr><td>Power</td><td>CL</td><td>1/2</td><td>DT</td><td>Fuel</td></tr><tr><td>Aft. Bur.</td><td>3.0</td><td>2.5</td><td>2.0</td><td>12.0</td></tr><tr><td>Military</td><td>1.5</td><td>1.0</td><td>1.0</td><td>4.0</td></tr><tr><td>Normal</td><td>0.0</td><td>0.0</td><td>0.0</td><td>2.0</td></tr><tr><td>Idle FP</td><td>0.5</td><td>1.0</td><td>1.0</td><td>0.0</td></tr><tr><td>Sp.Br. FP</td><td>0.5</td><td>1.0</td><td>1.0</td><td>—</td></tr></table></div><div>Smoker in Military Power</div></div> <td colspan="2"><div></div><div><div>Cruise Speed: 5.5</div><div>Restr.Arcs: 60-</div><div>Climb Speed: 4.5</div><div>BlindArcs: 30-</div><div>Visibility: 7</div><div>Internal Fuel: 600</div><div>Size Modifier: 0</div><div>Ata Refuel: Yes</div><div>Vulnerability: 0</div><div>Ejection Seat: Std.</div></div></td> <td colspan="2"><div>Air Power</div><div><div>Maneuver Costs:</div><div>HFP</div><div>Decel</div><div>Lag/Displ. Rolls: 1.0 1.0</div><div>Vertical Rolls: 0.0 0.0</div></div><div><div>Turn Drag Chart (Decel)</div><table><tr><td></td><td>CL</td><td>1/2</td><td>DT</td></tr><tr><td>TT</td><td>1.0</td><td>2.0</td><td>2.0</td></tr><tr><td>HT</td><td>2.0</td><td>3.0</td><td>4.0</td></tr><tr><td>BT</td><td>4.0</td><td>5.0</td><td>6.0</td></tr><tr><td>ET</td><td>5.0</td><td>NA</td><td>NA</td></tr></table></div></td> <td>7</td>		Power	CL	1/2	DT	Fuel	Aft. Bur.	3.0	2.5	2.0	12.0	Military	1.5	1.0	1.0	4.0	Normal	0.0	0.0	0.0	2.0	Idle FP	0.5	1.0	1.0	0.0	Sp.Br. FP	0.5	1.0	1.0	—	<div></div> <div><div>Cruise Speed: 5.5</div><div>Restr.Arcs: 60-</div><div>Climb Speed: 4.5</div><div>BlindArcs: 30-</div><div>Visibility: 7</div><div>Internal Fuel: 600</div><div>Size Modifier: 0</div><div>Ata Refuel: Yes</div><div>Vulnerability: 0</div><div>Ejection Seat: Std.</div></div>		<div>Air Power</div> <div><div>Maneuver Costs:</div><div>HFP</div><div>Decel</div><div>Lag/Displ. Rolls: 1.0 1.0</div><div>Vertical Rolls: 0.0 0.0</div></div> <div><div>Turn Drag Chart (Decel)</div><table><tr><td></td><td>CL</td><td>1/2</td><td>DT</td></tr><tr><td>TT</td><td>1.0</td><td>2.0</td><td>2.0</td></tr><tr><td>HT</td><td>2.0</td><td>3.0</td><td>4.0</td></tr><tr><td>BT</td><td>4.0</td><td>5.0</td><td>6.0</td></tr><tr><td>ET</td><td>5.0</td><td>NA</td><td>NA</td></tr></table></div>			CL	1/2	DT	TT	1.0	2.0	2.0	HT	2.0	3.0	4.0	BT	4.0	5.0	6.0	ET	5.0	NA	NA	7																							
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MH 17-25		2.5-10.0	3.0- 9.0	3.0-7.5	12.0																																																																										
ML 8-16		2.0- 9.0	2.5- 8.0	3.0-7.0	10.0																																																																										
LO 1- 7		2.0- 8.5	2.0- 7.5	2.5-6.5	9.0																																																																										
CL	1/2	DT	Alt. Bnd.																																																																												
AB Other	AB Other	AB Other																																																																													
1.0 0.5	1.0 0.5	— —	EH+																																																																												
2.0 1.0	1.5 0.5	1.0 0.5	VH																																																																												
4.0 1.0	3.0 1.0	1.0 0.5	HI																																																																												
4.0 1.5	3.0 1.0	2.0 0.5	MH																																																																												
5.0 2.0	3.0 1.0	2.0 1.0	ML																																																																												
6.0 2.0	4.0 1.5	2.0 1.0	LO																																																																												

The Combat Capabilities Panel is the lower half of the ADC and contains information about the combat abilities of the aircraft. The panel is divided into the following sections.

9. Radar Data. The Radar section indicates the characteristics of the aircraft's radar system. The search and tracking ranges are described in terms of hexes of distance. The functions of radar arcs, ECCM numbers and lock-on numbers are described in the radar rules.

10. ECM Data. The ECM section shows the types of electronic counter-measures gear, if any, the aircraft carries. ECM gear is identified by type (i.e., RWR= radar warning receiver) and quality. A dash indicates no gear of that type is present. A letter indicates gear is present and also indicates the relative quality of the equipment, (i.e., A= least capable, B and C= improved gear, and D= best). The number after the letter is its capability rating as explained in the ECM rules.

11. Internal Gun Data. The Internal Gun section shows the characteristics of the aircraft's internal guns, if any. The data is fully explained in the gun combat rules (Rule 9).

12. Bomb System. The Bomb System section lists the kind of bombsight carried and the attack die roll modifier it provides when the aircraft does air to ground attacks.

13. Technology Listing. The Technology section lists the

kinds of technology, if any, available to the aircraft. The effects on play of having a listed technology is defined in the appropriate rules sections.

14. Weapons Stations Diagram. The Weapon Stations Diagram identifies (by number) the aircraft's weapons pylons or internal bays. These weapons stations are where bombs, missiles, and other stores are attached to the aircraft. At the start of play, each aircraft should have its load of weapons and stores recorded on paper to facilitate keeping track of changes in the load as weapons are expended.

15. Configuration Points Limits. This section indicates what configuration an aircraft will be in when carrying a given amount of weapons and/or other loads. Every weapon, fuel tank, or store that can be carried is given a point value called its "load point rating" (see the associated weapons tables). These load points represent the weight and drag penalty that the item imposes on an aircraft when carried.

The sum of the load an aircraft is carrying at any instant, in load points (rounded down), is compared to the limits given for the three possible configurations (CL= clean, 1/2= half, DT= Dirty). Where the sum falls within those limits defines the current configuration of the aircraft. See advanced rule 4.3.

Internal Weapons bays Note: All weapons or stores car-

stations. Each Aircraft Data Card indicates the point limits which establish Clean, Half, and Dirty. When adding up the load, first total all points then round any fractions off.

Clean (CL). An aircraft in clean configuration is unencumbered by external ordnance or equipment (it may carry some external equipment, but not enough to produce appreciable drag). Generally, the data cards are rated so that fighters can carry a normal load of missiles without penalty.

Half (1/2). An aircraft in half configuration is midway between the lack of drag of Clean and the full drag of Dirty. Usually, adding a drop tank, and/or ECM pods or a small load of bombs is enough to cause a fighter to be half-loaded.

Dirty (DT). An aircraft in Dirty configuration experiences substantial drag from external add-ons. Carrying a large load of ordnance and/or drop tanks will suffice to cause a fighter to be considered Dirty. You will note, that DT configured aircraft have lower speeds, less power, and suffer more Decel penalties while maneuvering than lesser configured aircraft.

Changes in Configuration. An aircraft's configuration is never fixed, and will change during play as weapons are expended in attacks or jettisoned as the situation warrants. Changes in configuration take effect the instant enough load is disposed of to allow the point total to fall within a lesser limit.

Changes in configuration effect several aspects of play and are handled as follows:

- **Power Available:** Configuration changes can only occur after the power setting is selected so no increase in Accel is available until the following turn.
- **When Turning:** The turn drag decel points an aircraft receives for turning is that for the configuration which existed when the highest turn rate was used that game turn.
- **When Climbing:** The climb rate allowed is that of the configuration which exists when the aircraft expends its first VFP during the game turn.

Configuration Example: An aircraft with the following configuration limits: CL= 0 - 8, 1/2= 9 - 14, and DT= 15+; that is loaded with two Triple Racks (TRs) and six Mk.82 500lb. HE bombs, is carrying 11 load points and would be 1/2 configured. The TRs are worth one load point each and the bombs are 1.5 points each. If a 1200L fuel tank were added (4 load points), the aircraft would be considered DT configured (15 point total).

4.4 — JETTISONING WEAPONS AND STORES

Aircraft may voluntarily jettison weapons and/or stores to change configuration, or may be required to jettison them due to combat damage. If voluntary, the player may selectively choose which weapons/stores, and how many, are jettisoned. If a required action due to damage, enough weapons and/or stores, player's choice, must be jettisoned to allow the aircraft to become CL configured.

Jettison Procedure: Weapons and/or stores may be jettisoned by simply announcing the act during an aircraft's move. The configuration change takes effect immediately after the aircraft's next expenditure of an FP in movement.

CHAPTER 5 — AIRCRAFT FLIGHT

An aircraft is flown, in game turns, by moving it horizontally across the game maps and tracking its changes in speed and altitude on an Aircraft Log Sheet. An aircraft is allowed to move and make changes in altitude by expending Flight Points (FPs). Generally, one flight point moves the aircraft one hex on the map, or up or down one or more levels of altitude. The speed of an aircraft determines how many flight points it has each turn.

5.1 — THE AIRCRAFT LOG

A log sheet is used to record the starting speed and altitude of an aircraft each turn. Different actions an aircraft may take will affect its speed and altitude from one turn to the next. The different lines on the log provide spaces to record these actions and to calculate resultant changes in speed and altitude. A pad of generic aircraft log sheets is provided with each game. One log should be used for each aircraft in play. A log sheet is divided into 15 columns, enough to record 15 turns of play (about the average length of a game). If you run short you may make copies of the sheets. Where applicable, the various rules sections which follow will provide additional information on using the log sheet.

Set Up Information. When a scenario is set up, each aircraft must be given a start altitude level, and speed. These are noted in lines 1 and 2 of column one of the log sheets. Any scenarios provided in the game will establish these values in their set up instructions. If you create your own scenarios, you will have to decide on these values yourself. Once aircraft and any other required counters are placed on the maps, and the start speeds and altitudes are noted, play may commence.

Using The Log Sheet. As an aircraft is maneuvered, it might change altitude and/or accumulate accel and decel Points. The accumulation of accel and/or decel Points may cause changes in the aircraft's speed so spaces are provided on the log to record these points. Spaces are also provided to calculate changes in an aircraft's speed and/or altitude. The final altitude and speed at the end of one game turn becomes the new start speed and altitude for the next game turn.

5.2 — FLIGHT POINTS

The speed of an aircraft is always expressed in terms of Flight Points (FPs), each of which equates to 100 mph of speed. An aircraft with a speed of 5.5 would be traveling at 550 mph. Flight Points are expended to move an aircraft across the game map and/or to change altitude. An aircraft must expend all whole FPs available to it each game turn. Any unused 0.5 FP remaining can be ignored. An FP may be either a horizontal FP or a vertical FP depending on how it is used.

Horizontal Flight Points. FPs expended to move horizontally across the map are called Horizontal Flight Points (HFPs). One HFP is spent to move an aircraft forward one hex or hexside. It may only fly onto a hexside if it faces parallel to that hexside (see 3.1).

Vertical Flight Points. FPs expended to gain or lose altitude levels are called Vertical Flight Points (VFPs). The amount of altitude levels gained or lost with the expenditure of

each VFP varies with the exact type of climb or dive in use. The amount of FPs that may be VFPs in a game turn also depends on the exact type of climbing or diving flight chosen.

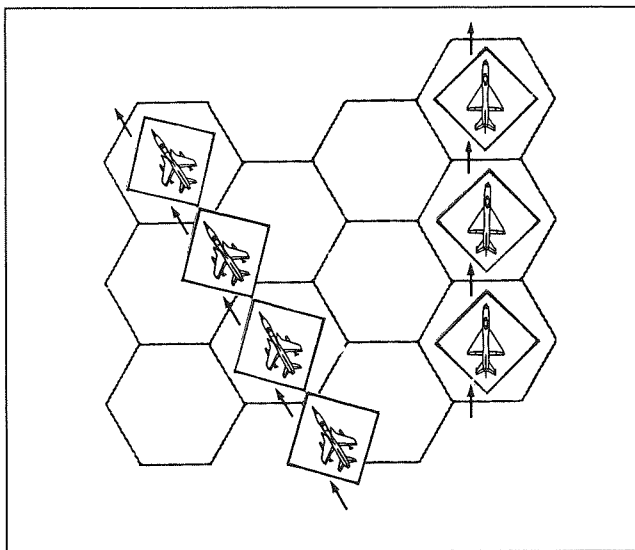
Note: To clarify; both HFPs and VFPs will be available to be expended within a single game turn only when an aircraft elects to climb or dive during its move.

5.3 — TYPES OF FLIGHT

At the start of an aircraft's move, it must commit itself to one of the following three general types of flight: Level, Climbing or Diving. Write the appropriate code in the flight type line of the aircraft log. This represents the aircraft committing its nose to remain level, to move up, or to move down for the game turn. The flight type may not be changed until the next turn. Only one type of flight may be performed each turn and some restrictions may apply when switching from one type to another between turns.

Level Flight. In level flight, all FPs must be expended as HFPs (for example, HHHHHH). The code for Level Flight is "LVL". Level flight is assumed if allowed and not otherwise specified by a player when he begins to move an aircraft.

Example Of Level Flight: An aircraft has a speed of 3.0. The player moves the aircraft through three hexes as shown below. Its turn is over when it has finished moving.



Climbing Flight. In climbing flight, the aircraft selects a specific type, either a Sustained, Zoom or Vertical climb, and determines the altitude gain in levels allowed for each VFP expended. A mix of HFPs and VFPs can then be expended subject to the limits outlined in the Climbing rules of section 8.

Diving Flight. In diving flight, the aircraft selects a specific type, either an Unloaded, Steep or Vertical Dive, and determines the altitude loss in levels allowed for each VFP expended. As with Climbing flight, the Diving Flight rules include limits on how many of each type of FP may be expended in a turn depending on the type of dive but some mix of HFPs and VFPs can be expended.

Expending Mixed FPs. HFPs and VFPs may be intermixed and expended in any order so long as any limits for the aircraft's actual climb or dive type chosen are adhered to.

Example Of Altitude Changing Flight: Assume an aircraft with a speed of 7.0 is allowed to expend up to two thirds of its FPs as VFPs. The player could have up to five VFPs and two HFPs but elects only to use three of its FPs as VFPs and the rest as HFPs. He may expend the seven FPs as follows:

HHHHVVV, or VVVHHHH, or HHVVHVH, or in any other order he desires.

Note: No matter how the FPs are mixed, the aircraft will only be moved horizontally four hexes as all other FPs will be used to change altitude.

Abnormal Flight. Two other types of flight are possible. These are Stalled and Departed Flight (see rule 6.4). An aircraft in abnormal flight may not select Level, Climbing, or Diving flight until recovered from the abnormal condition.

ADVANCED RULES

5.4 — HALF FLIGHT POINTS

Rather than ignoring left over half flight points, they may taken into account as explained below.

Half FPs. Any 0.5 VFP or 0.5 HFP not spent during a game turn is carried forward to the next game turn as a generic half FP. This is noted in the 0.5 FP Carry line of the Aircraft Log of the coming game turn. The existence of a carried half FP does not change the aircraft's new start speed for the next turn, but, if the new start speed has a half FP in it, it will marry up with any carried half FP to provide another whole FP.

For example, an aircraft with a start speed of 6.5 having a carried 0.5 FP in the Carry line of the Aircraft Log has 7.0 FPs to expend that game turn. For all applicable game purposes, its speed is still 6.5. If a 0.5 FP Carry cannot be mated to a half FP in the Start speed, it may be carried forward again (and again) until used. When used it is gone.

5.5 — FP EXPENDITURE RESTRICTIONS

To reflect the distance traveled forward while an aircraft is raising or lowering its nose, before any altitude change can occur, use the following restrictions.

After Level Flight; If an aircraft chooses Diving or Climbing flight, and in the previous game turn it used Level flight, the first FP used in the current game turn must be an HFP. The remaining FPs may be mixed normally.

After Climbing or Diving; If an aircraft chooses Diving or Climbing flight, and in the previous game turn it used the opposite (i.e., last turn= climb, this turn= dive), then HFPs equal to at least 1/2 the aircraft's speed (round down) must be expended before any VFPs can be used (representing distance flown while reversing nose attitude). Exception: **High Pitch Rate** capable aircraft need only expend HFPs equal to 1/3 their speed (round down) before using VFPs.

Same Flight Type; If an aircraft continues a climbing or diving type of flight from one turn to the next, then its HFPs and VFPs may be expended in any order.

5.6 — FORMATION FLYING

A formation is in effect when one or more aircraft fly and/or operate together as a unit while in close proximity to each other. Formations usually allow for better teamwork.

Formation Types. Two types of formations are possible: **Close** and **Tactical**. Close formations are designated by stacking aircraft in the same hex. Tactical formations exist whenever certain spacing conditions are met.

Formation Size. Formations can be of the following sizes.

- **Section (or Element):** Two aircraft; one is the leader and the other is the wingman.
- **Division (or Flight):** Three or four aircraft. One is the leader, and the others are wingmen. Alternately, a division may consist of two sections.

Formation Leaders. Each formation must have a designated leader. Leaders are chosen at the start of play or indicated in the scenarios. If not defined in the scenarios, one division leader is allowed for each four jets in play, and one section leader for each two jets. A division leader doubles as a section leader. During play, formations may split or form according to the leaders available.

Loss of Formation Leaders. Wingmen always begin play as part of a particular formation. If their original formation leader is lost and no other qualified leader in that formation exists, that formation is dissolved. The former wingmen may join other formations by moving into formation parameters on those leaders. They will not get the initiative benefits but do avoid any penalty for not being in formation.

5.6.1 — CLOSE FORMATIONS

Up to four aircraft may stack together in the same hex at the same altitude as a **close formation**. The close formation stack is moved as a single entity when it is the formation leader's time to move. All aircraft in the stack fly exactly as the leader does and must maintain the same speed, altitude and facing as the leader.

Forming Close Formations. A close formation may be formed prior to the beginning of a scenario (during set up), or in the Aircraft Admin Phase of a game turn whenever two, three, or four friendly aircraft end up in the same position with the same exact facing, speed and altitude.

Splitting Close Formations. A close formation may split up by declaring the intent to detach airplanes from the stack when it moves. Aircraft which detach are left in the starting hex while the rest of the formation executes its flight. The detached aircraft are then flown.

For example, a four plane division wishes to split into two sections. Two airplanes (one being a section leader) detach and are left in place while the original division leader and his remaining wingman move. The two detached aircraft may now move elsewhere as a close formation, or split up individually.

A close formation may contain aircraft of differing types or configurations. When an aircraft in the formation is unable to match the leader's moves or speeds, it must detach itself from the formation. Close formations may place restrictions on the activities of wingmen and on the maneuverability of the leader.

5.6.2 — TACTICAL FORMATIONS

A tactical formation exists anytime a designated formation leader and his wingmen meet the following parameters:

- When they are within six hexes of each other,
- and within three altitude levels of each other,
- and the wingmen's facings are no more than 60 degrees different from the leader's facing (left or right),
- and the leader is not in the wingman's blind arc.

Tactical formations can be formed or broken at any time during play by simply flying the aircraft into or out of these established parameters. A tactical formation can not have more than four aircraft in it. There are no maneuver or combat restrictions in a tactical formation.

CHAPTER 6 — CHANGING AIRCRAFT SPEEDS

Aircraft speed can change during play as a result of using various power settings, and as a result of doing climbs, dives, turns and maneuvers. To keep things simple, an aircraft's start speed is used as its speed for an entire game turn. Activities which may affect that speed, are noted in the log as the aircraft moves and any speed changes which result are determined after the aircraft completes its move. The changed speed is logged in the next turn as the aircraft's new start speed.

6.1 — POWER SETTINGS

In the game, aircraft engines produce thrust in terms of **accel points**; how many depends on the aircraft's chosen power setting and current configuration. At the beginning of each aircraft's move, the player must select one of the four allowed power settings. If a new setting is not selected, the setting from the previous turn remains in effect. Note the selected power setting code on the Power line of the Log.

Power Settings. The four power settings are: Idle, Normal, Military, and Afterburner (Codes: I, N, M, and AB).

• **Idle.** This is the minimum setting that will keep a jet engine functioning; it provides no accel points, but on the turn in which Idle power is selected, the aircraft's start speed is immediately reduced by the FP amount shown on the power chart. (this is the only game action that will change an aircraft's speed within the same game turn before it moves).

• **Normal.** Normal power is an economic setting used to conserve fuel and increase range. Normal power provides enough thrust to maintain an aircraft's current speed if that speed is equal to or less than its listed cruise speed and no drag producing maneuvers or climbs are performed. No accel points are received.

• **Military.** Military power is the maximum setting for a jet engine not having an Afterburner. Selecting Military power provides Accel points which can result in increased speed when sufficient points are accumulated. The minimum in accel points that can be taken in Military (unless damaged) is 0.5; the maximum is the value shown on the Power Setting Chart for the aircraft's configuration. The player may select any value of accel points within that range. Write the amount in the Accel line of the Log.

• **Afterburner.** Afterburners provide increased thrust by

dumping extra fuel directly into a jet engine's tailpipe to create a blowtorch effect. This provides extra thrust at a great cost in fuel consumption. Afterburner power provides more accel points than Military. The minimum Accel points a player may take while in AB is maximum Military power plus 0.5; the maximum allowed is the value shown on the Power Setting Chart. The player may select any value of accel points within that range. Aircraft not equipped with an afterburner have dashes instead of numbers in that line.

Rapid Power Response. An aircraft is normally limited in its ability to increase its power setting from turn to turn. Normal aircraft may safely increase power by one or two levels per game turn. For example, power may be increased from Idle to Military, but not from Idle to Afterburner. Aircraft may decrease their power setting without limit. Aircraft noted as being **Rapid Power Response** capable on their ADC are unrestricted and may increase power any amount each turn. Normal aircraft may increase power from Idle to Afterburner at the risk of flaming out (see 6.7).

Decel Point Penalty for Insufficient Power. If an aircraft selects Idle or Normal power, and its speed is greater than its listed Cruise speed, it incurs one decel point in addition to any others received that turn.

6.2 — ACCELERATION & DECELERATION POINTS

Aircraft speed will increase or decrease as a result of the accel points and decel points it accumulates in a game-turn.

Accel Points. Accel points represent the energy gain from high power settings and/or from diving flight. Accel points gained will cancel an equal number of any decel points gained.

Decel Points. Decel points represent the energy lost due to using low power settings, aircraft maneuvering, and/or climbing flight. The advanced rules discuss additional sources of decel points. decel points will cancel an equal number of any accel points gained.

Speed Change Determination Procedure. When an aircraft completes its move, it may have received both accel and decel points. Note the totals of each, then subtract any decel points from accel points. If the result is 0.0, there is no change in aircraft speed for the turn and you can ignore all following steps. If the result is positive, the aircraft may gain speed (accelerate). If the result is negative, the aircraft may lose speed (decelerate).

- **Speed Gain.** Add 0.5 to the aircraft's current speed for each 2.0 accel points left after subtracting decel. Any unused accel points (up to 1.5) are carried forward to the next game turn and will be added to any accel points received in that turn.

Example: an aircraft accumulating 6.0 accel points and 3.0 decel has a net accel of 3.0. Two of those accel are used to increase its speed by 0.5 and the last is carried to the next turn.

- **Speed Loss.** Subtract 0.5 from the aircraft's current speed for each 2.0 decel points left. Any unused decel points (up to 1.5) are carried forward to the next game turn and will be added to any decel points received in that turn.

Example: an aircraft accumulating 2.5 accel and 5.0 decel has a net accel of -2.5, or in other terms has 2.5 decel left over. Two of those decel are used to reduce its speed by 0.5. The

remaining 0.5 decel is carried to the next game turn.

Maximum Deceleration. Regardless of the number of decel points accumulated in a turn, no aircraft can end up with a start speed of less than 0.0. When an aircraft's speed reaches 0.0, all remaining decel points are ignored and considered lost.

New Start Speed. The sum of the aircraft's current speed plus any speed gain or loss at the end of its flight becomes the aircraft's start speed for the next game turn. Accel and decel points are almost always received in steps of 0.5 points. If the aircraft is damaged, Power setting points may be halved, and consequently they may produce fractional steps of accel or decel points. In order to keep the math simple, no fraction of less than 0.25 is ever used in play.

Rapid Accel Aircraft. An aircraft noted on its ADC as being Rapid Accel capable is considered to be an exceptionally clean design which speeds up quicker than normal. This kind of aircraft receives a speed increase of 0.5 FP for each 1.5 accel points instead of each 2.0. It decelerates normally.

Example: A rapid accel aircraft gaining 6.0 accel points and 2.0 decel points in a turn, would gain 1.0 of speed. Its net accel is 4.0 (6.0 - 2.0). Each 1.5 of accel gains 0.5 speed so 3.0 accel is good for the 1.0 speed increase and the left over 1.0 accel would be carried to the next game turn.

Reminder! Do not confuse accel and decel points with speed points. They are separate things.

6.3 — SPEED LIMITS

Aircraft are restricted in the minimum and maximum speeds they may use.

Minimum Allowed Speed. An aircraft must maintain a minimum speed or it will stall. The Minimum-Maximum Velocity Chart (MMVC) of the ADC shows the minimum allowed speeds in each altitude band for each aircraft configuration. This minimum speed is the smaller of the two numbers listed. An aircraft with a start speed below this minimum is stalled, and must check to see if it enters departed flight. Whether stalled or departed, it will use the abnormal flight procedures (see 6.4) instead of regular flight.

Maximum Allowed Speed. The Minimum-Maximum Velocity Chart shows the maximum allowed speed for the aircraft by altitude band and configuration for level or climbing flight. The Dive Speed column indicates the maximum speed allowed (regardless of configuration) after a turn of diving.

Acceleration Limits. If an aircraft is in level or climbing flight, accel points that would push it beyond its maximum speed on the MMVC (for the altitude band in which it ends its flight) are unusable and ignored. If an aircraft in level or climbing flight is at its maximum speed, up to 1.5 accel points may be carried forward; excess accel are lost (because they would accelerate the aircraft beyond its maximum speed).

If an aircraft is in diving flight, it may use accel points to accelerate beyond the maximum speed on the MMVC up to the indicated dive speed (for the altitude band in which it ends its flight); configuration has no effect on dive speed. If an aircraft in diving flight is at its dive speed, up to 1.5 accel points may be carried forward; excess accel points are lost (because

they would accelerate the aircraft beyond its dive speed).

Exceeding Level and Climbing Speed Limits. An aircraft choosing level or climbing flight may, if the previous turn involved diving, have a start speed greater than its maximum speed on the MMVC. If at the end of the non-diving turn, after accel/decel effects are determined, the speed still exceeds maximum allowed, a speed fadeback is performed.

Speed Fadeback. If a new start speed is determined to still be illegal, it must be reduced a further 1.0 or to the aircraft's maximum speed, whichever is greater.

Fadeback Example: Assume an aircraft which dove on the previous turn has a start speed of 12.0 which is in its allowed dive speed range. It chooses level flight, where its maximum allowed speed is 9.0, and maneuvers such that its power accel nearly balances its decel. At the end of its move it loses 0.5 speed due to decel. Its new start speed is 11.5, still greater than its maximum level so a fadeback penalty is applied reducing its new start speed to 10.5. In the new turn it stays level again accumulating only enough decel to lose 1.0 speed. The subsequent new start speed is 9.5, still above the limit of 9.0, so a fadeback is applied again reducing its speed to 9.0.

Diving Speed Limits. An aircraft in diving flight may never have a start speed greater than its dive speed on the MMVC. If (at the end of its move) its new start speed would be higher than its allowed dive speed, its start speed is automatically reduced to maximum dive speed. This usually occurs when an aircraft enters a new altitude band having a lesser dive speed.

6.4 — ABNORMAL FLIGHT (STALLS AND DEPARTURES)

An aircraft which does not maintain sufficient speed stalls. A stalled aircraft rapidly loses altitude, but remains under minimal control. A stalled aircraft has a chance of going out of control, meaning it departs controlled flight. If it does, it enters departed flight and tumbles or spins uncontrollably earthward until it crashes or the pilot regains control.

Check for Departed Flight. If the Start speed for an aircraft is less than its minimum allowed speed at the beginning of a turn, the aircraft is stalled. All stalled aircraft must check to see if they depart from controlled flight. During the Stalled Aircraft Phase, roll the die once for each stalled aircraft and apply any appropriate modifiers (see play aid tables). If the result is 5 or less, the aircraft enters Departed Flight; otherwise, it remains in Stalled Flight.

Stalled Flight Procedure. Aircraft in stalled flight may not change map location or facing. An aircraft in stalled flight loses altitude levels equal to its start speed FPs plus one for each turn it remains stalled (round 0.5 up). The aircraft receives 0.5 accel points per altitude level lost on the first game turn of the stall (in subsequent game turns, it receives 1.0 Accel points per altitude level lost). Accel points may also be received from the aircraft power setting.

Ending A Stall. An aircraft will exit stalled flight at the beginning of the first turn in which its start speed is no longer less than its current minimum speed (which may have changed from the original stall speed due to altitude loss, or configuration change). Upon exiting the stall, the aircraft may only perform level flight or diving flight. It may go directly into a

vertical dive if desired.

Configuration Effects. Configuration has an effect on stall speed. An aircraft may jettison external stores in order to reduce its configuration from DT to 1/2 or CL, or from 1/2 to CL. This change in configuration may change the aircraft's stall speed helping it to recover sooner.

Departed Flight Procedure. An aircraft in Departed Flight remains in Departed Flight until it executes a successful recovery. While departed, the aircraft's facing randomly changes as follows:

- Roll the die once to determine direction of facing change. Odd results change the facing left; even results change the facing right.

- Roll the die again: the result is the number of facing changes in the designated direction. If the aircraft is on a hexside, shift it to the adjacent hex in the direction of its facing changes even if it reverses direction. Departed aircraft do not otherwise change their map location.

- An aircraft in departed flight loses altitude levels equal to its start speed FPs plus two for each turn of departed flight (round 0.5 up).

Aircraft speed cannot be changed while in departed flight and all accel/decel points are ignored. Power setting does not aid recovery or affect speed. Aircraft that enter departed flight with a power setting of A/B or military risk flame-out.

Recovering From Departed Flight. During the Stalled Aircraft phase of each turn, each departed aircraft checks to see if it recovers from departed flight. Roll a die and apply any appropriate modifiers. If the result is 6 or less, the aircraft recovers; otherwise, it remains in departed flight.

If the aircraft recovers, it may resume normal flight. Start speed is automatically minimum speed (from the MMVC) or the speed at which it departed (whichever is greater). On the turn of recovery, an aircraft may only choose diving flight (vertical dives are allowed). Exception; a High Pitch Rate capable aircraft may choose level flight.

ADVANCED RULES

6.5 — SPEEDBRAKES

Most jet aircraft are equipped with speedbrakes. Speedbrakes may be applied once per game turn, at any point in an aircraft's flight, to burn off FPs. Speedbrakes (when applied) expend FPs up to the amount listed on the speedbrake (SPBR) row of the power chart of the ADC without actually moving the aircraft.

The FPs burned may be either HFPs, or VFPs if in climbing or diving flight. FPs burned by speedbrakes simply go away; they may not be counted toward any required expenditure of FPs such as those for doing turning flight, maneuvers, proportional moves, or combat.

Decel Penalty for Speedbrake Use. The aircraft receives one decel point for each 0.5 FP burned in speedbraking.

6.6 — SUPERSONIC SPEED EFFECTS

Aircraft flying at speeds approaching or exceeding the speed of sound are affected by the buildup of sonic shock waves and may receive decel penalties and restrictions as outlined below.

The Speed Of Sound. The speed of sound is referred to as Mach 1.0 (M1). Speeds just under the speed of sound are termed Transonic speeds. Speeds equal to or greater than M1 are termed Supersonic speeds. The actual game speeds that are considered Transonic or M1 vary by Altitude Band (The speed of sound decreases as air temperature decreases with increased altitude). These speeds are summarized in the Transonic/Supersonic Speed Reference Table.

Transonic Speeds. An aircraft with a start speed 1.0 less than M1 are considered to be at Low Transonic speed. Aircraft with a start speed 0.5 less than M1 are considered to be at High Transonic speed. Aircraft flying at Low Transonic speed, High Transonic speed, or at exactly M1 receive Transonic Decel point penalties. These are listed in the Transonic Drag Table and vary depending on whether the aircraft is a design which suffers from **High Transonic Drag (HTD)** or benefits from **Low Transonic Drag (LTD)** or is average (normal). The ADC will note if an aircraft is an HTD or LTD design.

Supersonic Speeds. An aircraft flying at M1 or faster is in supersonic flight and is subject to the following effects:

- An aircraft selecting Idle power loses 0.5 FPs of speed over that listed on the Power Setting Chart. In addition, the aircraft is subject to the normal 1.0 decel point for being over cruise speed while at Idle power.
- An aircraft in Normal power receives 2.0 decel per 0.5 FP of speed over High Transonic. In addition, the aircraft gets 1.0 decel for flying at greater than cruise speed.
- An aircraft in Military power receives 1.0 decel per 0.5 FP of speed over High Transonic.
- An aircraft in Afterburner power is not penalized as for other Power Settings.
- An aircraft which uses SpeedBrakes may lose up to 0.5 FPs of speed over the amount listed in the power chart.
- An aircraft which turns (even at the EZ rate) while supersonic incurs 1.0 additional decel point for the game turn.
- An aircraft which performs rolling maneuvers while supersonic incurs 1.0 extra decel points per roll executed.

Poor Supersonic Maneuvering Aircraft (PSSM). Some aircraft, usually early delta-winged designs without tails or canards, maneuver poorly when at supersonic speeds due to shifts in their aerodynamic center of lift. Such aircraft are noted on their ADC. They are penalized as follows when Supersonic:

- The maximum allowed Turn-Rate of a PSSM aircraft is reduced by one level when at supersonic speeds (but never to less than HT).
- A PSSM aircraft which turns at supersonic speeds (even at the EZ rate) incurs 2.0 additional decel points instead of 1.0.
- A PSSM aircraft performing a roll maneuvers incurs 2.0 additional decel points per roll executed instead of 1.0.

Good Supersonic Maneuvering Aircraft (GSSM). An aircraft noted as being a GSSM aircraft maneuvers well at Supersonic speeds. They receive the following benefits:

- GSSM aircraft do not incur the decel point penalty for turning while at supersonic speeds.
- GSSM aircraft are not subject to the Decel point penalty for doing rolling maneuvers while supersonic.

Supersonic Delta Aircraft. Some Air Superiority game aircraft were noted as being supersonic deltas. These are now treated as **Low Transonic Drag** aircraft under Air Power rules.

Supersonic Effects On Climb Capability: At supersonic speeds reduce the aircraft's CCC numbers to 2/3ds that listed due to shock wave effects on wing lift. (The wings are less efficient due to shifting of aerodynamic center of lift).

6.7 — ENGINE FLAME-OUTS

Rapid throttle movements or uncontrolled yaw rates can flame-out jet engines which are at high power settings.

When Does A Jet Flame-Out? An aircraft may experience a flame-out if:

- it is at Military or Afterburner power and in departed flight.
- it is not Rapid Power Response and changes power setting from Idle to Afterburner.
- it starts the turn above its maximum altitude ceiling and selects any power setting other than Idle.

Flame-out Procedure. If an aircraft meets one of the above conditions, roll a die for each engine at the start of its move. A flame-out occurs on a roll of 4 or less. Apply a die roll modifier of -1 for each turn an aircraft has been above its ceiling. If a flame-out is called for on the damage tables, it occurs automatically.

Note: The number of engines an aircraft has is indicated on the Power Chart by dots to the right of the chart title. One dot per engine is used.

Effects of Flame-Out. A single-engine jet is treated as if it is in Idle power. On multi-engine aircraft, if half (or less) of the engines flame-out, the aircraft produces half normal Accel points (keep fractions). If more than half (but not all) are flamed out, the aircraft produces 1/3 normal Accel points (drop fractions). If all engines are out, the aircraft is at idle power.

Engine Relights. Attempts to start flamed out engines are allowed if an aircraft is not in abnormal flight and during its turn it performs or meets the same criteria as for performing Damage Control (see chapter 10). Roll a die once at the end of the aircraft's flight phase. On the first attempt, 2 or less indicates success; on the second and third attempts, 4 or less indicates success.

One attempt is allowed per engine per turn beginning on the game-turn following the flame-out. A maximum of three relight attempts per engine is allowed; if all three relight attempts are unsuccessful, the engine is permanently flamed out. (If in a single engine jet, the pilot might consider reading the ejection rules).

CHAPTER 7 — CHANGING A/C DIRECTION

This chapter discusses the procedures for changing an aircraft's direction by turning.

Aircraft change facing by turning. Facing changes usually occur in 30 degree increments. To execute a turn, an aircraft must first fly a certain distance forward and then it may change facing by 30 degrees to the left or right depending on which way it was turning. The distance it must fly before changing facing is dependent on its speed, altitude band, and rate of turn as described below. An aircraft may change facing as often as possible within a single game turn depending on its selected turn rate.

7.1 — TURNING

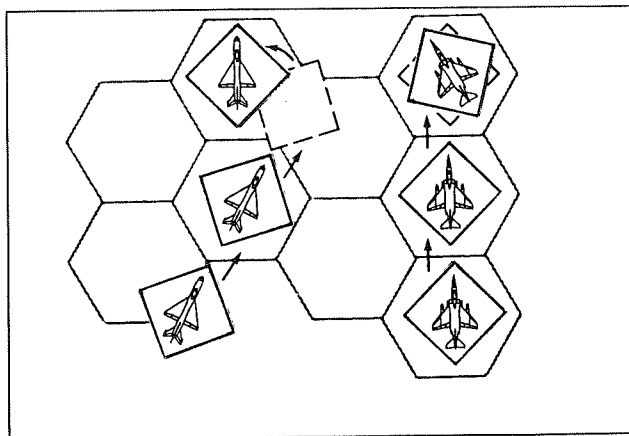
Five rates of turn are available to an aircraft. Each rate of turn corresponds to an increasing angle of bank and wing angle of attack. In general, the greater the angle of bank and angle of attack, the quicker the aircraft will turn and the greater the G force the pilot will feel.

Turning Procedure. An aircraft may begin turning at any point in its flight. When the first FP is spent to begin turning, the player must announce:

- the direction of the turn (Left or Right) and,
- the turn rate, either Easy, Tactical, Hard, Break, or Emergency. (EZ, TT, HT, BT, ET respectively).

Next consult the **Integrated Turn Charts** and cross index the selected turn rate with the aircraft's current speed (rounded down). Be sure to use the chart corresponding to the altitude band the aircraft is in. If an "NA" is encountered, that combination of turn rate and speed is not allowed. If a number appears, that is the minimum number of FPs that the aircraft must expend in flight before changing facing. If a 60 or 90 appears, that indicates the aircraft may change facing by up to 60 or 90 degrees respectively for each FP expended in flight that game turn.

Changing facing does not cost any FPs; it is the end result of having begun to turn and having used the specified number of FPs (or more) in flight while turning. A turn consists of all the FPs used prior to changing the aircraft's facing plus the act of facing itself. If an aircraft is on a hexside at the time of facing, shift it to the adjacent hex (in the direction the aircraft is turning) and then change its facing as shown below.



Stopping or Changing Turns. An aircraft may stop a turn at any point in its flight prior to changing its facing but any FPs that were used toward the aborted turn may not be counted toward any other maneuvering requirements or new turns. The turn rate in use may be changed to a tighter one whenever a facing change is completed or when the turn is stopped and started anew. An aircraft may always expend more FPs than necessary prior to changing facing.

Carrying a Turn Sometimes a turn will not or cannot be completed in one game turn. In this case the turn may be continued into the next game turn. The continuing turn should be noted on the Turn Carry row of the aircraft log with:

- the number of FPs expended for the turn so far,
- the turn rate (EZ, TT, HT, BT, ET), and
- the direction (L, R).

For example, "2BTL" indicates the aircraft has expended 2 FPs on a break turn to the left.

Move to Face Requirement. An aircraft must move in order to change facing. If an aircraft ends a game turn with sufficient FPs expended to meet the turning requirements but does not face; it may not change facing in the next game turn until it expends at least one FP in flight. It may not face freely and then begin moving, it must move to face.

Turn Induced Decel. Turning creates drag which causes deceleration. If an aircraft used turning flight in a game turn (whether it changed facing or not), check the Turn Drag Chart on the ADC. At the intersection of the Configuration column and the Turn Rate row is the number of decel points it receives for making the turn. EZ turns are not listed; there is no Turn Drag for EZ rates (exception; see sustained turning).

Note: An aircraft is assessed decel points for Turn Drag based on the highest turn rate used in the game turn. Those Turn Drag decel points are imposed if any turning occurred, whether the aircraft faced once, more than once, not at all, or used different turn rates in the game turn.

You are now ready to play Training Scenario 1.
The Sequence of Play is not required, ignore it.

Turning While Climbing or Diving. VFPs expended to climb or to dive do count as FPs expended toward turn FP requirements. If an aircraft moves to a new altitude band while turning, use the Turn Chart entry for the altitude band it began the turn in until the aircraft changes facing the first time; then use the chart for the altitude band the aircraft is currently in.

ADVANCED RULES

7.2 — SUSTAINED TURNS

Whenever an aircraft changes facing more than once in a game turn, it is performing a sustained turn.

Sustained Turn Drag Penalty. An aircraft performing a sustained turn receives a drag penalty of 1.0 decel point for each change of facing beyond the first; in addition to any decel from the Turn Drag Chart. The drag penalty for sustained

turning applies even if mixed turn rates or turn rates that normally incur 0 decel points are used.

Special maneuvers which cause facing changes are not considered for purposes of the sustained turn penalty. The snap turn facing change is counted toward determining sustained turn penalties.

High Bleed Rate Drag Penalty. An aircraft noted as having a High Bleed Rate, loses speed faster than others in a sustained turn. Such aircraft receive a drag penalty of 2.0 decel points for each change of facing (after the first; in addition to any penalty from the Turn Drag Chart).

As above, the penalty for sustained turning applies even if mixed turn rates or turn rates that normally incur 0 Decel points are used.

7.3 — SNAP TURNING

A snap turn represents an aircraft using its instantaneous maximum angle of attack (as opposed to smoothly increasing its angle of attack). A Snap Turn allows an aircraft to immediately change facing without meeting the normal turning requirements.

Snap Turn Prerequisites. An aircraft must be capable of performing BT turns to do a Snap Turn safely. An aircraft capable of HT turns (but not BT) can Snap Turn, but at a risk of a Maneuvering Departure. If an aircraft cannot perform HT or better turns it may not Snap Turn.

Snap Turn Limits. An aircraft is limited to one Snap Turn per game turn but may use one at any point in its flight.

Snap Turn Preparatory Moves. If the aircraft is in transonic or supersonic speeds, it must spend 1 HFP in forward flight as a preparatory move prior to executing a snap turn. If it is not currently wings level (i.e., it is presently turning, just faced, prepping for or just executed a maneuver), it must spend 1 HFP in forward flight as a preparatory move prior to executing the snap turn. If both cases apply, then two HFPs must be expended. If performing a Snap Turn at high altitudes, additional HFPs must be expended for preparatory moves as follows:

- In the HI band add +1 preparatory HFP.
- In the VH band add +2 preparatory HFP.
- In the EH band add +3 preparatory HFP.
- In the UH+ band add +4 preparatory HFP.

Snap Turn FP Costs. The act of changing facing with a snap turn does cost 1 HFP. The aircraft remains in place and changes facing by 30° in the direction of the turn (if the Turn Chart allows 60° or 90° facing, the snap turn can be up to 60°). A snap turn may be used to begin a turn of any turn rate.

Snap Turn Drag. Any time a Snap Turn is used in a game turn, the aircraft incurs decel points as if it did a BT turn unless, the aircraft's highest allowed turn rate was HT, in which case HT decel +2.0 is incurred. If an aircraft later turns at the ET rate within the game turn, the ET decel would be used instead.

Snap Turn Equivalent to Break Turn. For purposes of gun combat, weapon launches, and other restrictions, a Snap Turn is equivalent to a BT turn. However, if the aircraft also turned at the ET rate during the game-turn, the ET restrictions would apply instead.

7.4 — ANGLE OF BANK

When an aircraft turns, it banks in the direction of that turn. If an aircraft first turns left, and then immediately turns right, it must first roll out of the left bank and into a right bank. To reflect this momentary delay, an aircraft must spend 1 FP after the last facing (or after aborting the other turn) before FPs can be used to turn in the opposite direction. The aircraft is reversing its bank while spending this FP; this FP cannot be used for any other maneuvering requirement.

High Roll Rate. An aircraft noted as having a High Roll Rate can instantly reverse its angle of bank. It is not required to spend the 1 FP to reverse angle of bank.

Low Roll Rate. An aircraft noted as having a Low Roll Rate must spend 2FP after the last facing (or after aborting the other turn) before FPs can be used to turn in the opposite direction. The aircraft is reversing its bank while spending these FPs; the FPs cannot be used for any other maneuvering requirement.

If wings level, a Low Roll Rate aircraft must first spend 1 FP to establish an angle of bank (either left or right) before spending FPs for turns or snap turns. A Low Roll Rate aircraft may elect to end a flight phase with wings banked, even if no turn carry is in effect. Note BL (Banked Left) or BR (Banked Right) on the Turn Carry line of the Aircraft Log. Low Roll Rate aircraft must also expend an extra HFP above the normal amount to prep-move for rolling maneuvers.

Rolling Maneuvers and Banks. When an aircraft performs a rolling maneuver, it may exit that maneuver banked in any desired direction.

7.5 — TURNING AND MINIMUM SPEEDS

As the angle of attack on an aircraft's wing increases, so does the speed at which it stalls. To simulate this, no aircraft may utilize turn rates greater than EZ unless their start speed for the turn equals or exceeds their minimum speed plus the amount shown on the table below.

Turn Rate Minimum Speed Requirements

EZ = A/C's Minimum Speed
 TT = A/C's Minimum Speed +0.5
 HT = A/C's Minimum Speed +1.0
 BT = A/C's Minimum Speed +1.5
 ET = A/C's Minimum Speed +2.0

If an aircraft has turn carry brought forward to the next game turn, and the new start speed for the aircraft is less than the Minimum Turn Speed required, a Maneuvering Departure automatically occurs. If not using advanced rule 7.7, consider the aircraft to enter regular departed flight.

7.6 — G INDUCED LOSS OF CONSCIOUSNESS

Aircrew aboard aircraft which turn too sharply may lose consciousness due to G force effects. This is known as GLOC.

When Can GLOC Occur? When an aircraft turns at the ET rate in the LO, ML, or MH altitude bands its crew may lose consciousness (at higher altitudes, the G-force of these turn rates is insufficient to cause GLOC). Each crew member must check for GLOC after each facing change at the ET rate.

GLOC Procedure. Roll the die once for each crewman and apply any required modifiers. A result of 1 or less results in GLOC. The GLOC roll is modified for the following:

- Second or subsequent GLOC roll in a GLOC cycle = -1 (cumulative)
- Snap turn used in this flight phase = -1
- Non-pilot crewmember checking = -1
- Canted seat in aircraft = +1
- Crewmember fitness (variable) = +/- 1 (See Chapter 18)

GLOC Cycle. The GLOC check cycle continues with increasing probability of unconsciousness until the aircraft does no ET or BT turn rates in a game turn.

GLOC Duration and Recovery. GLOC normally lasts from the instant it occurs until the affected crewmember recovers. Affected crewmembers automatically recover in the Admin Phase of the second game turn following the one in which GLOC occurred (If a pilot blacked-out during turn 5, recovery would occur in the Admin Phase of turn 7).

Early Recovery. A crewmember may recover from GLOC early. Unconscious crewmembers with excellent fitness, or unconscious crewmembers in multi-crew aircraft in which another member is not GLOC'd are eligible for early recovery. Check for early recovery during the Admin Phase of the game turn following the one in which GLOC occurred. To check for early recovery, roll the die: the crewmember recovers on a result of 4 or less (no modifiers apply).

Effects Of GLOC. An individual affected by GLOC is unconscious. The following procedures are followed depending on which crewmember is unconscious:

- **Unconscious Pilot.** The aircraft's flight is randomized. It is controlled by the GLOC/Disoriented Flight Tables. Roll on the table once for the present game turn. If the pilot does not recover early, roll once on the table for the following game turns as well.

- **Unconscious Radar Officer (or Weapons Officer or Observer).** The efforts of that crewmember are lost until he recovers. Radar cannot be used, except for Auto Track and Boresight modes. The bombsight is degraded one level (but never to less than manual). Multi-crew spotting and any other multi-crew benefits are lost.

- **Ejection.** If the pilot of a multi-crew aircraft is GLOC'd, and randomized flight of the aircraft will result in an inevitable crash, a conscious crewmember can eject himself and all other crewmembers.

7.7 — MANEUVERING DEPARTURES

An aircraft may departed controlled flight for reasons other than being stalled. An aircraft may experience maneuvering departures in the following situations:

- When its Start speed is insufficient for a carried turn rate.
- When performing a risky snap-turn.
- When an aircraft is above its ceiling and attempts to roll or use higher than EZ turns.
- When an aircraft executes a rolling maneuver in the EH or higher altitude bands.

A Maneuvering Departure is always automatic in the first case and occurs on a die roll of 4 or less in the latter three.

When a maneuvering departure occurs, use the following procedures for its abnormal flight:

Determine Location Shift. A maneuvering departure will shift the aircraft's position. Divide the aircraft's remaining FPs (at the instant of maneuvering departure) by 2 and drop any fractions. This result is the number of hexes the aircraft will be moved during the maneuvering departure.

Facing Changes. Determine the direction and quantity of facing changes as for regular departures. However, initially make only the first facing change, then shift the aircraft the required number of hexes determined as described above, and only then apply the remaining facing changes.

Subsequent Turns. On subsequent game turns, a maneuvering departure is treated as regular departed flight.

7.8 — FORMATION RESTRICTIONS ON TURNING

Close Formations. If a Close Formation consists solely of two aircraft, turns of up to the HT rate may be used. If more than two aircraft are in a close formation, only the EZ and TT rates may be used. If these limits are exceeded, the formation automatically breaks down to tactical and collisions are possible if more than two aircraft are in the same position at the end of the turn. Tactical formations have no turning restrictions.

CHAPTER 8 — CHANGING AIRCRAFT ALTITUDE

This chapter details the procedures involved in changing aircraft altitudes.

Climbs or Dives Only. An aircraft may either climb or dive in a turn, but it may not do both. When climbing or diving, a portion of the aircraft's FPs are spent as Vertical Flight Points (VFPs); the rest are used as Horizontal Flight Points (HFPs). As an aircraft changes altitude during flight, mark the number of altitude levels gained or lost on the Aircraft Log. At the end of the aircraft's flight use this record to determine the aircraft's new start altitude for the next turn.

Altitude Structure. In the game, the atmosphere is divided into 1,000 foot levels. These altitude levels are further grouped into altitude bands, each several levels thick. Aircraft and missile performance varies within each altitude band. An aircraft's altitude at the beginning of a turn is noted on the Start Altitude line of the aircraft log. A missile's altitude at the beginning of a turn is noted on the Missile Notes line of the launching aircraft's aircraft log. An aircraft may not climb higher than its ceiling. The altitude structure is depicted below:

ALT. BAND	CODE	LEVELS
Low	= LO	1 to 7
Medium Low	= ML	8 to 16
Medium High	= MH	17 to 25
High	= HI	26 to 35
Very High	= VH	36 to 45
Extremely High	= EH	45 to 60
Ultra High +	= UH	61 and Higher

Vertical Flight Points. FPs spent to gain or lose altitude levels are called Vertical Flight Points (VFPs). VFPs vary in the amount of altitude increase or decrease they provide depending on the specific type of climb or dive used. VFPs are usually available as 1/3 or 2/3 of the total FPs; the 1/3 - 2/3 Table is a quick reference to the accepted proportions of VFPs to FPs available for most aircraft speeds. VFPs are only spent as full FPs. When the 1/3 - 2/3 Table provides half VFPs, they are ignored. A single VFP will never gain or lose more than two altitude levels.

8.1 — CLIMBING FLIGHT

An aircraft in climbing flight selects one of three types of climb to use: Zoom Climb, Sustained Climb, or Vertical Climb. Each type of climb prescribes how many VFPs and HFPs an aircraft must or may have available to it.

8.1.1 — ZOOM CLIMBS

A zoom climb is a maneuvering climb in which the aircraft gains altitude more from inertia than wing lift. Some wing lift may be involved but most of it is being applied to aircraft maneuvering instead of altitude gain. In a zoom climb the player is less restricted than in other climbs. Altitude is gained less efficiently though sometimes at a greater rate.

- **ZC Procedure:** Declare climbing flight and note ZC as flight type on the Aircraft Log. At least 1/3 of FPs must be HFPs; the remainder may be VFPs.

- **ZC Altitude Gain:** ZC VFPs produce an altitude gain based on the Climb Capability Chart. Refer to the CCC on the ADC and find the appropriate configuration, power setting, and altitude band. If the climb capability is 2.0 or less, one VFP produces a gain of 1 altitude level; if the climb capability is more than 2.0, one VFP produces a gain of 2 altitude levels.

- **ZC Restrictions:** Aircraft in a Zoom Climb may not use the ET turn rate.

- **ZC Decel Points:** In the first turn of a Zoom Climb, the aircraft receives 1.0 decel point per altitude level gained; on subsequent consecutive turns of ZC, the aircraft receives 1.5 decel points per altitude level gained.

8.1.2 — SUSTAINED CLIMBS

A sustained climb relies on maximum power and full lift and is the most efficient way to climb over several game turns. Sustained climbs do restrict the aircraft's maneuverability.

- **SC Procedure:** Declare climbing flight and note SC as flight type on the Aircraft Log.

- **SC Altitude Gain:** SC VFPs produce an altitude gain based on the Climb Capability Chart. Refer to the CCC and find the appropriate configuration, power setting, and altitude band. Three cases may apply:

- 1) If the climb capability value is a fraction, only 1 VFP is allowed, the rest are HFPs. The VFP gains only the fractional altitude level.
- 2) If the value is 1.0 to 1.5, then up to 2/3ds the FPs may be VFPs and the first VFP gains any fraction and the rest gain 1 level each.

- 3) If the value is 2.0 or more, then up to 2/3ds the FPs may be VFPs and each may gain 1 or 2 levels.

- **SC Prerequisites and Limits:** To use a sustained climb the aircraft must have a start speed at least 1.0 greater than its minimum speed. If the start speed is less than the aircraft's optimum climb speed, the CCC values are halved (retain fractions). Sustained climb decel applies only to an amount of levels gained equal to the CCC value (halved if applicable).

- **SC Excess Altitude Gain:** Aircraft may expend VFPs to climb more levels than listed or normally allowed if sufficient VFPs are available. However, any levels gained beyond the listed or allowed CCC limits incur decel points as if the aircraft were zoom climbing instead of sustained climbing.

- **SC Restrictions:** Aircraft in a sustained climb may only use EZ turn rates (snap turning prohibited) and may only use slide maneuvers.

- **SC Decel Points:** 0.5 decel points are incurred for each altitude level gained in a sustained climb until the sustained climb limit is reached and then decel is accumulated as if zoom climbing.

Example of a SC with excess altitude gain: A MiG-21 with a speed of 6.0 in the LO band, CL configured, and at AB power has a CCC value of 4. It may have up to 4 VFPs and chooses to do so. Since the CCC value is greater than 2.0 it may gain two levels per VFP. The player elects to move as follows; H, H, V+2, V+2, V+1, V+1 (moves forward two hexes and uses the four VFPs to gain 6 altitude levels. 0.5 decel is incurred for each of the first four levels gained (the amount = to CCC value), and 1.0 decel for each of the last two (the amount exceeding CCC value). Total decel for climbing is 4.0.

8.1.3 — VERTICAL CLIMBS

A vertical climb gains altitude quickly but at great cost in energy; no wing lift is involved. The aircraft is coasting upward on power and inertia.

- **VC Prerequisite:** A Vertical climb may be selected only if the aircraft climbed in the previous game turn. Exception, a High Pitch Rate aircraft (if its current speed is less than 4.0) may declare a Vertical Climb from Level Flight.

- **VC Procedure and Limits:** Declare climbing flight and note VC as flight type on the aircraft log. On the first turn of VC, exactly 1/3 of FPs must be HFPs; the remainder are VFPs. On the second or subsequent turns of a consecutive VC, no more than 1/3 of FPs may be HFPs (and up to all FPs may be VFPs).

- **VC Altitude Gain:** All aircraft may gain 1 or 2 altitude levels per VFP regardless of normal climb ability.

- **VC Restrictions:** No turns or maneuvers except Vertical Rolls are allowed. The aircraft may not dive on the game turn following a vertical climb. Exceptions: A High Pitch Rate aircraft may freely steep dive or use unloaded dives following a vertical climb. A non-High Pitch Rate aircraft may use the Half-Roll Dive and vertical Reverse maneuvers to enter diving flight (see rules 13) after vertical climbs.

- **VC Decel Points:** The aircraft receives 2 decel points for each altitude level gained.

8.1.4 — ADDITIONAL CONSIDERATIONS

Partial Altitude Gains. The CCC at times indicates fractional altitude gains. You will have noticed that the climb charts sometimes allow fractional gains in altitude levels. Some aircraft may require more than one turn of climbing flight to gain an altitude level. An aircraft's starting altitude is always the last full altitude level it climbed to.

Altitude Carry. If an aircraft's total altitude change during flight included a fractional amount, the fraction is carried forward to the next game-turn to be added to any further climbing. Note this on the climb notes line of the log sheet. Fractional gains may be carried and added only as long as the aircraft continues to climb from turn to turn. The moment an aircraft chooses level or diving flight, any fractional climb carry is lost. Climb carry is ignored when determining an aircraft's altitude for spotting, combat or any other purposes.

Supersonic Climbs. If the advanced rules for supersonic flight are in use, the CCC value is reduced to 2/3ds that listed on the ADC when aircraft are at supersonic speeds.

8.2 — DIVING FLIGHT

An aircraft in diving flight selects one of three types of dive: Steep Dive, Unloaded Dive, or Vertical Dive. Diving flight is handled in a manner similar to climbing flight. For purposes of maintaining dive speeds (rule 6), at least two or more altitude levels must be lost in a game turn through diving flight.

8.2.1 — STEEP DIVES

A steep dive is a maneuvering dive in which some of the aircraft's acceleration is committed toward maneuvering the aircraft instead of speeding up. A steep dive is the least restrictive type of dive.

- **SD Procedure:** Declare diving flight and note SD as flight type on the aircraft log. At least 1/3 of FPs must be HFPs. The rest may be VFPs.

- **SD Altitude Loss:** 1 or 2 altitude levels may be lost per VFP expended.

- **SD Restrictions:** There are no restrictions to maneuvering the aircraft while in a steep dive.

- **SD Accel Points:** On the first turn of steep diving, the aircraft receives 0.5 accel points per altitude level lost; on subsequent turns of continued diving, it receives 1.0 accel points per altitude level lost.

8.2.2 — UNLOADED DIVES

An unloaded dive is used to rapidly gain acceleration. The aircraft dives to match the fall of gravity; this causes weightlessness and eliminates induced drag from the aircraft. Combined with acceleration from gravity and the engine's thrust, the aircraft achieves rapid gains in distance and speed.

- **UD Procedure:** Declare diving flight and note UD on the aircraft log. All FPs are HFPs. All or some (but at least one) of these HFPs must be spent with the aircraft "unloaded". Each HFP spent while unloaded moves the aircraft forward one hex or hexside and causes it to lose one altitude level.

- **UD Limits:** All unloaded HFPs must expended in a continuous series. They may be spent at the beginning, end or in the middle of the aircraft's flight. The rest of the HFPs may be expended normally for maneuvering purposes. Unloaded HFPs may not be counted toward any turning or maneuvering requirements.

- **UD Restrictions:** An aircraft spending unloaded HFPs may not conduct any attacks, aim, track targets or launch weapons.

- **UD Accel Points:** On the first turn of an UD, the aircraft receives 0.5 accel points per altitude level lost; on subsequent turns of continued diving it receives 1.0 accel point per altitude level lost.

Note: The advantage to unloaded over steep dives is the horizontal distance gained over similar dives.

8.2.3 — VERTICAL DIVES

A vertical dive sends an aircraft nearly straight down; altitude is lost quickly and acceleration builds up rapidly.

- **VD Procedure:** Declare diving flight and note VD on the Aircraft Log. If this is the first turn of vertical diving, 1/3 of the FPs must be HFPs and the rest VFPs. If this is the second or subsequent turn of consecutive vertical dives, then no more than 1/3 of the FPs can be HFPs but all can be VFPs.

- **VD Altitude Loss:** In a vertical dive, 2 or 3 altitude levels must be lost for each VFP expended.

- **VD Restrictions:** Aircraft in a VD may not do turns or use maneuvers except for Vertical Rolls. Climbing flight is not allowed on the turn following a vertical dive. Vertical dives must be followed on subsequent game turns by diving flight.

- **VD Recovery:** Due to the difficulty of pulling out of vertical dives, the following applies:

- a) when a steep or unloaded dive immediately follows a vertical one, half the aircraft's speed (round down) must be VFPs or unloaded HFPs as appropriate.

- b) In the case of a High Pitch Rate aircraft, only 1/3 has to be VFPs or unloaded HFPs. Exception! A High Pitch Rate aircraft whose start speed after vertically diving is 3.0 or less may use level flight following a vertical dive.

- **VD Accel Points:** Aircraft in a vertical dive gain 1 Accel point per altitude level lost.

8.2.4 — FREE DESCENT

Level Flight Free Descent. An aircraft in level flight may choose free descent and lose one altitude level during the game-turn. This descent may be selected to take place after the expenditure of any one HFP during the game-turn. No Accel points are received. No other restrictions apply.

You are now ready to play Training Scenario 2.
The sequence of play is still not required.

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ADVANCED RULES

8.3 — USING HALF VFPS

In normal practice, VFPS are spent only as full FPS. When the 1/3 - 2/3 Table allots half VFPS, the aircraft may either:

- Carry the half VFP forward to the next turn as a generic half FP.
- Mate the half VFP to a previously carried half FP to create a full VFP, and use it.
- Steal a half HFP from allotted HFPs to create a full VFP, and carry the remaining half HFP forward to the next turn.

8.4 — LOSS OF THRUST WITH ALTITUDE

Jet engines lose thrust in the thinner air at high altitudes. To reflect this, use the following:

- In the VH band, thrust is 2/3 normal (but never less than 0.5).
- In the EH and UH bands, thrust is 1/3 normal (but never less than 0.5).

The 1/3 - 2/3 Chart is useful in calculating reduced thrust.

High Altitude Engines: Some aircraft are noted as having engines specifically designed for high altitude flight. These aircraft ignore this rule.

8.5 — FLIGHT ABOVE MAXIMUM CEILING

Each aircraft has a ceiling (maximum altitude) stated on the MMVC. An aircraft may temporarily ZC or VC above its ceiling (SC cannot carry an aircraft above its ceiling). While above its ceiling, an aircraft is subject to the following risks:

- If the aircraft uses any turn rate other than EZ, the aircraft experiences a Maneuvering Departure on a die roll of 4-.
- If the aircraft performs a roll maneuvers, the aircraft experiences a Maneuvering Departure on a die roll of 4-.
- If the aircraft starts the game turn above its ceiling and selects any power other than Idle, each engine will Flame-out on die roll of 4- (apply a modifier of -1 for each turn the aircraft starts above its ceiling). Check for Flame-out immediately upon selecting the power setting.

8.6 — FORMATION RESTRICTIONS ON CLIMBS AND DIVES

Close Formations. Aircraft in close formation may only change altitude using non-AB powered sustained climbs, or steep dives of no more than two altitude levels per turn, or by free descents. If these limits are exceeded, the formation automatically breaks down into tactical formation and collisions are possible if more than two aircraft end the turn in the same position.

Tactical Formations. Aircraft in Tactical formations have no altitude change restrictions.

CHAPTER 9 — AIR TO AIR GUN AND ROCKET COMBAT

This chapter details how to conduct gun and rockets attacks against other aircraft.

9.1 — AIR TO AIR GUNNERY

An aircraft equipped with guns may conduct one or two gun attacks per game turn. It may attack at any point during its move, but at least one FP (HFP or VFP) must be expended before each shot. The Internal Gun Data section on the Combat Characteristics panel of the ADC provides basic information about internal guns on an aircraft. If the aircraft has been fitted with a gun pod, the Gun Pod Weapons Table shows the basic information.

Range. All aircraft guns have a range of two hexes unless noted otherwise on the ADC. The Aircraft Gun Range Diagram shows the field of fire for fixed or pod mounted guns. When firing at a target at a different altitude, Each two full levels of altitude difference equals one hex of range.

Gun Attack Procedure. The Roll To Hit entry (in the Internal Gun Data section of the ADC) for the aircraft shows the basic die roll number required to hit the target at ranges 0, 1, and 2. Roll the die, and modify the result as required. Compare the final result to the hit numbers. A hit is achieved if the modified roll is less than or equal to the hit number.

Die Roll Modifiers. The roll to hit is modified by a variety of circumstances. The possible modifiers are summarized here and in the play aid tables:

- **Target Size.** The Size number on the ADC is used directly as a die roll modifier.
- **Snap Shot.** If the attack was a Snap Shot, apply a modifier of +1.
- **Deflection (Angle-Off).** The best shots occur when an attacker is directly behind his opponent; at other angles, the target aircraft is harder to hit. Consult the Angle-Off Table and apply the listed modifiers (see 9.2)
- **Firer Damage.** See chapter 10 for the effects of aircraft damage on firing aircraft.
- **Gunsight Effects.** Apply the die roll modifier if the firing aircraft is currently turning or has faced by turning during the game-turn at one of the rates listed. The modifier for the highest turn rate used up to that point or carried over into that game-turn up to the instant of attack must be used. If an ET turn rate was used, attacks are not normally allowed (see recovery period below).
- **Steady State Gunsight Tracking.** See the advanced SSGT rules below. Apply the appropriate modifier for tracking time on the target.
- **Radar Ranging.** See the Advanced Ranging rules below. If ranging is successful, apply the appropriate modifier.
- **Pilot Quality** (chapter 18). Better trained pilots shoot better while poorly trained or inexperienced pilots shoot worse. Apply modifiers for pilot quality/characteristics.

Restrictions On Gun Attacks. Gun attacks are restricted as follows:

- An aircraft may not fire at unspotted aircraft.
- A climbing aircraft may not fire at an aircraft at a lower altitude.
- A diving aircraft may not fire at an aircraft at a higher altitude.
- An aircraft flying level may fire at a target in the same hex only if it is at the same altitude.
- An aircraft may fire at a target in another hex only if it is at the same altitude level or at an adjacent altitude level.
- An aircraft may not fire while in, or just after having faced from, an ET turn (see recovery period).
- Aircraft performing rolling maneuvers may not fire until they expend an FP doing something other than prep-moving for a roll or executing the roll.

Recovery Period Exceptions. Aircraft may fire after using ET turns and/or need only apply turn rate modifiers for turning done after a recovery period has elapsed. The "recovery period" is completed if an aircraft has expended at least half its FPs (round up) while turning at a rate less than ET and/or while wings level and not turning, not maneuvering, or not prep-moving for maneuvers prior to firing. The recovery period represents the time it takes for the gunsight or pilot to recover from the effects of high G forces.

Snap Shots. A snap shot is a short gun burst. It uses half the normal ammunition, but has a lower chance of hitting and a lower damage rating. If multiple guns fire and a Snap Shot is used, all guns fire Snap Shots.

Head On Gun Attacks. If both the attacker and target directly face each other with the attacker on the 180 degree line shown in the Angle-Off Diagram, the attack is a Head-on Attack. A target aircraft waiting to move (or having already finished its move) may return fire in response to head-on attacks provided it does not exceed the 2 shot per game turn limit, the higher/lower target restrictions, and the ET turn rate prohibition.

Ammunition. The Internal Gun Data section shows the number of shots allowed for the aircraft gun. Each shot represents 2 seconds of firing and expends 1 ammo point. A snap shot (a 1 second burst) may be taken instead and uses up a half point of ammo.

Gun Pods: A gun pod places aircraft machine guns or cannon in an external, detachable container. If the Station Limits section of the ADC permits, an aircraft may carry a gun pod as part of its external load. The External Stores Table shows the types of gun pods available. An aircraft may carry more than one gun pod; if it does, they must be of the same type. If loaded on wing stations, they must be carried symmetrically in pairs; each pod must be on the same weapon station as the pod on the opposite wing.

Multiple Guns Firing. If the aircraft is firing both internal guns and pods or more than one pod, a single die roll is used for each attack. The roll is compared to all the hit numbers of each of the guns firing. Of those that hit, the highest damage rating available is used, and it is increased by +1 for each additional gun of those fired that hit.

9.2 — ANGLE-OFF

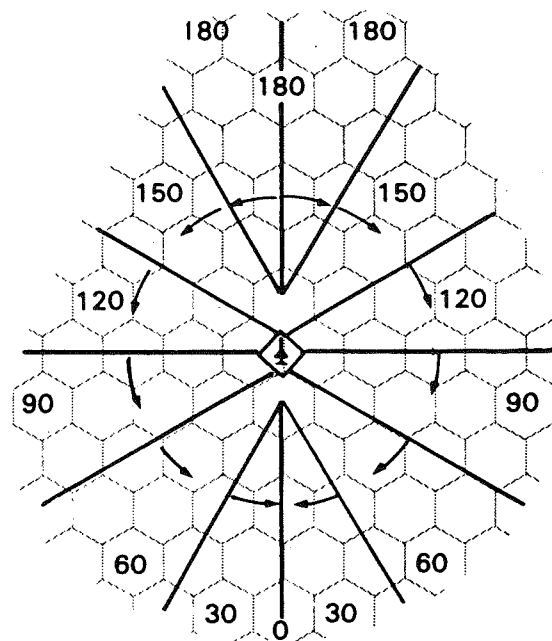
Concept. Angle-off (another term for deflection) is the angle "off" the target's tail. It is used to define eligibility for attack modifiers and other functions. The Angle Off Diagrams show the various angles of approach to an aircraft. Two diagrams are used: one for target aircraft in a hex; the other for target aircraft on a hex side. In each case, the target aircraft defines the Line of Flight. The Line of Flight extending ahead of the target aircraft is the 180° Line; the Line of Flight extending behind the target aircraft is the 0° Line.

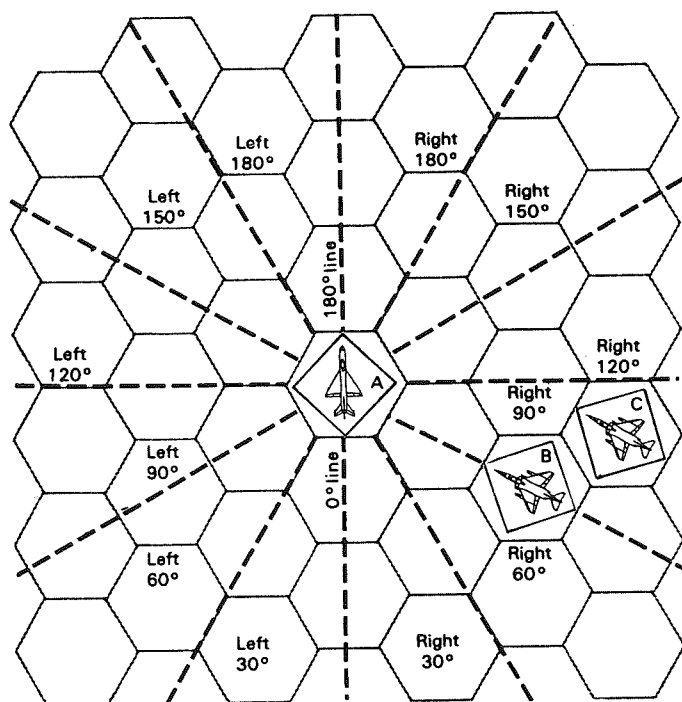
For example, an aircraft directly behind the target aircraft and facing in the same direction has a zero deflection shot (0° angle-off). An aircraft making a head-on attack is facing in the opposite direction to the target (180° of angle-off).

Angle-Off Arcs. Angle-off is described in 30° arcs to the left or right of the target using the hex grid. The Angle Off Diagrams illustrate the arcs relative to the target aircraft. An attacker will be clearly in an arc or directly on one of the lines defining the border of two arcs. If it is on one of the borderlines, it is in the arc it would fall into if the faster of the target or attacker were moved forward one hex. If the attacker would remain on the line (if moved forward), it is in the arc that benefits the attacker. In the case of same hex (range 0/same altitude) attacks, the aircraft is in the angle off arc that equates to its heading difference from the target at the instant it fires. For diving and climbing same hex attacks against lower or higher targets respectively, both angle-off and a +2 vertical attack modifier is applied.

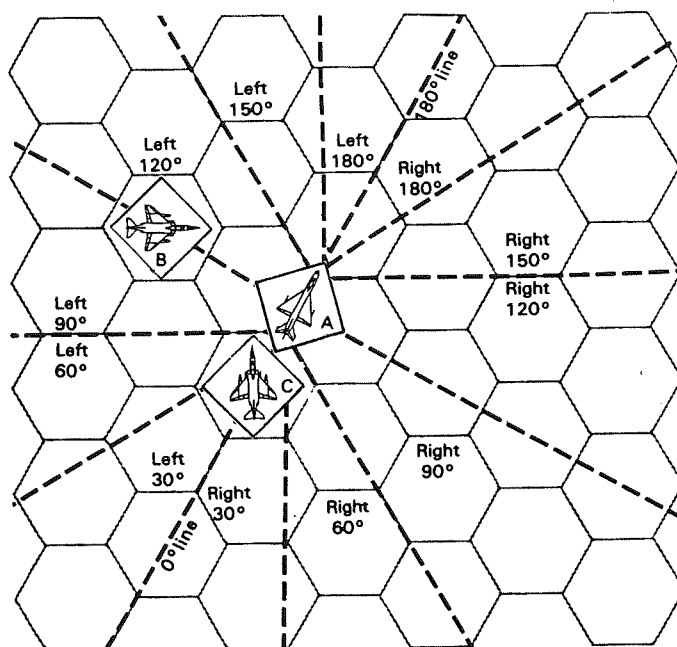
Other Angle-Off Arc Functions. The Angle Off Diagrams in the play aids are also used to define radar and visual spotting arcs, aircraft restricted and blind sighting arcs, jamming arcs, and for determining missile attack modifiers.

The following illustrations show examples of angle-off arc determinations:





B is the right 60° arc.
C is the right 90° arc.



B is the left 90° arc.
C is in the right 30° arc (if it was facing A it would be on the 0° line).

ADVANCED RULES

9.3 — AIR TO AIR ROCKETRY

Before the advent of guided missiles, aircraft designers worked to provide interceptors with a weapon that out ranged the defensive guns of long ranged bombers and that had sufficient power to knock the bomber down. The solution most came up with was to utilize clusters of unguided rockets fired from retractable packs or pods attached to the wings. The rockets were to be fired in shotgun like blasts. The concept was never tested in battle and it never proved satisfactory in practice. Intercept geometry was difficult to attain and the rockets proved to be inaccurate. As soon as guided missiles became available, air to air rocketry faded from the scene. Nevertheless they were, for a short time at least, the primary anti-bomber weapon of the early 1950's Cold War period.

Air To Air Rocket Factors: The ADC shows if an aircraft can carry rockets (and if so, how many). Each factor represents 10 to 15 rockets fired in volley.

Range. To declare a rocket attack, the firing aircraft must have a target in its limited radar arc and be within four hexes (count each two full altitude levels as one additional hex of range). Rocket attacks may not be done at range zero.

Rocket attacks are distinct from air to air gun attacks. Rockets or guns may be fired, but not both in one game turn. Only one rocket attack is allowed per game turn; it may be fired at any point in the aircraft's move.

Procedure. The attacking aircraft declares its target and indicates the number of rocket factors being fired. The Air To Air Rocketry Table is consulted. At the intersection of the range column and the rocket factors row is the base die roll to hit. Roll the ten-sided die and modify the result as appropriate: if the result is equal to or less than the base die roll to hit, the attack has produced a hit. The rocket factors entry also shows the Attack Rating for that number of rockets being fired. This Attack Rating is used on the Damage Tables if a hit occurs.

Rocket Attack Modifiers. The roll to hit is modified as for air to air gunnery, however only the following modifiers apply:

- Target Size.
- Deflection (Angle-Off).
- Gunsight Effects.
- SSGT.
- Radar Ranging.
- Collision Course Attack (CCA). technology

Collision Course Attack (CCA) Technology: Aircraft designers fitted some American and Canadian fighters with auto-pilot guidance systems which utilized an early computer linked to the interceptor's radar. The computer figured rocket ballistics and if the radar was tracking a target, it could guide the fighter to a release point and automatically launch the rockets. This concept freed the fighter from having to use pursuit curves to get into gunnery parameters and was called "collision course" guidance as the interceptor could now theoretically attack from any angle.

To qualify for the CCA to hit modifier, the attacking aircraft must start a game-turn with an air to air lock-on to the target

and must not do TT or greater turns, any maneuvers except slides, or utilize climbs or dives of more than one altitude level up to the point of executing the rocket attack. If it meets this criteria, a -2 is applied to the hit roll.

Rocket Damage Modifiers. Rockets, because of their large warheads, receive -2 to the damage table roll just like direct missile hits.

Rocket Attack Restrictions. Rocket attacks are restricted as follows:

- An aircraft may not fire rockets at unspotted aircraft.
- A climbing aircraft may not fire rockets at an aircraft at a lower altitude.
- A diving aircraft may not fire rockets at an aircraft at a higher altitude.
- An aircraft may not fire at a target at zero range.
- An aircraft may fire at a target in another hex only if it is at the same altitude level or at an adjacent altitude level.
- An aircraft may not fire while in, or just after having faced from, an HT, BT, or ET turn.
- An aircraft may not fire while prepping for or executing other than slide maneuvers.

Air To Ground Rockets In The Air-To-Air Role. Aircraft equipped with air to ground rockets or rocket pods may fire them in the air to air role. The conversion is as follows:

- Each 10 single RKs are equal to one air-to-air rocket factor.
- One small rocket pod is equal to one air-to-air rocket factor.
- One medium or one large rocket pod is equal to two air-to-air rocket factors.

Air to Air rockets in the Air to Ground Role. Each point of aerial rockets equals 2 soft attack strength factors and one hard attack strength factor.

9.4 — ADDITIONAL GUN AND ROCKET ATTACK MODIFIERS

Steady State Gunsight Tracking (SSGT): Gunsights are optimized for rear quarter attacks. Any aircraft attacking from the 60° or less angle-off arc may track its target and achieve improved probabilities for hits. The firing aircraft must expend FPs while on a tracking line (see Tracking Diagram). For each 1/3 (round down) of the aircraft's speed (in full FPs) expended on a tracking line, modify the Roll To Hit by -1. A maximum modifier of -2 is allowed for SSGT; tracking may not begin until the firing aircraft is within six hexes range of the target.

Radar Ranging (RR). An aircraft with radar ranging uses its radar to compute precise range and modify gunsight position for best hit probabilities. The Radar line of the Internal Gun Data section of the ADC shows the type of RR available (if any). There are three types:

- RE (Regular). The attacker must be in SSGT in order to get RR benefits.
- CA (Computer Assisted). The attacker may use CA RR with or without SSGT when firing from the 90° angle-off or less.

- IG (Integrated Gun Ballistics). The attacker may fire from any angle, with or without SSGT.

RR Procedure. Ranging is automatic if the firer already has a radar lock-on to the target and meets the arc/SSGT requirements. Otherwise, once the arc/SSGT requirements are met, roll the die. If the result is less than or equal to the radar lock-on number listed in the radar section of the data card, ranging is successful and the ranging modifier is applied.

Having previous radar contact or lock-ons is not a prerequisite for ranging nor are previous contacts and locks lost when ranging. Radar ranging, once achieved is maintained for any second shots at the same target in that game-turn. If not achieved for the first shot, it may be rolled for again prior to the second shot at the same target. Radar ranging does not carry forward to the next game turn or to different targets in the same game turn.

9.5 — FORMATION RESTRICTIONS ON GUN AND ROCKET COMBAT.

Close Formations. The wingmen aircraft in a close formation may not fire cannons or rockets at air to air targets. They are too busy holding formation on the leader.

Tactical Formations. There are no restrictions on wingmen of Tactical formations.

9.6 — NUCLEAR ROCKETS (AIR-2 GENIE)

In an attempt to compensate for the general inaccuracy of air to air rocketry, the AIR-2 Genie was developed by the USAF. It was large, unwieldy, but featured a nuclear warhead.

Genie Launch. To launch a Genie, an aircraft must have a radar lock-on to the target and end its move wings level (not turning or maneuvering). Roll for a successful launch in the Air to Air Missile Launch Phase. A die roll less than or equal to the launch number of the Genie indicates a successful launch, otherwise the Genie fails due to a dud motor or warhead and is removed from play.

Genie Flight. The Genie is unguided. It does not turn or maneuver. It simply flies forward for its entire movement expending its FPs as HFPs unless the firer climbed or dived on the turn of launch, in which case the Genie must also climb or dive expending the same proportion of FPs as VFPs that the launcher did. Each VFP expended must gain or lose a full two levels of altitude.

Genie Scatter. The Genie wasn't very accurate, it had a big warhead though. After completing the Genie's flight, and after all aircraft have moved for the turn, the Genie's position will be shifted randomly by rolling a die twice and consulting the scatter diagram below. The first roll indicates scatter direction. The second roll's result is halved (drop fractions) and that is the number of hexes the Genie is shifted in the direction previously determined. See Genie Scatter diagram in play aids.

Nuclear Attack. After shifting the Genie, roll the die; on a 10 the warhead is a dud. On anything else, it explodes creating a nuclear blast zone that extends out to a range of six hexes in every direction (count two altitude levels as 1 hex). All aircraft, friendly or enemy, in the same position as an exploding Genie are vaporized along with their crews. Other aircraft elsewhere

in the zone are automatically hit. The attack rating is 12 minus 2 for each hex of range from the point of detonation.

For example, an aircraft four hexes away is attacked with a rating of 4 ($12 - (2 \times 4 \text{ hexes}) = 4$).

CHAPTER 10 — AIRCRAFT DAMAGE

This chapter details the procedures for determining the damage results of successful hits against aircraft.

10.1 — AIRCRAFT DAMAGE RESOLUTION

When a gun, rocket, or missile hit is achieved on an aircraft, determine the damage inflicted and apply it to the aircraft.

Levels of Damage. A hit can potentially produce one of five levels of damage.

- **Superficial Damage.** The hit has no effect.
- **Light Damage.** The aircraft experiences some performance loss.
- **Heavy Damage.** The aircraft experiences major performance loss and/or systems damage.
- **Crippled.** The aircraft is heavily damaged and possibly combat ineffective.
- **Killed.** The aircraft is destroyed. Remove the aircraft counter from play.

A result of no effect, or aircraft kill requires no further action. Light, Heavy, and Crippled damage produce the appropriate performance and combat restrictions listed on the Aircraft Damage Table.

Procedure. When a gun or missile hit is achieved on an aircraft, consult the Damage Table. Roll the die once and apply any required modifiers. Cross index the modified roll with the attacking gun or rocket's Air To Air rating or missile's listed Attack Rating for the type of hit achieved (Proximity or Direct). The result gives the level of damage achieved.

Previous Damage Effect: If the aircraft was previously damaged, the hitting weapon's attack rating is increased one.

Damage Table Modifiers. The damage table die roll is modified for the following:

- **A/C Vulnerability.** The target's Vulnerability shown on the ADC is used directly as a modifier to the die roll.
- **Direct Missile Hit.** If the damage roll was prompted by a Direct Missile Hit, apply a modifier of -2. This does not apply to Proximity Missile Hits.
- **Rocket Attack.** If the damage roll is the result of a rocket attack, apply a modifier of -2 just as for Direct Missile Hits.

10.2 — CUMULATIVE DAMAGE EFFECTS

Cumulative Damage. At the end of a scenario, an aircraft's damage level for purposes of victory points equals the highest level of damage it has sustained. When an aircraft is repeatedly hit, it can accumulate several hits of one or more types. These multiple hits are cumulative and sufficient hits of a lesser type will equal a worse level of damage as follows:

• **3L = H.** Three cumulative L hits equal an H hit. The aircraft's level of damage is now at least H.

• **2H = C.** Two cumulative H hits equal a C hit. The aircraft's level of damage is now at least C.

• **C + H = K.** Any H or C hit, or cumulative hits equating to an H or C hit, on an already Crippled aircraft destroys it.

For example, if an aircraft was hit twice before and had H and L hits. It's damage level is considered H. On this turn, it is hit again and receives a 2L result. Since $3L = H$, the aircraft damage becomes 2H. And since $2H = C$, the aircraft damage level becomes C. It is now Crippled.

You are now ready to play Training Scenario Three.
The Sequence of play is still not required.

ADVANCED RULES

10.3 — PROGRESSIVE DAMAGE

An aircraft's damage can worsen or spread if not contained by Damage Control (for example, leaking hydraulic fluid could burst into flame, or a damaged engine could fail).

Procedure: Roll the die once for each damaged aircraft during the Aircraft Admin Phase of every game-turn following the one in which it was hit. Do not check for progressive damage on any game-turn in which a damaged aircraft is hit again if the hit resulted in a higher damage level.

Consult the progressive damage table, if the die roll is less than or equal to the number given next to the aircraft's current damage level, then the aircraft's damage increases to the next higher level.

Damage Control. Performing damage control involves the crew activating back-up electrical, fuel transfer and hydraulic systems and/or shutting down damaged ones and/or fighting fires. Damage Control essentially stabilizes the aircraft's current damage level so that it will not progress. Aircraft which perform Damage Control negate progressive damage and do not check for it until they suffer a new hit.

Damage Control Procedure. Declare the intent to perform damage control at the start of the aircraft's move. Fly the aircraft normally within the following restrictions:

- No attacks or weapons launches are allowed.
- External stores may be jettisoned.
- No radar work may be performed.
- No maneuvers except Slides may be performed.
- No turns above EZ may be performed.
- Only non-A/B power sustained climbs allowed.
- Only non-A/B power steep dives using up to 2 VFPs may be performed.
- Free descent is allowed.
- Terrain Following flight is not allowed.

Once an aircraft completes its flight without violating the above restrictions, damage control is automatically com-

pleted. An aircraft which is damaged before moving may not perform damage control in the game-turn it was hit. It may perform damage control on any subsequent turn. Previous damage control is nullified when an aircraft is hit anew.

10.4 — OPTIONAL AIRCRAFT DAMAGE TABLES

The optional Damage Tables may be substituted for the generic damage level restrictions. These tables determine specific effects of L, H, and C level hits. For each hit consult the appropriate Damage Table and roll the die with no modifiers. (Optional damage tables are in play aids sheets.)

Optional Damage Table Results: Only the indicated results from the die roll are applied to a damaged aircraft. In some cases, an aircraft may lose systems and not performance, or lose performance and not systems, or it may lose both systems and performance. The specifics of the damage rolled are not revealed to the enemy; they are recorded on paper. Visible signs of damage such as smoke or fire indicated on the tables are told to the opponent.

Progressive Damage: The progressive damage process is checked normally. If it occurs, roll on the tables as if a hit at the new damage level had occurred.

Hollow Aircraft: If the table indicates damage to a system or performance capability the target aircraft does not have, roll again. If the second roll also results in non-applicable damage, record the hit for progressive damage purposes and for die roll penalties for combat. The aircraft is otherwise not affected.

Jettison of Stores: Only the results calling for jettison of ordnance require an aircraft to do so. It must jettison enough stores to become CL configured.

Combat Ability: As long as an aircraft has functional combat systems it may attack air and land targets regardless of damage level. The damage modifiers do apply to (and degrade) attack rolls.

10.5 — AIRCRAFT CRASH SITES

An aircraft may impact the ground as a result of a variety of mishaps. Whenever an aircraft is shot down, abandoned, or crashes because of stalled, departed, terrain collision, GLOC/Disoriented/fatal error flight, it must impact somewhere.

Crash Site Determination. The crash site is determined by the nature of the crash. For stalled, departed, terrain collision, GLOC/Disoriented/fatal error, GLOC crashes, the crash site is the aircraft's present hex or hexside. For shot down or abandoned aircraft, the crash site is determined by the Crash Site Location Diagram. Consult the CSLD in the play aids for the exact location based on the aircraft's facing and position at the moment of the craft.

Crash Site Damage. If a crash site hex contains ground units, buildings, or target type terrain, damage may be inflicted on them by the explosion and crash. One ground unit, building, POL marker, or one of the target terrains printed in the hex is immediately attacked at 1-2 odds (no modifiers). Determine which is attacked randomly.

CHAPTER 11 — VISUAL SIGHTING

This chapter details the procedures for visual detection and tracking of targets.

11.1 — SIGHTING AIRCRAFT AND MISSILES

When Is Sighting Checked? Enemy aircraft and missiles in flight are determined to be sighted or not during the Visual Sighting Phase of every game-turn. Sighting probability is based on range and visibility numbers. Visually aimed weapons may only be fired at sighted aircraft targets.

Visibility Number. All aircraft, and all missiles in flight have visibility numbers (presented on the ADC for aircraft, and on the missile charts for missiles). The visibility number is used to determine the maximum range for sighting. The Maximum Visual sighting range for a target is 4 times its visibility number.

Sighting Eligibility. Any aircraft or missile which is not currently sighted, and is within visibility range, and is not in the blind arc of the searcher, is eligible to be sighted. Count each two levels of altitude as one hex of range.

Visual Sighting Procedure. In the Visual Sighting Phase, the friendly aircraft which is closest to an unsighted or unpadlocked enemy aircraft or missile is used as the reference aircraft for sighting attempts against it. If more than one friendly aircraft is the same distance from an enemy, the searching player may designate which of the friendly aircraft will be the searcher.

All ranges and applicable sighting die roll modifiers are determined from the relative positions of the reference aircraft and the targets it is attempting to sight. Unless padlocked by friendly aircraft, previously sighted enemy aircraft or missiles do not remain sighted. Sighting must be successfully accomplished anew to keep them in sight (padlocking previously sighted targets, makes sighting anew automatic).

Declare any Padlocks first. Roll the die for each unsighted or unpadlocked eligible target. If the result is less than or equal to the target's visibility number, it is considered sighted for the game-turn. A sighted target is considered sighted to all friendly aircraft.

Padlocking Enemy Targets. Each pilot only crewed friendly aircraft may padlock one previously sighted enemy target not in its blind arc. A padlocked target remains sighted and does not have to be rolled for. Each multi-crew aircraft may padlock two previously sighted targets instead of one. Crew quality (see Chapter 18) may also affect how many padlocks are possible.

Padlocking is an administrative procedure used only in the Visual Sighting Phase to keep enemy threats in sight. An aircraft which padlocks an enemy is in no way restricted and may move and attack any sighted enemy aircraft or engage sighted missiles whether they were padlocked by it or not.

Blind and Restricted Arcs: Each ADC indicates its aircraft's blind and restricted arcs (if any). An L on the entry indicates that the aircraft is blinded or restricted only to targets at a lower altitude. An aircraft is always blind to enemy aircraft in the same hex at lower altitudes unless the target is pad-

locked. An aircraft may sight aircraft in the same hex at higher altitudes (through the top of the Canopy). It is permissible to padlock same hex lower altitude aircraft but not to search for them (if you know about them, you would roll slightly to keep them in sight). An aircraft may not be used as the reference for sighting against targets to which it is blind.

Modifiers: The die roll for sighting may be modified by a variety of circumstances. The modifiers available are shown on the Sighting Charts and include:

- Number of searching aircraft and crew quality.
- Range and relative altitude to target aircraft.
- Paint Scheme of target aircraft.
- Whether lock-ons exist to target.
- Whether target is smoking, ejecting flares, or in various weather conditions.

Gun and IR Missile Attack Restrictions. A target aircraft may not be attacked by guns or fired on by IR missiles unless the attacker has visual sight of the target at the start of his movement. However, if an enemy aircraft moved first and was lost from sight due to entering haze or passing through a stratus layer, it may be followed and attacked.

Sighting and Defensive Preemption (see Chapter 12). A moving enemy aircraft may not be defensively preempted against unless;

- it is sighted and not in the blind arc of the defender when the attacker begins moving, or
- the defender has just been fired on by its guns, or
- the attacker is sighted, and both attacker and defender are within spotting range of (and not in the blind or restricted arc of) another friendly aircraft at the start of the defender's movement.

Sighting & Defensively Engaging Missiles (see Chapter 14). An enemy missile may not be defensively engaged unless;

- it is sighted and not in the blind arc of the defender when the missile starts its move, or
- it is sighted, and both defender and missile are within spotting range of (and not in the blind or restricted arc of) another friendly aircraft at the start of the defender's movement.
- RWR indications allow the engagement of an unsighted missile.

11.2 — SIGHTING GROUND AND NAVAL UNITS

Each ground or naval unit (or target terrain type) has a sighting number on its counter. The sighting number is the range (in terms of hexes, count two altitude levels as one hex) at which it becomes automatically sighted to an aircraft. Any aircraft which starts a game-turn within that range may see and attack the sighted ground units and/or targets.

Ground Sighting Procedure. During the visual sighting phase, aircraft may either participate in searching for enemy aircraft and missiles or they may sight ground targets.

If they choose to sight ground units, two adjacent angle-off arcs about the aircraft may be looked into (except aircraft may not look into their blind arcs). Ground units and targets within their printed sighting range to the searching aircraft are auto-

matically spotted unless;

- The LINE OF SIGHT is blocked by terrain.
- The targets or ground units are camouflaged.

Note: Sighting ground targets (or FAC marks) is an individual affair. Only the aircraft looking for them, can see them. Aircraft looking for ground units do not normally participate in the sighting of aircraft or missiles. Exception, see incidental sighting rule below.

Aircraft may only aim at and attack sighted ground units, or FAC (Forward Air Controller) supplied laser marks, or smoke marks.

Incidental Sighting Of Aircraft & Missiles. When aircraft are searching for ground targets, they may participate in the sighting of aircraft and missiles located at the same or lower altitude in the two arcs they are seeking ground units in. If applicable, they may be the designated reference aircraft.

Line Of Sight. In order for aircraft to see ground targets, or for ground units to see aircraft, a line of sight must exist which is unblocked by terrain. The line of sight is the straight line from the aircraft's position to the center of the target's hex.

An unblocked line of sight exists between aircraft and ground units if:

- There is no intervening contour line or terrain higher than both the aircraft and target.
- There is an intervening contour line and/or terrain feature higher than the target but not the aircraft, which is closer to the aircraft, and the aircraft is at least two altitude levels above the terrain.
- There is an intervening contour line and/or terrain feature higher than the target but not the aircraft, which is closer to the target or midway between the aircraft and target, and the aircraft is at least four altitude levels higher than the terrain.

There exists a blocked line of sight between the aircraft and target if:

- A ground unit is at an altitude below that of an intervening contour and/or terrain feature and the aircraft is at or below that contour or terrain's altitude.
- A ground unit is at the same altitude as an intervening contour and/or terrain feature and the aircraft is lower unless the contour or terrain is part of a downward slope of a hill the unit is on the side of.
- A ground unit is higher than an intervening contour or terrain feature which is not defining the slope of the rising terrain or hill the unit is on, and the aircraft is lower by the same amount or is in T-level flight (Chapter 20) and within two hexes of the intervening contour or terrain.
- The aircraft and ground unit are at equal altitudes and the line of sight crosses a woods, urban, or built up area hex feature, or a ridgeline also at the same altitude.

Note: Aircraft deliberately flying so that terrain is blocking a line of sight between them and a ground unit, are using "Terrain Masking".

Effects of Camouflage. Ground units may be camouflaged as a result of being in certain terrain types, or if designated as camouflaged in the scenario instructions. The sighting range of a camouflaged ground unit is half its normal range. Also, sighting is no longer automatic. When sighting a camouflaged unit, roll the die. On a 5 or less it is spotted. A minus 2 modifier applies to the roll if the target is marked by a FAC with smoke, or by laser if the sighting aircraft has laser spot tracker technology. Any crew quality or eyesight modifiers also apply unless VAS is used.

Effects of Activity by Camouflaged Units: Any camouflaged AAA or SAM units which fired or launched missiles on the previous game turn may be sighted out to normal range with a die roll as above.

A camouflaged SAM unit that launched a missile in the SAM Interaction Phase of the current game turn whose basic missile visibility number is 7 or more is sighted automatically if in sighting range and the just launched missile is sighted.

When a camouflaged AAA or SAM unit fires or launches a missile it becomes "detected" for the rest of the game turn and for the following game turn. Whether sighted or not, a detected unit can be attacked as its general position is known. If sighted, it may be attacked normally, if detected but not also sighted, it may be attacked but is treated as a secondary target. Aiming is done normally against a detected target but the bombsight and tracking time modifiers are disallowed. Smart or guided weapons may not be used against detected only targets.

ADVANCED RULES

11.3 — VISUAL AUGMENTATION SYSTEMS (VAS)

Aircraft can be augmented by television and optical equipment to enhance the aircraft crew's ability to sight targets at longer than normal ranges.

Independent Search: An aircraft with a VAS may conduct a visual search independent of the sighting process or its radar. It is allowed to do the following:

- attempt to sight one eligible target already detected by radar (but not locked on) in the searcher's 180° angle off arcs and within 10 times the target's visibility number, or
- visually search in the limited radar arc within 6 times the target's visibility number for one eligible target (whether previously detected or not).

In either case, roll the die once for each eligible target. Modify the roll as appropriate. If the modified roll is less than or equal to the eligible target's visibility number, it is sighted. If the roll is greater, the target remains unsighted.

Ignore multi-crew and HUD interface modifiers. The VAS range modifiers are used in place of the eyesight modifiers.

Radar /VAS Interface. An aircraft equipped with VAS may (upon establishing a radar lock) automatically sight one of the locked targets in the next Visual Sighting Phase if it is:

- in the searcher's 180° angle off arc and,
- within 10 times the target's visibility number.

VAS Considerations. Enemy aircraft sighted by VAS systems are sighted only to the VAS equipped aircraft that specifically saw them and may not be attacked by other aircraft unless also visually sighted by the regular procedure. VAS systems may be used to accomplish target identification. An aircraft that elects to use VAS during the Visual Sighting Phase may not padlock.

11.4 — INFRA-RED SEARCH AND TRACK SYSTEMS (IRSTS)

An Infra-Red Search and Track System is capable of passively detecting and tracking aircraft. IRSTS operation is not detectable by any aircraft's ECM or RWR gear. IRSTS can be used to sight aircraft at night and to target IR missiles in a manner similar to IR Uncage technology.

IRSTS Types. Two types of IRSTS systems exist: A (Early) and B (Advanced). IRSTS is used in the Radar Search and Lock-On Phase. A single pilot aircraft may use radar or IRSTS in this phase, a multi-crew aircraft may do both.

Detection IRSTS detects heat based on fuel consumption. Detection range equals four times the fuel used number (based on the Fuel column of the Power Chart for the current power setting). This range is doubled of the IRSTS is in the target's 30° arc or less. The target is detected if it is in detection range.

- IRSTS-A operates in the limited radar arc of an aircraft.
- IRSTS-B operates in the 180° arc of an aircraft.

IRSTS Lock-on. One lock-on attempt is allowed against the nearest detected target or the target with the highest fuel point use (and consequently the largest IR signature); double the value if seen from 30° arc or less. Roll the die. On a 6 or less for type A or 8 or less for type B, the target is locked-up.

Lock-on Sighting Benefits: In the visual sighting phase, an aircraft with an IRSTS lock-on and having HUD interface technology receives the HUD modifier. Visual Sighting at night is permitted against a locked-on target out to twice the normal range.

IR Missile Targeting: An IRM equipped-fighter with an IRSTS lock-on may launch missiles at the target even if they are not visually spotted (handy at night and in haze). A type B system lock-on allows IRMs to be launched as if IR uncage technology were available even if the fighter does not normally have that technology.

11.5 — LIMITED INTELLIGENCE

Some scenarios allow players to start with aircraft types unknown to their opponent or they restrict one side (or both sides) from firing until an unknown aircraft is identified.

Aircraft Identification. A sighted aircraft is identified:

- Automatically when it is within twice its visibility number in hexes to a friendly aircraft.
- Automatically by VAS aircraft when it is within four times its visibility number in hexes.
- By VAS when within 10 times its visibility number in hexes on a die roll of 7 or less.
- When it begins its second turn being radar locked by an aircraft with TGT.I.D. technology.

Note: IFF ECM gear may help determine if an aircraft is friendly but it does not identify them.

Missile Identification. A missile's type is not revealed until it has been defeated by decoys or until it attacks a target. If a missile misses, the type need not be revealed until the end of the game. At missile launch the target aircraft's player should be told only that he is the target of a missile. If the missile is AHM and the target aircraft has an RWR capable of detecting an AHM in active mode, he must be told that the missile is an AHM when it goes active. A player's aircraft may use radar lock-ons and target illumination procedures to confuse the enemy player even if he launches only IR missiles.

Ground Unit and Naval Unit Identification. Ground and naval units, especially vehicles, seen from the air are hard to identify. To reflect this, always set up ground units and Naval units with their generic side up. Their exact type is not revealed unless visually identified or the instant they fire on aircraft or are attacked by aircraft.

Furthermore, generic AAA and SAM site counters (mobile and static types) may be provided which are placed on the map instead of the actual units. Only when a AAA or SAM unit fires for the first time, or the site is attacked, is the actual unit revealed and returned to the map in place of the site marker. In some scenarios, dummy sites are provided, these are not revealed until attacked or I.D.'d.

I.D. Procedure. Visual identification of ground and Naval units may occur before a unit is attacked or fires. Aircraft may attempt to visually I.D. targets in the sighting phase after sighting them. Roll once for each sighted unit in an aircraft's searched arc. If the number is less than or equal to 10 minus the range in hexes (counting 2 altitude levels as a hex), the unit is identified and flipped over to its non-generic side. Once a unit is identified through visual sighting or by attack or when it fires, it remains I.D.'d for the rest of the game.

11.6 — FORWARD AIR CONTROLLERS (FACs)

Forward Air Controllers identify targets and direct ground attacks for pilots. A FAC may be ground-based or airborne. A FAC marks a ground target with smoke or with a laser spot. An attack on a marked target receives a minus 1 die roll modifier.

Ground FAC: A ground FAC is a vehicle-mounted observer on the ground. A Ground FAC automatically sees any enemy ground units (camouflaged or not) within six hexes provided LOS is not blocked. It sees units in adjacent hexes even if LOS is blocked.

Each Ground FAC may mark one enemy unit (which it can see) during the AAA Planning Phase of each turn. If the Ground FAC marks the target with a laser spot, the marking is removed at the end of the game turn. If the Ground FAC marks the target with smoke, the marking is removed at the end of the next game-turn (the marking lasts two turns).

Airborne FAC: An airborne FAC is in an aircraft flying over the target area. The aircraft can usually carry smoke rocket pods for marking targets, and some may be equipped with laser designators. An Airborne FAC sights ground targets using normal Visual Sighting but is better at sighting camouflaged units.

In order to mark a target, the airborne FAC must initially sight the target just as other aircraft do. Due to special training a FAC may always try to sight camouflaged targets out to their normal sighting range using a modified roll of 5 or less, and at or inside half range, on a modified roll of 8 or less. Once sighted by a FAC, a camouflaged target is considered to remain sighted to that FAC for the rest of the game (he has marked it on his grid-map). A FAC that searches for a "detected" camouflaged unit gets a -2 modifier to his die roll.

Laser Spots. Airborne FACs with laser designators may mark targets with laser spots as described in Chapter 27.

Smoke Spots. Airborne FACs with smoke rockets may mark targets by attacking them with smoke during their flight. Normal aiming and a release point must be reached by the FAC to declare his shot. All modifiers that apply to a normal rocket attack apply to the marking shot roll.

Roll one die, on a modified 7 or less, the target is successfully marked and a smoke counter is placed on it. The smoke, as above, is removed at the end of the following game-turn. Smoke rocket pods are detailed in the external stores tables. Light spotter plane characteristics are detailed in the accompanying game booklet if applicable. Aircraft may attack laser or smoke marked but unsighted targets after aiming normally except that the bombsight and tracking time modifiers are ignored; the marked target modifier still applies.

11.7 — LONG-RANGE GROUND UNIT SIGHTING

Aircraft with observers on board (scout helos, some FAC aircraft and two seat jets or trainers opting to carry an observer) may double the distance at which ground units may be sighted and identified (binoculars or other optics in use). Identification is as per rule 11.5 except treat each two hexes or four altitude levels as one hex of range.

V.A.S. or TV/IR Optics. Aircraft equipped with VAS, or TV/IR Optics technology or pods, may sight and identify ground units and targets out to triple the normal range if sighting into arcs into which the VAS or TV/IR optics can see. In this case treat each 3 hexes or six altitude levels as one hex of range.

Also, aircraft with laser designators type B and C, and having TV/IR optics capability, may do long range sighting and identification in the same arcs as the designators are capable of designating into.

11.8 — HIDDEN INITIAL PLACEMENT OF UNITS

Some scenarios allow units to be hidden at the start of play, meaning their hex position is noted on paper and the unit is kept off the game map until an aircraft sights it or it reveals itself by firing on the aircraft.

Hidden but uncamouflaged units are revealed whenever the other player elects to search for ground targets and is in sighting range per 11.2. When an aircraft searches for ground targets, the player with the hidden units must tell the other player if any camouflaged units are in sighting range so that the die can be rolled to determine if they're sighted.

Hidden units which fire on or launch missiles at aircraft are immediately "detected" and must be placed on the map and are eligible to be sighted normally in following game turns.

11.9 — FORMATION EFFECTS ON SIGHTING

Close Formations Restrictions. Wingmen in close formations may not padlock enemy aircraft, nor be counted for the multiple searching aircraft modifier. They may not be the reference aircraft either. They are concentrating on holding formation on the leader. Aircraft in tactical formations have no sighting restrictions.

Close Formation Effects. Any sighting attempts against aircraft in a close formation are done treating the close formation as a single entity. The sighting number of the largest aircraft in the formation is used and a minus1 modifier is applied to the sighting roll for each two aircraft in the formation. Success indicates all aircraft in the formation are spotted.

CHAPTER 12 — ORDER OF FLIGHT

This chapter covers the procedures which determine the order in which aircraft move during the flight phase. In play, aircraft are moved one at a time based on which has a higher initiative and/or position of advantage.

12.1 — INITIATIVE

At the start of each game-turn, each side rolls the die to establish a base initiative number of from 1 to 10. Each aircraft takes this base number and modifies it for any of the applicable reasons given below. The modified number becomes the individual aircraft's initiative and is noted on the initiative line of the aircraft log.

Within a given category of advantage (as explained below) the aircraft with the lowest initiative number will move first followed by the next lowest numbered aircraft and so on. Whenever multiple aircraft have the same initiative number after modification, each again rolls a die. No modifiers apply and the lower roll moves first.

Modifiers To Initiative. Initiative die rolls are modified by the factors listed below. All modifiers are cumulative.

- **National Training Standard.** The level of training for the pilot provides a modifier to the initiative roll. The scenario will indicate the national training standard.

- **First Kill.** The side which achieves the first aircraft kill in the scenario receives a modifier of +1 beginning on the next game turn.

- **Most Kills.** The side having the most kills at any point in the scenario receives a modifier of +1.

- **Crew Quality.** See Chapter 18 for the crew quality effects on initiative.

12.2 — POSITIONS OF ADVANTAGE

An aircraft with an "advantage" over an enemy aircraft is better positioned to maneuver against, react to, and/or attack that enemy. Being advantage or not depends primarily on the relative positions of opposing aircraft. This is reflected in the game by allowing aircraft which are positioned to the rear of others to move after them, thus allowing them the advantage of seeing their opponent's move first.

Positions Of Advantage Categories. Each turn, aircraft will fall into one of the following categories:

- **Departed.** An aircraft in departed flight.
- **Stalled.** An aircraft in stalled flight.
- **Engaged.** An aircraft (not in stalled or departed flight) which is actively defending itself against missiles.
- **Disadvantaged.** A spotted aircraft in the 150° or 180° angle-off arc of an enemy that is advantaged over it.
- **Nonadvantaged.** A spotted aircraft that is neither advantaged or disadvantaged. This category includes an aircraft which has an advantage over another aircraft but is also disadvantaged by the same or a different aircraft.
- **Advantaged.** An aircraft which has a spotted enemy aircraft in its 150° or 180° angle off arc within 9 hexes and not more than 6 altitude levels above or 9 altitude levels below it.
- **Unspotted.** An aircraft not visually spotted by any enemy aircraft.
- **Undetected.** An aircraft not detected by radar or visually spotted.

This list is read in order, and an aircraft is categorized by the first situation in which it fits. Any aircraft not departed, stalled, or engaged is termed a "free" aircraft. Only a free aircraft can be advantaged over non-free aircraft. Non-free aircraft cannot be advantaged over any aircraft.

Order Of Flight. Each turn, aircraft will move sequentially during the Flight Phase by category. Categories are executed in the order shown above in the categories list (for example, all departed aircraft move first, then all stalled aircraft etc.). Initiative is used to determine the order of movement of aircraft within each category. Missiles move when their target moves.

Exceptions. The following three exceptions apply to the order of movement:

- **1) Illuminating Aircraft:** An aircraft performing radar illumination for a radar guided missile must move at the same time as the missile's target regardless of its original category. This may cause a re-arrangement of the order of movement to resolve missile shoot-outs when opposing aircraft target and illuminate each other.

- **2) Tailing Aircraft:** Any aircraft "Tailing" another, moves immediately after the "Tailee" does as explained in 12.3.

- **3) Preempting Aircraft:** Aircraft which have not yet moved in a turn and which are threatened by an aircraft currently moving may attempt to evade the attacker by Defensively Preempting it as explained in 12.4.

12.3 — TAILING ENEMY AIRCRAFT

A Free aircraft ending its flight stacked in the same position as an enemy aircraft which has already moved that turn may declare that it is tailing the enemy provided:

- The tailing aircraft's facing is within 60° of the tailee's, and
- The tailing aircraft's start speed is not more than 1.0 greater than the tailee's.

Advantages of Tailing. An aircraft electing to "tail" an enemy will not collide with it. Tailing negates collisions. An aircraft tailing another will always move after the tailee thus

avoiding an overshoot, which could occur otherwise if it were not tailing and ended up with a lower initiative number on the following turn.

Limits on Tailing. No more than one friendly aircraft may ever tail a given enemy but the friendly aircraft could in turn be tailed by another enemy which moves later that turn. No more than three aircraft. Multiple tailing in a hex/hexside may occur as long as each pursuer meets this criteria.

Effects On Positions Of Advantage. The tailing aircraft is considered advantaged over the tailed but is not allowed to disadvantage any other enemy aircraft since it is concentrating on the pursuee. The tailing aircraft moves immediately after the pursued aircraft does regardless of normal initiative numbers. Other aircraft may consider or ignore a tailing aircraft for purposes of determining order of flight depending on what would be more advantageous to them.

12.4 — DEFENSIVE PREEMPTIONS

Due to the rule that allows gunfire during movement, it often happens that aircraft with a higher initiative, which are waiting to move, get attacked by those supposedly at a disadvantage which are moving first. This rule allows aircraft with the higher initiative, to react to such threats by preempting the movement of those enemy aircraft.

When Can You Preempt? An aircraft may preempt the normal order of flight once per game-turn by moving before it normally would. This is allowed only when a sighted enemy aircraft, which has a lower initiative or which is in a lower position of advantage category, is moving or about to move, and is threatening it with gunfire.

To be considered threatening, the moving or about to move enemy aircraft must have the friendly aircraft in its 150 to 180 degree angle off arc and be within six hexes of range (2 alt. levels = 1 hex of range).

Procedure. If you think you will be preempting an enemy, you should alert the player controlling that aircraft so that he can pause momentarily between FP expenditures to allow you time to announce a preemption. The option to preempt may be taken before the enemy aircraft expends its first FP, or between the each of its FPs if the enemy is already moving.

To avoid confusion, the threatening aircraft should first expend an FP and then the defensive player should announce simply yes or no. If yes, the preemption is executed immediately. If no, the threatening aircraft may then conduct any possible gun attacks and move an additional FP. This process is repeated until a preemption occurs or the enemy completes its move.

Effect On Movement. When an aircraft elects to preempt, the enemy aircraft's movement is temporarily halted, and the preempting aircraft now expends half its FPs (rounded up) in flight. Once that is done, the enemy aircraft completes its flight making any possible attacks. When the enemy finishes, the preemptor then completes his flight and both are done moving for the game turn. The preemptor may not preempt again that turn even if attacked by another aircraft.

Restrictions: An aircraft that does a defensive preemption may not:

- make any attacks or launch weapons and,
- may not do any radar work except to use the "Boresight" or "Auto-Track" modes

You are now ready to play all guns only Air Combat Scenarios. For more fun, also read the Special Maneuvers of Chapter 13 which allow you more options in how to maneuver your fighters. Use the Sequence of Play but ignore the AAA, SAM, and Ground Unit Interaction Phases.

ADVANCED RULES

12.5 — FORMATIONS AND ORDER OF FLIGHT

Initiative. All aircraft in close formations use the leader's initiative in place of their own. Wingmen aircraft in tactical formations whose initiative ends up being less than their leader's may add one to their initiative (reflecting teamwork and radio calls). Regular or less quality aircrew who are not in a formation of some sort must subtract one from their initiative.

Order of Flight. All aircraft in a Close Formation move with and at the same time as their leader. Their leader's order of flight is determined normally. Aircraft in Tactical Formations move individually with their order of flight determined normally.

CHAPTER 13 — SPECIAL MANEUVERS

This chapter details specific flight actions used to change aircraft position and facing.

A maneuver is a distinct flight action. It may not be combined with turning, although turns and maneuvers can be performed in the same game turn. A maneuver may be started at any point in an aircraft's flight. Beginning a maneuver aborts a turn in progress and beginning a turn aborts a maneuver in progress. More than one maneuver may be performed in one game turn. Some maneuvers may restrict attacks and/or weapon launches.

13.1 — PREPARATORY HFPS

A maneuver usually requires the expenditure of HFPS in flight as preparatory moves prior to execution of the maneuver itself. These "prep" moves actually represent the aircraft's forward movement while in the maneuver. An aircraft is considered to be performing a maneuver from the first expenditure of preparatory FPs until its actual execution. For Slide maneuvers, two preparatory HFPS are required and for most roll maneuvers one preparatory HFP is required. However, when performing snap turns or any maneuvers at high altitudes and speeds, additional penalty HFPS must be expended prior to the maneuvers as follows.

- In the HI band add +1 preparatory HFP.
- In the VH band add +2 preparatory HFP.
- In the EH band add +3 preparatory HFP.

- In the UH band add +4 preparatory HFP.
- At supersonic speeds, add +1 preparatory HFP.

Note: The speed HFP is used in addition to the others.

13.2 — SLIDE MANEUVERS

A slide is an aircraft turn of less than 30 degrees. It requires a small angle of bank and (on the game map) no facing change. A sliding aircraft shifts one hex (or hexside) to the left or right without changing facing. The slide diagram shows how a slide is executed.

Procedure. Announce the start of a slide and its direction. Spend 2.0 or more in preparatory HFPs and spend 1.0 HFP to move the aircraft forward and to the left or right as announced.

Limits. If the aircraft's start speed is 9.0 or less, it may perform one slide per game turn. If the start speed is greater than 9.0, two slides may be performed per game turn (an aircraft receives 1 decel point if it performs 2 slides in a game turn). If two slides are possible in the game turn, the aircraft must spend at least 4 FPs between the end of the first slide and the first preparatory HFP of the second slide.

13.3 — ROLLING MANEUVERS

Rolling maneuvers use the outcome of a roll to change position and possibly facing.

13.3.1 — DISPLACEMENT ROLLS

A displacement roll is a rapid snap-roll that allows an aircraft to shift left or right exactly as in a slide.

• **DR Procedure.** Announce the start of a displacement roll and its direction. Spend 1.0 or more in preparatory HFPs and spend 1.0 HFPs to execute the displacement roll. Shift the aircraft forward and to the left or right as announced. The aircraft receives decel points as shown on the ADC. The displacement roll diagram shows the resulting position shift.

13.3.2 — LAG ROLLS

A lag roll is a modified displacement roll in which the pilot uses a combination of rudder and pitch control to pull the aircraft's nose to the inside of the roll effecting a facing change in the direction opposite the roll.

• **LR Procedure.** Announce the start of a lag roll and its direction. Spend 1.0 or more in preparatory HFPs and spend 1.0 in HFPs to execute the lag roll. Shift the aircraft forward and to the left or right as announced then change the facing by 30 degrees as depicted in the lag roll diagram. The aircraft receives decel points as shown on the ADC.

13.3.3 — BARREL ROLLS

A barrel roll is a large version of a lag roll or displacement roll. The barrel roll is performed gamewise as a series of two or more connected lag or displacement rolls in the same direction (in actual flight, the pilot would be doing one big roll instead of several small ones).

Multiple lag rolls or displacement rolls in the same game turn but with FPs expended between one roll and the prepa-

ratory move of the next, or rolls done in opposite directions, are not a considered a barrel roll.

• **BR Procedure.** Announce the start of a barrel roll and execute it as a series of two or more lag rolls and/or displacement rolls. The barrel roll diagram shows the resulting position shifts of a barrel roll done as three connected lag rolls.

Note: All of the Maneuver Diagrams are in the play aids.

13.3.4 — VERTICAL ROLLS

When flying straight up or down, an aircraft can easily roll about its longitudinal axis changing facing in the process. In reality, facing has no meaning going straight up or down but upon recovery from a vertical climb or dive any amount of roll would manifest itself as a heading change.

• **VR Limits.** A vertical roll may only be performed by an aircraft in a vertical climb or vertical dive. It may only be performed from a hex or hexside in which the aircraft just expended a VFP. Multiple vertical rolls are allowed in a game turn, but only once per VFP expended.

• **VR Procedure.** Announce the vertical roll and its direction at the moment of execution. No prep move is required. There is no FP cost. The ADC indicates any Decel point cost for a Vertical Roll. The aircraft may change facing up by 30 degrees up to 6 times in the chosen direction for each VR executed. If on a hexside, and it faces less than 6 times, the aircraft must shift left or right (as for a turn); otherwise it may stay on the line or shift as desired during the roll.

Low Roll Rate Restriction. A low Roll Rate aircraft is limited to three 30 degree facing changes per Vertical roll executed.

High Pitch Rate Restriction. If a High Pitch Rate aircraft uses its HPR ability to enter a vertical climb from level flight, then it may only do a vertical roll at the end of its flight, and only if the last FP expended was a VFP.

13.3.5 — HALF-ROLLS AND DIVES

Aircraft often invert in order to enter dives quickly as they have better positive G pitch rates than negative G ones; meaning, it is easier to pull toward the top of the aircraft than push toward the bottom. An aircraft that executes a half-roll and dive may do one of the following:

- Immediately enter a vertical dive from level flight.
- Enter a vertical dive from a zoom or sustained climb if its start speed is 4.0 or less.
- Enter a steep dive from a vertical climb.

Note: Use of the half-roll and dive avoids the restrictions against diving flight imposed by vertically climbing, and avoids the restrictions against entering vertical dives without previously using diving flight.

• **HRD Procedure.** Announce the half-roll and dive at the beginning of the aircraft's flight. The aircraft immediately inverts at no cost (in FPs or decel points) and may now conduct normal diving flight, Steep or Vertical as appropriate. The aircraft is considered upright (not inverted) again at the end of its flight.

Restrictions. A half-roll and dive restricts aircraft as follows;

- No other maneuvers are permitted except for one final vertical roll allowed at the end of the aircraft's flight if the last FP was a VFP.

- No attacks, weapon launches, or radar work (except boresight, auto-track) are permitted in the game-turn.

13.3.6 — PENALTIES AND RESTRICTIONS ON ROLLING MANEUVERS

All rolling maneuvers produce the following penalties and restrictions on aircraft:

Additional Decel Points. In any game turn in which more than one roll maneuver was performed, extra decel points are incurred. For each lag, displacement, and/or vertical roll performed after the first, an aircraft receives 1.0 decel points in addition to normal roll costs.

Each lag roll or displacement roll in a barrel roll is counted as an individual roll. Even rolls which normally produce 0 Decel points are counted for this penalty.

Weapons Restrictions. Guns may not be fired, nor weapons launched, if the FP expended immediately prior to those desired actions was used to prepare for or execute a roll of any type.

Radar Tracking. Radar lock-ons held by the aircraft against other aircraft are lost the moment it does any rolling maneuver other than a vertical roll. The lock-on is also lost if more than one vertical roll is done in a game turn.

Turn Rates. For purposes of gunsight tracking, or missile launch G modifiers, a roll maneuver counts as turning at the BT turn rate.

High Altitude Maneuvering Departures. An aircraft attempting rolling maneuvers in the EH altitude or UH bands risks a maneuvering departure. Upon executing any roll at EH or higher, roll one die. On a result of 4 or less, the aircraft suffers a maneuvering departure.

ADVANCED RULES

13.4 — CLIMBING AND DIVING BARREL ROLLS

An aircraft may change altitude while barrel rolling if it is also in climbing or diving flight (and to a limited degree if in level flight).

When an aircraft executes a climbing or diving barrel roll, it may gain or lose one level of altitude respectively for each lag or displacement roll component of the barrel roll after the first. There is no additional cost in FPs for this altitude gain or loss.

The barrel roll altitude change may be done in place of, or in conjunction with, VFPs expended for normal climbing and diving and satisfies the requirement for choosing a specific climb and dive type. For purposes of nose attitude, a climbing or diving barrel roll is considered a zoom climb or steep dive respectively.

Limited Climbing Or Diving Barrel Roll. When a barrel roll is executed from level flight, only one level may be gained or lost and only upon executing the last roll in the entire maneuver.

Decel Points. An aircraft which changes altitude in a barrel roll receives 2.0 decel points per altitude level gained, and 0.5 accel points per altitude level lost.

13.5 — VERTICAL REVERSE MANEUVER

A vertical reverse (sometimes called a hammer-head stall or pitch-over) is a maneuver in which an aircraft enters a vertical climb and just prior to stalling, the pilot kicks the rudder and coordinates the controls to cause the aircraft to reverse its direction in the stall. It is difficult to perform.

Procedure. An aircraft in a vertical climb may, if it ends its move at or no more than 1.0 below minimum speed, attempt a vertical reverse in the next stalled aircraft phase.

Announce Vertical Reverse in the Stalled Aircraft Phase. Roll for stall/departure normally even if at minimum speed. If the aircraft departs, it must do departed flight. If it does not depart, it rolls again immediately to see if it successfully reverses. The roll required to vertical reverse is the same as the roll for recovering from a departure (The same modifiers apply as well).

If successful, the aircraft enters a vertical dive and is exempted from the requirement to first spend HFPs (when switching between climbs and dives). The aircraft's start speed is changed to its minimum speed (lose any .5 carry if it started below minimum speed). It moves in normal order and may affect order of flight. If unsuccessful, it enters stalled flight.

13.6 — VIFF MANEUVERS

Vectoring in forward flight (VIFF) is the ability of an aircraft to use movable thrust nozzles and/or special control surfaces to maneuver in directions normally impossible with traditional control surfaces. An aircraft noted as being VIFF capable can perform VIFF maneuvers.

13.6.1 — VIFF SIDESTEP

The aircraft executes a slide maneuver, but pays different costs for the result.

Procedure. During flight, announce the start of a VIFF sidestep and its direction. The aircraft spends no HFPs in preparation at MH or lower (it spends 1 HFP in preparation at HI or VH; it spends 2 HFPs in preparation at EH and UH). To execute the VIFF sidestep, the aircraft pays 2 HFPs and receives 2 decel points.

More than one VIFF sidestep may be performed in a game turn, but the aircraft must spend at least one HFP between each sidestep (turning in the direction of the sidestep is allowed during this HFP). The aircraft must reverse its angle of bank if it sidesteps one way and then desires to sidestep the other way.

13.6.2 — VIFF ASSISTED TURNING.

Vectored thrust is used to aid a turn. Turn the aircraft normally but reduce the listed FP requirement by one for any given turn rate. If the FP requirement is already 1, then use 60°. If it is already 60° or 90°, a VIFF turn will not improve it. If a VIFF turn is used, the aircraft receives a 2.0 decel point penalty, and the aircraft is treated as being **High Bleed Rate** for the entire game turn.

13.6.3 — VIFF VERTICAL PITCH.

This is executed as a half roll with dive except that the aircraft may additionally go directly from a vertical climb to a vertical dive. 2.0 decel points are received when the VIFF vertical pitch is declared.

13.6.4 — VIFF POP-UP.

An aircraft in level flight may pop up one altitude level by expending 1 FP and incurring 2 decel points. This may be done once per game turn, and the aircraft must be wings level at the instant it executes the pop-up. (not in a turn, performing a maneuver, nor having just executed any other maneuver).

13.7 — FORMATION RESTRICTIONS ON MANEUVERS

Close Formations. A close formation may slide, but may not use any other maneuvers.

Tactical Formations. Aircraft in tactical formation are not restricted in which maneuvers they may perform.

CHAPTER 14 — AIR TO AIR MISSILE FLIGHT AND COMBAT

This chapter describes the procedures for launching and moving missiles in flight, and for conducting missile attacks when a target aircraft is reached. Aircraft may launch missiles against a properly detected and tracked target. The precise requirements for detection and tracking are specific to each type of missile and are described later.

14.1 — Missile Data Tables

The information required to launch and fly each type of air-to-air missile is provided in the Missile Data Table (MDT) included in the play aid charts. The data included in the table is as follows:

- 1) **Type:** The name and/or model number of missile.
- 2) **Year:** The operational service entry date, if known.
- 3) **Weight:** Weight in pounds of missile (for load limits).
- 4) **Load:** The load points of missile (for conf. limits).
- 5) **Seeker:** A letter code indicating the type of seeker the missile has. E, I, M, A, are infra-red seekers (Early, Improved, Modern, Advanced). BR, RH, AH are radar seekers (Beam-Rider, Radar-Homer, Active-Homer). A dash means it is unguided and has no seeker.
- 6) **Launch G:** This is the maximum turn rate an aircraft may use during flight to launch the missile without penalty. If a higher rate was used, a cumulative +2

modifier must be applied to the roll for each step of higher turn rate.

- 7) **Launch Roll:** The die roll or less needed to successfully launch missile. The missile combat charts indicate the various modifiers to the roll.
- 8) **Turn Ability:** Missiles use the Turn Charts just as aircraft do. Their maximum allowed turn rates are listed here.
- 9) **Flight Time:** This is the maximum number of game turns the missile may be in play.
- 10) **Visibility:** This is the missile's visibility number used for sighting purposes.
- 11) **ECCM #:** The missile's resistance rating to jamming and ground clutter. It is used as a die roll modifier in certain situations explained later, see ECM rules.
- 12) **Chaff #:** This is the missile's vulnerability rating to chaff and mini-jammer decoys. See ECM rules.
- 13) **Flare #:** This is the missile's vulnerability rating to flare decoys. See ECM rules.
- 14) **Launch Envelope:** The missile's minimum and maximum ranges in terms of hexes that a missile may be fired at a target are listed here for front, side and rear shots (note, for radar missiles the maximum range is a function of the aircraft's radar tracking strength).

Note: Front shots are those taken from the target's 150 and 180 arcs; side shots are those from the 120 and 90 arcs; rear shots are those from the 60 or less arcs. NA indicates the shot is not allowed. Each two altitude levels difference in altitude between firer and target equal one hex in range.

- 15) **Speed:** This is the missile's BASE speed which is used as described below to determine a missile's actual speed on its first turn of flight. After the first game turn, the missile's speed will be vary based on numerous factors explained below. A slash with a second number indicates the missile has a sustainer motor which lasts a number of game turns equal to the second number.
- 16) **Active Homing:** This is the range in hexes at which an AH missile's own radar seeker becomes active allowing it to track its target.
- 17) **Home-On-Jam:** A "Y" indicates the missile has a home on jam ability which allows it to guide against aircraft using barrage jamming, see ECM rules.
- 18) **Look Down:** A "Y" indicates the missile has the ability to be used in look down parameters in conjunction with a look down capable radar.
- 19) **Roll To Hit:** The two columns list the number or less from the missile's attack die roll that will result in a direct (first column) or proximity (second column) hit. A direct hit gives a minus 2 damage roll modifier for blast effects.
- 20) **Attack Rating:** The two columns list the attack ratings for a direct (first column) or proximity (2d column) hit for use with the Aircraft damage tables.

Notes: Any special characteristics or missile notes are indicated in the notes section and the note text can be found at the bottom of the MDCs.

14.2 — MISSILE LAUNCHES

An aircraft may launch up to two missiles at a targeted enemy aircraft during the Air to Air Missile Launch Phase.

Procedure. Announce the number of missiles that each aircraft will attempt to fire (one or two) and their intended target

during the Air to Air Missile Launch Phase.

Roll the die for each missile. If the result is equal to or less than the missile launch roll number given for that type of missile on the MDT, the launch is successful. Place a missile counter in the launch aircraft's position with the exact same facing and altitude as the aircraft. On the next game turn, the missile will fly in pursuit of its target. If the launch roll is greater than the launch number, the missile has malfunctioned (through faulty guidance, or because of a dud motor). The malfunctioned missile is removed from play. In either case, the missile and its load points are considered expended.

If all declared launch attempts from an aircraft fail, the player may attempt one additional launch that phase. If at least one missile fired previously, this last attempt is not allowed. A missile's target is noted when it is launched.

Missile Launch Restrictions. Only "free" aircraft may launch missiles. All missiles launched by one aircraft in a single phase must be of the same type (for example, AIM-9 or AA-7). IR and RH versions of a single type may be launched in the same phase by the one aircraft if the targeting requirements of each seeker type are met.

Aircraft attempting to launch Visually aimed (IR) missiles are restricted as follows:

- If the launch aircraft climbed during the turn of launch, it may not fire at a lower target.
- If the launching aircraft dove, it may not fire at a higher target.
- If the launching aircraft flew level, the difference in altitude between the firer and target may not be more than one level for each two hexes distance between the two.

Aircraft attempting to launch Radar Guided missiles are restricted as follows:

- The target must be within the aircraft's radar arc limits or the launch aircraft may not fire.

Aircraft attempting to launch any type of missile are restricted as follows:

- An aircraft that turned at ET may not launch a missile unless the recovery period described in chapter 9 has been met.
- An aircraft that fired its guns during its last FP that turn may not launch missiles.
- An aircraft that executed or roll maneuver, or prepped for a roll during its last FP that turn may not launch missiles.

Missile Launch Modifiers. High aircraft turn rates during the turn of launch can adversely affect a missile's ability to stay locked on to a target during its separation from the launch aircraft and motor ignition. Each missile has a Launch G (turn rate) listed for it on the MDT. This is the highest turn rate the launching aircraft may use in the game turn and still be able to launch those missiles without penalty. If a higher turn rate was used in the turn, a +2 modifier is applied to the launch roll for each turn rate above the listed Launch G.

For example, if a missile has a Launch G of "TT", and the aircraft used a BT turn rate during the game turn, a +4 modifier to the launch roll would apply.

Additional launch roll modifiers may exist for weather, terrain clutter, crew quality, and the presence of missile countermeasures in the form of decoys (expendable chaff, flares, and mini-jammers), or electronic jamming. These modifiers are explained in later rules.

14.3 — MISSILE FLIGHT

Missile flight has been simplified for ease of play. A missile must expend all of its FPs each turn. It does not differentiate between HFPs and VFPs as aircraft do. The missile's start speed and altitude is recorded on the aircraft log each game turn. Unlike aircraft, missiles may both climb and dive (within restrictions) in the same turn in order to pursue their target. Missile's never have or carry half FPs or partial altitude gains.

Start Speeds And Altitudes. On its first turn of flight (the game turn after the one in which it was launched) a missile's start altitude is the same as the launch aircraft's start altitude the turn after launch. Its start speed is its base speed listed on the MDT adjusted as follows:

- minus one if the speed of the launch aircraft on the turn after launch is 3.0 or less or,
- plus one if the start speed is 6.0 or more or
- plus two if the start speed is 9.0 or more

On subsequent turns, the missile's start altitude will be the altitude it ended up at after its flight in the previous turn and its start speed will be two thirds its previous speed rounding fractions up, and adusted as follows:

- minus one if the missile's altitude gain for the turn equaled half or more of its speed in levels, or minus two if it equaled its speed or more in levels.
- plus one if the missile's altitude loss for the turn equaled half or more of its speed in levels, or plus two if it equaled its speed or more in levels.

Example: A missile with a start speed of 14 gained 8 levels during its flight. Its new start speed would be 8 (2/3'd's of 14=9; minus 1 for altitude gain).

Sustainer Motors. Missiles equipped with sustainer motors (indicated on the MDT) determine their start speed differently. If a missile has a sustainer, its first turn of flight speed is equal to its base speed as indicated on the MDT plus the full speed of the aircraft (rounding fractions up). For every turn the sustainer lasts, the missile's speed is not reduced to two thirds as above but only adjusted for climbs and dives. After the sustainer burns out, the missile's speed is reduced as above. A missile with a sustainer will have a number after a slash in the Speed column of the MDT. The number indicates how many turns the sustainer motor lasts. A "1" indicates the sustainer is only good for the first turn of flight.

Missile Order of Flight. A missile always flies at the same time as its target.

Missile Proportional Flight. Missiles and their targets move simultaneously. To simulate this, the missile and its target always alternate their expenditure of FPs in proportion to their relative speeds. Proportional speed is determined by dividing the faster speed by the slower speed. The result (ignoring fractions) is the number of FPs expended by the faster missile per FP expended by the slower aircraft. Leftover missile FPs are tacked on as extra FPs in the first few

segments of the proportional flight.

For example, if the aircraft speed is 5.0 and the missile speed is 15.0. Five goes into fifteen three times. Thus the missile will move 3 FP for each 1 FP moved by the aircraft. In this case, the aircraft would move one FP and then the missile would move three. This continues until both are out of FPs for the turn or the missile reaches a position from which an attack can occur.

If the proportion includes leftover FPs, for example, say the missile's speed was 17.0 instead of 15.0. In this case five goes into seventeen three times with two leftover. The missile would still move three for one except the two extra points are added on one at a time in the first two segments of movement that turn. That is, the aircraft would move one, then the missile four (3+1), then the aircraft one and missile four again. After that, the missile reverts to its three to one proportion.

If an aircraft's speed includes a fraction; say it is 4.5 instead of 5.0, round it up to simplify determining proportions but use its actual speed when moving. This would give the same result as in the above paragraph (5 into 17). The difference comes in the execution of the segments. The moves would be 4 for 1, 4 for 1, 3 for 1, 3 for 1 and then 3 for the aircraft's half FP.

Speedbrake Effects on Proportional Moves (adv. rule 6.5). When engaged in proportional movement with attacking missiles, speedbrakes (when applied,) can only use up the last available FPs to be expended. Or, stated another way; when engaged in proportional flight with attacking missiles, if the aircraft still has at least one full FP to expend it must do so in each and every proportional move whether speedbrakes have been used yet or not.

Missile Types Of Flight. A missile may fly level, climb and dive all in the same game turn as necessary to pursue its target. The following is a summary of missile types of flight.

- **Level Flight:** The missile expends one FP to fly forward one hex or hexside. A missile may freely lose one altitude level (at no FP cost) for each hex /hexside it enters.

- **Climbing Flight:** The missile expends one FP to climb one or two levels. A missile may not climb if its target is at the same or a lower altitude level. Exception: Those missiles noted as "TVM" (track-via-missile) or "MCG" (Mid-Course-Guidance) capable may climb as high as desired above a target before diving back down to intercept. The maximum altitude level any missile in play is allowed to reach is 100.

- **Diving Flight:** The missile expends one FP to dive two or three levels. A missile may not dive if its target is at the same altitude level or a higher one. Once per game-turn, a missile may lose just one altitude with one FP. Remember, missiles may lose altitude freely by one level, for each hex entered in level flight mode.

- **Combined Flight:** FPs expended to move forward or to change altitude may be intermixed in any order. Any number of FPs may be expended climbing OR diving on the same hex/hexside. However, a missile may not both climb AND dive from the same hex/hexside and the following restrictions apply if the missile wishes to switch directly from climbing to diving or visa versa:

- If the missile's Turn Ability is less than BT/2, it must expend two FPs in forward level flight (free altitude loss not allowed for these) between the climbing and diving FPs.

- If the missile's Turn Ability is BT/2 or greater (i.e. ET/2 or ET/3), only one FP must be expended in level flight between the climbing and diving FPs.

- **Turning:** Missiles use the Turn Charts just as do aircraft. Missiles do not receive decel points for turning or changing facing. Missiles never consider angles of bank and may therefore reverse turns instantly. Missiles may only use a snap-turn once in their entire flight. If the snap turn is the first action performed, the normal prep-move requirements for snap-turning are waived (see Arming below). If a divisor is given, then the turn rate is better by the divisor's factor.

Example; A missile with ET/2 turn rate requires only half the normal ET requirement. At speed 16.0, in the LO band, it would only have to move 3 FPs per facing change (half of six). Always round fractions up when determining missile turn requirements (i.e. half of 5 would be 3, or a third of 7 would be 3).

- **Maneuvers:** Missiles are allowed slide maneuvers on every game turn like aircraft, lag, displacement and barrel rolls are not allowed. Any missile which expends more than one FP from the same position while climbing or diving may execute a vertical roll. Missiles are limited to one vertical roll in their entire flight unless they are pursuing a target which also does vertical rolls. In this case the missile is allowed as many additional vertical rolls in a game turn as their target has performed.

The normal prep-move requirements for all maneuvers must be met just as for aircraft and all maneuvers cost 1 FP to execute except vertical rolls which cost 0.

Missile Arming. Missiles must complete arming before they can turn or maneuver in pursuit of a target. Arming occurs automatically after the missile's have flown a certain distance, usually one hex.

To become armed, missiles must expend their first FP moving forward in level flight unless on the turn of launch the firing aircraft was in a climb or dive where more than half the aircraft's flight was spent as VFPs. In this case the missile could use an FP to gain or lose altitude as appropriate instead. This one FP in which missile's are becoming armed may not be counted toward prep-moves, or turning requirements, nor can the missile attack targets it reaches (they are missed). They may commence maneuvering normally on second and subsequent FPs.

Missile Tracking. At the end of each game turn, and at the end of each segment of proportional movement, a missile must have the target within the tracking parameters of its seeker head (in terms of angle-off) or it will lose contact and either self-destruct or enter ballistic unguided flight; in either case it is removed from play. The exact tracking requirements are described for each missile kind of missile later in the rules.

Instant Snap Turning (adv. rule 7.3). *Instant arming missiles*, (indicated by an asterix on the MDT) may begin maneuvering and attack immediately after launch. They are also allowed to immediately snap turn without prep-moving with their first FP or any FP later on in their flight so long as no turns, maneuvers, or switches between climbs and dives have yet commenced. If they elect to snap-turn later in their flight, after

any turns, maneuvers, or switches have occurred, they must prep-move for the snap-turn normally.

Non-instant arming missiles may also snap-turn as their first maneuvering action but only after becoming armed. This is allowed as above, with their first FP following becoming armed, or later as long as no turns, maneuvers, or switches between climbs and dives have yet occurred or commenced. As above, if they elect to snap turn later in their flight they must prep-move normally.

Follow On Missiles. Whenever two missiles are launched at a time, the second one is termed a "follow-on" missile. This missile may not begin moving until the first missile has moved at least two FPs. This simulates the time delay between the firing of the two missiles. The time delay may be longer; but not more than 1/3 the first missile's speed.

When the follow on missile first begins moving, it is not allowed to move more FPs than the lead missile has left to it in that segment of the proportional move. For example, if the proportions are 5 to 1 and the follow on starts moving after the lead missile moves three points, the follow on would only be able to move 2 points (the same as was left to the lead). In the next segment, both could move 5 hexes but the follow on missile would still trail by a distance of 3 (the original delay).

On the first and subsequent turns of flight, the follow-on must cease moving when the first missile does. Thus, on the first turn, it will be cheated out of FPs equal to the delay between it and the first missile. To compensate, the follow-on missile is allowed to use those FPs on the last turn of its flight, they are added as bonus FPs, one per proportional segment starting with the first until used up.

14.4 — MISSILE ATTACKS

When Does A Missile Attack? At the instant a missile starts a proportional move with its target in its 180+ arc and the range (in hexes; 2 levels of altitude equals one hex) is equal to or less than the number of FPs the missile has available in that proportional move, a missile attack is declared.

Procedure. Roll the die and apply any modifiers. Compare the modified result to the missile's to hit numbers to determine if a hit was achieved, and if so, what kind of hit. If a hit is achieved, roll on the Damage Tables using the appropriate attack rating.

The two "Roll to hit" columns on the MDT indicate the Die Roll or less result that will give a direct or proximity hit. A direct hit occurs if the roll was equal to or less than the indicated number. A proximity hit (which has a lesser attack rating) occurs if the roll was greater than that for a direct hit but less than or equal to that given for a proximity hit. If the roll was higher than the proximity number, the missile misses.

Roll To Hit Modifiers. The Missile Attack Modifiers Table lists the modifiers for missile angle off, terrain clutter effects, target considerations, and ECM. For purposes of the angle-off to hit modifiers, the missile is always considered to be in the angle-off arc it was in during the proportional move in which the missile attack was declared. If it is on a line between two arcs, it is considered to be in the arc which favors the defender.

Missile Damage. The two Attack Rating columns of the MDT list the attack rating of the missiles for direct and proximity

hits respectively. The ratings are used to determine aircraft damage as described in chapter 10. However, a direct hit always gets a minus 2 modifier to the damage roll (warhead blast effects as opposed to just shrapnel from a proximity hit).

14.5 — DEFENSIVELY ENGAGING MISSILES

An aircraft under attack by one or more missiles may declare itself defensively engaged against any of the missiles which are sighted or to which it has been alerted to by ECM. This declaration is made during the aircraft decisions phase.

Engaged Aircraft Versus Missiles. An "engaged" aircraft is considered to be actively defending itself against attacking missiles. As such, it is allowed the following benefits during its move;

- Idle power may be selected and is automatically effective providing modifiers to IR missile attacks.
- Missile decoys (chaff/flare/jammers) may be manually deployed to defeat the missile. Manual decoys may be deployed in addition to any being deployed by a DDS program (see ECM rules).
- The target aircraft begins proportional movement first, expending its first FP before the missile expends any FPs.

Restrictions. Engaged aircraft are not allowed to make attacks of any sort and may not launch weapons, use "T"-level flight or do damage control while engaged.

Free Aircraft Versus Missiles. A free aircraft under attack by a missile has either not spotted it, or opted to ignore it, possibly depending on a dispenser program to stop it. As such it has the following disadvantages;

- The missile begins proportional movement first expending its FPs before the aircraft does.
- Free aircraft may not manually deploy decoys, although they may gain the benefit of any DDS programs already in operation.
- Idle power selected by a free aircraft is only effective against the missile on a die roll of 1 to 4.
- The missile is given an additional -1 modifier on the to hit roll.

Note: Free aircraft are not restricted like engaged aircraft.

Multiple Missile Attacks. An aircraft that engages one missile, is considered engaged against all missiles currently pursuing it. However, manual decoys may only be employed against missiles which are sighted or to which it is specifically alerted by ECM. Against engaged aircraft, missiles which were not sighted or alerted to are still affected by idle power and do not get the -1 to hit modifier but still move first as if the target were a free aircraft.

14.6 — MISSILE COUNTERMEASURES

Aircraft defend against missiles by trying to outmaneuver them (not likely) and by using expendable decoys such as chaff, flares and mini-jammers, and through electronic warfare. A "decoy" in the game, represents a cluster of two to four actual expendables.

Out-Maneuvering Missiles. If an aircraft reaches a position where a missile cannot move to keep it within its tracking

requirements at the end of the turn or proportional movement segment, or if the missile is below maneuver speed and the target is not directly in front of it when an attack is declared, the missile is out-maneuvered and removed from play.

Manual Decoy Dispensing. Aircraft equipped with decoy dispensing systems (DDS) as part of their ECM suite, or aircraft carrying decoy dispenser pods may manually dispense decoys against an attacking missile if they are defensively engaged against it. Manual decoys may be dispensed even if an automatic decoy program is in effect (see rule 19).

When a sighted missile attacks, the engaged aircraft may immediately expend 1 or 2 decoy clusters of each type of decoy available. Quantities dispensed of each type must be equal (although some types may run out early).

The defender rolls the die once for each decoy dispensed. For Chaff or Flares, if the roll is less than or equal to the missile's appropriate decoy vulnerability number (given on the MDT), it is decoyed and removed from play. For mini-jammers, if the roll is less than or equal to the missile's Chaff Vulnerability plus 1, it is decoyed and removed from play. If the missile is not decoyed, it rolls for its attack.

Automatic Decoy Dispensing. Decoy dispensers may be used to continuously emit decoys over the course of a game-turn via automatic programs as described in rule 19. A decoy program provides a "Protection Level" number which is used as an attack die roll modifier if it is dispensing decoys to which a missile is vulnerable.

Electronic Warfare. Radar guided missiles and aircraft radars may be vulnerable to electronic jamming which affects their ability to launch and track, and their attack die rolls. Rule 19 covers electronic warfare in detail.

ADVANCED RULES

14.7—REALISTIC MISSILE SPEED ATTENUATION

Missiles use powerful boost motors which accelerate them to top speed within a matter of two to three seconds. After that, most missile's simply glide to their targets rapidly losing speed along the way. Some have sustainer motors which burn for a short period of time after the booster goes out and these lose speed at a lesser rate. Nevertheless, the speed loss can be dramatic, up to a third of the missile's top speed within the span of a single turn depending on its actions. This rule replaces the generic method for determining missile speeds given in 14.3.

Missile Speed Attenuation Factor. To realistically account for the high speed loss that can occur each turn, a Speed Attenuation Factor is applied to the missile's base start speed to get an average speed for the turn. The average speed indicates the number of FPs that the missile has. The average speed is therefore the speed that is listed on the aircraft log and used for the missile's flight.

Missile Base Start Speed. On the first turn of the missile's flight, the base start speed equals the missile's listed speed from the MDT plus the speed of the launching aircraft. On all

subsequent game turns, the base start speed is the missile's previous average speed plus any changes for climbing, diving and maneuvering.

Procedure. At the beginning of every turn of its flight, including its first, determine a missile's average speed as follows:

- Refer to the Missile Speed Attenuation Table and find the altitude band the missile is starting in.
- Cross index the band with the game turn of the missile's flight to find the attenuation factor.
- Multiply the attenuation factor by the missile's base start speed. Round resulting fractions up at .5 or better, and drop fractions of less than .5.

The final result is the missile's average speed for the current turn. Note: a math saver table is provided in the play aid's which does the math for you.

Climbing and Diving Effects On Speed. At the end of a game turn increase or decrease the missile's speed as given in 14.3 for climbs and dives.

Maneuvering Effects On Speed. At the end of game turn, reduce the missile's speed by one for each 30 degrees of facing change it accomplished by turning during that turn.

Sustainer Motor Effects. Some missiles have sustainer motors which provide extra thrust after the missile's booster gives out. This rules replaces the one given in 14.3.

On the first game turn sustainer powered flight, use the missile speed attenuation factor that applies for the altitude band two above that the missile is actually in or the UH band, whichever occurs first, to determine average speed. For each game turn of sustainer powered flight after the first, the speed attenuation factor is 1.0 regardless of its current altitude (meaning no attenuation speed loss applies, though other speed loss effects do). Once the sustainer gives out, normal speed attenuation factors are used.

Minimum, Maneuver and Maximum Missile Speeds. Listed Next to the Missile Speed Attenuation Table is the minimum, maneuver and maximum speeds allowed to any missile in a given altitude band. Speed gain above the maximum speed is not allowed, excess speed gain is lost. Any missile with a start speed of less than the minimum listed is considered to stall out and is removed from play. Any missile with a start speed of less than maneuver speed may not turn or perform maneuvers of any sort. It may only fly forward and climb or dive.

14.8—FORMATION EFFECTS ON MISSILE ATTACKS

Missiles Versus Close Formations. Heat seeking missiles launched at a close formation, randomly determine which aircraft is the actual target. Radar, laser, or optically guided missiles target aircraft normally (See following missile rules).

Engaging Missiles. Aircraft that remain in close formation may not engage missiles. If any aircraft wishes to detach to engage a missile, the close formation is automatically nullified and all must move during the engaged aircraft movement phase and all are restricted from performing actions as if each had engaged the missile (they would all initially be unsure of who the real target is!).

CHAPTER 15 — HEAT SEEKING MISSILES

This chapter details the operations of infra-red heat-seeking missiles (weapon code IRM). A heat-seeking missile homes on the infra-red heat emissions of a target aircraft.

15.1 — IRM LAUNCH PREREQUISITES

To launch IRMs, the firing aircraft must;

- 1) Have a sighted target in the missile seeker's field of view and be within the launch angle off limits of the missile's seeker head (see below).
- 2) Obtain a seeker lock-up while within the minimum and maximum ranges given on the MDT under the missile's launch envelope for the type of shot (front, side, or rear).
- 3) Not have violated the missile launch restrictions of rule 14.2.

Seeker Head Field Of View (FOV). IRMs can only lock-up targets in their FOV. IR seeker heads normally have an FOV equal to a limited radar arc (see limited radar arc diagram on play aid reference sheet). If turning left or right or banked left or right, the FOV can optionally be considered equal to the firer's 180 degree left or right arc as appropriate.

IR Uncage Technology FOV. Some aircraft have the ability to uncage a missile's IR seeker head allowing it to swivel freely to acquire targets over a wider area. An uncaged IR seeker always has an FOV equal to a 180 radar arc. The act of uncaging missiles is declared in the Aircraft Decisions Phase. The technology section of the ADC indicates whether an aircraft has "IR UNCAGE" ability or not. Only "I", "M", or "A" type seekers can be uncaged.

Seeker Head Launch Angle-Off Limits. IR seeker heads cannot lock-up a target unless the firer is within the listed target angle-off arcs as given below by seeker type.

Seeker Type	Angle-Off Limits
E Early	Target's 60 degree arc or less if target used A/B power; target's 30 degree arc or less otherwise.
I Improved	Target's 60 degree arc or less at any target power setting.
M Modern	Target's 120 degree arc or less if it used A/B power; target's 90 degree arc or less otherwise.
A Advanced	Any of target's angle-off arcs at any target power setting.

Seeker Head Lock-Ups. Anytime there is only one target in a seeker's FOV, it is automatically locked-up.

If more than one aircraft, including friendlies, are in a LIMITED FOV, the closest aircraft is automatically locked-up. If several aircraft are equally close, randomly determine by die roll which was actually locked-up AFTER the missile is launched.

If more than one aircraft, including friendlies, are in an UNCAGED FOV, the firing player chooses which is the intended target and rolls a die. If the target is the nearest aircraft, the lock-up succeeds on a roll of 8 or less. If other aircraft in the

FOV are equally near, or if the target is not the closest, then the die roll is modified by a cumulative +1 for every closer or equally near aircraft. If successful, missiles may be fired normally. If the lock-up attempt fails, missiles may not be launched.

IRM Tracking Requirements. Once launched, all IRMs have an uncaged FOV. At the end of every game turn, and at the end of each proportional move for the missile, the target must still be in the missile's FOV otherwise the missile loses its lock-up and becomes unguided. At the instant a missile becomes unguided it is removed from play.

15.2 — IRM COUNTERMEASURES

Flare Decoys. If an aircraft is equipped with an internal DDS, or is carrying a DDS pod, then it can be equipped with flare decoys to be used against attacking missiles. Flares may be dispensed either through automatic programs as described in rule 19, or manually if the aircraft engages an attacking missile (rule 14.6).

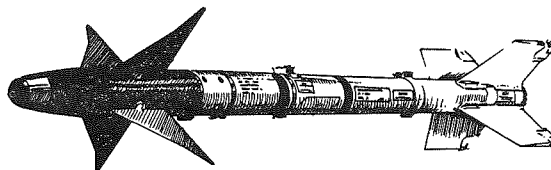
Manual Flare Procedure. When a missile declares an attack, but before it rolls to hit, an aircraft with a DDS system may declare using flares and "pop" one or two flare clusters. For each flare popped, roll one die; if the result of either roll is equal to or less than the missile's flare vulnerability rating, the missile is decoyed and removed from play. When a flare is popped, it is used up even if it is the second of two popped and the first decoyed the missile. When the aircraft has expended all of its flares, it can no longer decoy IRMs.

Flare program Procedure. If a DDS program is in use and includes flares, then a die roll modifier equal to the lesser of the Program Protection Level (PPL) of the flares or the flare vulnerability rating of the missile is used as a positive modifier to the attack die roll. Note: A flare PPL also provides a modifier to IRM launch rolls equal to the program's PPL (see rule 19) or the missile's flare vulnerability rating whichever is less.

Ground Clutter. Ground Clutter interferes with an IR missile's ability to track targets. Add 2 to the launch roll if the firing aircraft is in the LO or ML altitude band and fires IR missiles at a "lower" target. A lower target by definition, is one more than one altitude level lower than the firer for each two hexes of horizontal range it is away. Example; a target 7 hexes away is lower if it is more than 3 altitude levels below the firer.

If a missile dives in its proportional move (meaning it loses 2 or more altitude levels by any means) to attack a target in the LO altitude band, add 2 to the hit die roll. If a missile attacks a target in "T" level flight (rule 20) add 1 to the hit roll. This can be cumulative with the above modifiers.

You may now play all guns and heat seeking missile only combat scenarios! Ignore the AAA, SAM and Ground Unit Interaction Phases of the SOP.



ADVANCED RULES

15.3 — REALISTIC SEEKER HEAD VERTICAL FIELD OF VIEW LIMITS

Rather than just allowing aircraft that climbed or dived to launch at targets an unlimited distance above or below respectively, a more realistic set of seeker head limits can be simulated by using the Radar Vertical Limits Table (see 16.5) to define the vertical FOV limits for caged and uncaged seekers as follows:

- Use the limited radar arc Vertical Limits for a caged seeker head.
- Use the 180 degree radar arc Vertical Limits Tables described for uncaged IRMs.

15.4 — HELMET MOUNTED SIGHTS

Helmet Mounted Sights (HMS) Technology. A few aircraft can be equipped with helmet mounted sights (see scenario notes or the technology section of the ADC). An HMS allows a pilot firing uncaged IR missiles to attempt lock-up against any one sighted enemy aircraft in the firer's 150 to 180 degree arcs (essentially expanding the uncaged missile's FOV). The lock-up succeeds on an unmodified roll of 9 or less regardless of any closer or equally near aircraft. If the lock-up attempt fails, missiles may not be launched.

15.5 — IRM SEEKER LOCK-UP ASSISTANCE METHODS

Radar Assist. Uncaged IR missiles may be slaved to an aircraft's radar (declare in the Aircraft Decisions Phase). If the firing aircraft currently has a radar lock-on (see rule 16) to the intended target, the missiles may be automatically locked-up to it without rolling and regardless of how many aircraft are currently in the missile's FOV. IR missiles may be fired at night against otherwise unsighted targets using radar assist. This is an exception to the rule requiring targets to be sighted.

VAS Assist. Type "M" and "A" seeker head equipped missiles, if uncaged, may be slaved to the VAS system and automatically lock-up a VAS spotted target as above in radar assist. Declare in the Aircraft Decisions Phase.

IRSTS Assist. Any IR missile may be slaved to an IRSTS system (declare in the Aircraft Decisions Phase) and may automatically lock-up any target the IRSTS system is locked onto as above in radar assist. A type B IRSTS lock-on allows missiles to be fired at targets in the firer's 180 arcs even if the missile normally would not have an FOV that wide (i.e. non-uncaged missiles). This along with HMS technology are the only exceptions to the missile FOV requirements.

15.5 — EXPANDED AND REDUCED IRM ENVELOPES

Expanded/Reduced Envelopes. The listed missile envelopes are for fighter sized targets at normal or military power. Larger or hotter targets may be acquired from greater distances, while targets at idle power may be more difficult to acquire. The following rules reflect this:

- Any target with a visibility number of 10 or more, or any target using AB power, or which has a fuel usage number greater than 5 for its chosen power setting increases an IRM's existing lock-on envelope by 50% (round up).

- Any target using idle power reduces a missile's Lock-on envelope to 2/3d's normal amount (round up). Exception; for a large (vis 10+) target in idle use the normal missile envelope.

Out Of Envelope IRM Launches. An IRM may be launched inside its minimum range with a launch roll modifier of +3, except range "0" launches are not allowed and range "1" launches for IRMs that do not instantly arm automatically fail.

Type "A" seekers may still be launched at extended range, as defined above, at large targets or those which are not in AB power or which do not meet the fuel use parameters given above by accepting the +3 out of envelope launch roll modifier. If the target is at idle power, extended range out of envelope shots are those over 2/3rds the listed range up to the original listed range.

Note: With these rules it is possible to lock-up and launch at targets beyond the missile's flight range capabilities resulting in wasted shots.

CHAPTER 16 — AIR TO AIR RADAR

This chapter details the procedures for the use of radar for detection and tracking of other aircraft.

Detection and Lock-On Eligibility. Any aircraft not currently detected, within radar range, and in the radar arc of the searcher, is eligible to be detected. Count each two levels of altitude as one hex of range. An aircraft that is, or becomes, radar detected is eligible to be locked-on to. Radar guided missiles may only be launched at locked-on targets.

16.1 — RADAR SEARCHES

Radar Search Data. The Radar Data section of the ADC shows two numbers on the search line. The first number is the maximum detection range in hexes; the second number is the radar search strength rating. If a dash exists there, the aircraft has no search capability.

Radar Arcs. The Radar Data section of the ADC shows a number on the Arcs line. This is aircraft's radar arc. The radar arc for an aircraft is expressed in terms of its angle-off arcs and followed by a plus. Because angle off arcs begin from the tail of the aircraft, the forward direction for an aircraft is 180°. Radar arcs include all angle-off arcs **higher** than the number stated. Thus, the 150+ radar arc includes the right and left 150° angle-off arcs, and the right and left 180° angle-off arcs (because they are higher than 150°). Some aircraft have a "Limited" radar arc. This arc is less than the 180+ radar arc, and is shown in the Limited Radar Arc diagram of the play aids.

Radar Search Procedure. Aircraft may attempt to detect targets which are in the search aircraft's radar arc and within its maximum detection range. To detect a target, a successful die roll must be made. The actual detection probability depends on the aircraft's search strength rating and the range. Use the following procedure to determine the die roll required:

1. Enter the Radar Detection Table on the line corresponding to the radar's search strength. Each column on the table lists a range in hexes corresponding to a detection number at the top which is the die roll or less required to contact a target.

2. Move right across the listed columns until the column whose range number first equals or exceeds the range the target is at is reached.

3. Roll the die, if the number is less than or equal to the detection number at the top of the column, the target is detected.

Die Roll Modifiers. Detection die roll modifiers exist for electronic jamming, the presence of chaff and mini-jammer programs, stealth technology, crew quality, and/or aircraft size. These are summarized on the Search Modifiers Table.

Duration of Detection. Once an aircraft is detected, it remains detected as long as it remains in the search aircraft's radar arc and the searcher remains a "free" aircraft and does not violate the limitations given below in 16.3

Search Limits. There is no limit to the number of detected targets an aircraft can maintain, however, no more than four die roll attempts for radar detection are allowed per searching aircraft each game turn, and no more than one die roll per eligible target is allowed.

Once an aircraft switches to tracking mode, it loses contact with all detected aircraft except the one being tracked through a lock-on (exception; see Track-While-Scan radars). It may not search again until the lock-on is broken or dropped.

Search Example: An aircraft with a search strength of 12 and a maximum detection range of 48 is looking for two aircraft, one 27 hexes away (9 miles) and another 40 hexes (13.3 miles) away. Entering at the strength line we move right stopping at the second column. This column's range equals 30 which is higher than 27. Looking at the top of the column, we see that we need to roll 9 or less to make contact. Continuing further right two columns, we find the range listing of 42 which is higher than 40 and the die roll required is 7 or less.

Electronic Warfare and ECCM. The effects of jamming are fully described in rule 19, but generally, the presence of jamming will cause modifiers to the detection die roll. Aircraft radars may have an ECCM (electronic counter-counter measures) rating given on the ADC which is used to counter jamming modifiers.

16.2 — RADAR TRACKING AND LOCK-ONS

For weapons guidance, an aircraft must refine and concentrate its radar beam on a target for accurate position readings. This is accomplished by switching to a tracking mode and achieving a lock-on.

Radar Tracking Data. The Radar Data section of the ADC shows two numbers on the track line. The first number is the maximum tracking range; the second number is the radar tracking strength rating. If a dash exists there, the aircraft is not capable of tracking targets. The tracking strength is used to determine the maximum range a locked-on target can be illuminated at for radar missile guidance.

Lock-On Number. The Radar Data section of the ADC shows a number on the Lock-on line. This is the base chance

of a successful lock-on against a detected radar target. Note; this number is also used for gun attack radar ranging.

Radar Lock-On Procedure. An aircraft may make one lock-on attempt against one detected target per game turn (exception, see Multi-Target Track Technology). Once a target is locked-onto, it remains locked-onto from game turn to game turn unless the lock-on is broken or voluntarily dropped. An aircraft may only have one lock-on at a time unless it has Multi-Target Track Technology.

Procedure: Roll the die. If the result after applying any modifiers is less than or equal to the lock-on number listed in the radar section of the ADC, the target is locked-onto.

Die Roll Modifiers. The same modifiers that apply to search rolls, apply to lock-on rolls.

Breaking Radar Lock-ons. A lock-on will be broken if the tracking aircraft;

- stalls, departs, or declares itself engaged.
- performs any rolling maneuver (except Vertical Roll), or a Vertical Reverse.
- turns at the ET rate.
- receives an H or C hit, or is destroyed.
- allows the target to leave its radar arc.
- voluntarily breaks its lock-on.

16.3 — RADAR USE LIMITATIONS

Radar Limitations: An aircraft is limited to four detection attempts against eligible radar targets per game turn. An aircraft is limited to one lock-on attempt per game turn unless it has multi-target track technology. An existing radar lock-on must be broken before a new lock-on is attempted unless multi-target track technology exists.

A pilot only crewed aircraft may not perform normal searches if:

- it turned at greater than HT rate or Snap turned.
- it performed any rolling maneuvers, Viff Maneuvers, or a Vertical Reverse.
- it vertical climbed, it vertical dived, or it used an unloaded dive.
- it made an air to air gun attack or an air to ground attack.
- it stalled, departed, or engaged missiles.
- it performed any damage control.

A multi-crew aircraft may not perform normal searches if:

- it turned at greater than BT rate or snap turned.
- it vertical climbed, vertical dived, or used an unloaded dive.
- it performed any rolling maneuvers, Viff Maneuvers, or a Vertical Reverse.
- it stalled, departed, or engaged missiles.
- it performed any damage control.

Look Down Limitations. Due to ground clutter, an aircraft may not search for or track targets within four altitude levels of the ground unless it (the searching aircraft) is at a lower level than the target or has full Look-Down technology.

An aircraft may not search for targets whose altitude level is within 5 to 10 levels of the ground if it (the searching aircraft) is higher than the targets unless the difference in altitude

between the target and the ground is greater than the difference in altitude between the searcher and the target, and the horizontal range is less than the difference in altitude between the target and ground.

For example, If the ground is at level 0, and a target aircraft is at level 6, a higher searcher would have to be no more than 5 levels above the target and within six hexes.

Note: Aircraft with Look-Down Technology ignore this limit. Aircraft with limited Look-Down Technology ignore the horizontal range aspect of this limit.

Nose Attitude Limits. An aircraft which climbs cannot search for or track lower targets, and an aircraft which dives cannot search for or track higher targets. An aircraft which flies level cannot search for and track targets which are more than one altitude level above or below for each two hexes of range away they are. Note; Advanced rule 16.5 introduces more specific nose attitude limits.

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16.4 — RADAR SYSTEM TECHNOLOGIES

Multi-Target Track Technology. Some radars may track more than one aircraft at a time. This is noted in the Technology section of the ADC as "multi-Tgt Track" (Number.). The number is the number of targets the aircraft may attempt to lock-onto and/or maintain locked each game-turn.

Track-While-Scan Technology: An aircraft with track-while-scan technology does not lose contact with detected targets when it switches to tracking mode. It is also allowed to continue searching for new targets while maintaining or acquiring lock-ons.

Limited Track-While-Scan: An aircraft with parenthesis around its Track-While-Scan Technology indication has a Limited Track-While-Scan capability. It can maintain previous contacts while having a lock-on but may not search for new ones.

Look-Down Technology: An aircraft with Look Down Technology can ignore all Look Down Limitations and may guide look down capable missiles against targets in ground clutter conditions.

Limited Look Down: An aircraft with parenthesis around its Look-Down Technology indication has a Limited Look-Down capability. It may search for and lock-onto lower altitude targets within 2 to 10 levels of the ground if the difference in altitude between the target and the ground is more than the difference in altitude between the searcher and the target. They may also guide look down capable missiles against targets as above.

16.5 — RADAR VERTICAL LIMITS

Aircraft Nose Attitude. An aircraft radar arc is limited in its vertical arc as well as its horizontal arc. The Radar Vertical Limits Table defines the vertical limits to radar arcs in terms of allowed altitude differences between searcher and target based on searcher's flight profile for the game turn. The listed

UP limit is a factor used to determine the number of levels above the searcher the target can be for each hex away it is. The listed DOWN limit is a factor used to determine the number of levels below the searcher the target can be for each hex away it is.

For example, an aircraft in a zoom climb with a 180+ arc radar can search for or track higher targets up to 5 levels higher for each hex away they are ("x5"). It cannot search for lower targets as its Down limit is "x0" meaning the allowed down difference per hex of range the target is away is zero. Thus a target 10 hexes away could be as much as 50 levels above the searcher but not lower. The target could be at the same level.

16.6 — SPECIAL RADAR MODES

Boresight Radar Mode: Boresight mode slaves the radar to the gunsight. All aircraft can use boresight mode.

Procedure. Announce Boresight mode when the aircraft begins its flight. All previous contacts and lock-ons are lost. Normal radar search is not allowed. The aircraft's effective radar arc becomes a Limited arc (regardless of the aircraft's normal radar arc). In the Air Radar Search and Lock-On Phase, the closest visually sighted aircraft within a range equal to the radar's TRACKING strength in hexes in the limited arc is automatically detected. If two or more aircraft are equally close, randomly determine which is detected. Jamming has no effect on this detection. Boresight mode detection occurs even if the aircraft violated the normal radar use maneuver restrictions.

One Boresight Mode lock-on attempt is allowed against the detected target even if the aircraft violated the normal radar use maneuver restrictions. An aircraft without Look-Down Technology may use boresight mode to detect and lock-on to low level visually sighted targets. In this case, the automatic contact and lock-on attempt is allowed, and the lock-on can be maintained as long as the difference between target level and ground level is more than the searcher and target altitude level difference. The lock-on die roll is subject to a Boresight Look Down Modifier of -2.

Auto-Track Radar Mode. AutoTrack Radar mode allows an aircraft to automatically detect and then lock-on a target. Only aircraft with Auto-Track Technology may use this mode.

Procedure. Announce AutoTrack when the aircraft begins its flight. All previous contacts and lock-ons are lost. Normal radar search is not allowed. The aircraft's effective radar arc becomes the 180° arc (regardless of the aircraft's normal radar arc). In the Air Radar Search and Lock-On Phase, the closest aircraft within a range equal to the radar's SEARCH strength in hexes in the 180° arc is automatically detected.

One AutoTrack Mode lock-on attempt is allowed against the detected target even if the aircraft violated the normal radar use maneuver restrictions. AutoTrack will ignore all friendly aircraft with IFF on. A visually sighted enemy aircraft may be selected for detection and lock-on even if it was not the closest as long as it meets the range and 180° arc requirements.

16.7 — FORMATIONS AND RADAR DETECTION

Radar Searches. Enemy radar searches are done against the Close formation as a single entity. If the formation contains 3 or 4 aircraft, apply a modifier of -1. If radar contacted, all

aircraft in the close formation are contacted.

Radar Lock-ons. For air radar and SAM TTR lock-ons (see Chapter 25 for SAM rules), randomly determine which aircraft in the close formation is locked up. Exception: an aircraft radar of 120+ or 150+ arc ability with a search strength of 40 or more, or a SAM TTR of VF or MW frequency is powerful enough to distinguish individual aircraft in the formation and may choose which aircraft is locked up normally.

CHAPTER 17 — RADAR GUIDED MISSILES

There are three kinds of radar guided missiles in the game; BEAM-RIDERS (BRMs), RADAR-HOMERS (RHM), and ACTIVE-HOMERS (AHMs). Each will be discussed separately in the following sections.

17.1 — BEAM RIDING MISSILES

Beam riding was the earliest missile guidance method adopted for air warfare. The firer simply pointed a compact radar beam at the target, then fired a missile which flew along the beam until it hit something. While more effective than shot-gunning clusters of unguided rockets at lumbering bombers, beam riding missiles had serious limitations. Fighters could easily evade them by maneuvering out of the firer's radar beam. A sudden course change by the firer could even yank the beam away from the missile causing it to become unguided. The early radars used for BR guidance were susceptible to ECM jamming. Nevertheless, BRMs provided aircraft with the first all weather guided weapons and certainly increased the odds against a heavy bomber.

BRM Launch Prerequisites. In order to launch a BR type missile, the firer must:

- have a target in his limited radar arc (even if his normal radar arc is different).
- have a lock-on to the target unless SNAP-FIRING per advanced rule 17.6.

BRM Guidance Requirements. To successfully guide a BRM, the firing aircraft must ILLUMINATE the target (Rule 17.4) and maintain a lock-on until the missile hits, misses or is removed from play.

BRM Tracking Requirements. A BRM is removed from play at the end of any proportional move and/or game turn in which:

- it ends its move further away in terms of range from the target than when it started.
- it ends its move outside the guiding aircraft's limited radar arc.
- it ends its move with the target outside the missile's own 180+ arc.
- the firer fails to maintain lock-on and illumination.

17.2 — SEMI-ACTIVE RADAR HOMING MISSILES

Radar Homing (RH) was the next method developed for guiding missiles. Engineers soon figured out that by putting a radar receiver in the missile's nose, it could detect radar energy being bounced off the target by an illuminating radar

beam. This allowed the missile to guide itself to the target giving it greater maneuverability as it was no longer constrained to trying to stay within a guidance beam. So effective is radar homing that it remains the primary guidance method in use today.

RHM Launch Prerequisites. In order to launch an RHM, the firer must:

- have a target inside his normal radar arc, but not past his 150+ arc.
- have a lock-on to the target unless SNAP-FIRING per advanced rule 17.6.
- have the target between the missile's minimum firing range and no further than three times the launch aircraft's tracking strength in range.

RHM Guidance Requirements. To successfully guide an RHM, the firer must ILLUMINATE the target and maintain a lock-on until the missile hits, misses, or is removed from play.

RHM Tracking Requirements. An RH missile is removed from play at the end of any proportional move and/or game turn in which:

- it ends its move further from the target than when it started.
- it ends its move with the target outside the missile's own 150+ arcs.
- the firer fails to maintain lock-on and illumination.

17.3 — ACTIVE HOMING MISSILES

With the advent of miniaturized electronics, it became possible to build radars small enough to fit inside some missiles. With its own radar, the missile can theoretically guide itself to a target without any help from the firing aircraft. In reality, active homing is only possible at short ranges due to the small radar antenna in the missile. To utilize longer ranges, an AH missile must be guided like an RH one, or through mid-course guidance updates until it reaches active homing range.

AHM Launch Prerequisites. As for RHM's except the target may be further than three times the tracking strength in range away. That launch restriction does not apply to AHMs.

AHM Guidance Requirements. Different requirements apply depending on whether the missile has mid-course guidance capability (as indicated on the MDT under "MCG") or not.

- Normal AHM - As for RHM's until active homing range is reached.
- Mid-Course Guidance AHM - Only a lock-on needs to be maintained to the target. The firer does not have to illuminate the target.

AHM Tracking Requirements.

- Normal AHM - As for RH missiles until active homing range is reached.
- MCG Capable AHM - An MCG missile need only keep the firer in its 90 degree or less arc (in order to receive guidance signals in its rear antenna). The radar vertical limits table does not apply in this case. While in mid-course guidance, the AHM also does not have to keep the target in its 150+ arc.

Terminal Active Homing Phase. At the instant an AHM moves into active homing range and the target is in its 150+ arc, its own radar takes over. The firer is freed from the requirement to maintain lock-on and/or illuminate the target. When active, An AHM must end each proportional move and/or game turn no further away than when it started and with the target in its 150+ arc otherwise it is removed from play.

Multi-Target Track Technology Effects. If the firing aircraft has multi-target track capability and is using MCG capable AH missiles, it may:

- simultaneously guide MCG missiles at as many targets as it has lock-ons with.
- launch MCG missiles at different targets in the same game-turn. Still, no more than two missiles per turn may be launched as per normal rules.

17.4 — TARGET ILLUMINATION

Illuminating (or "painting") refers to directing a high power radar beam at a target.

Illumination Procedure. To illuminate, an aircraft must have a locked-on target in its radar arc. The act of illuminating is declared in the Aircraft Decisions Phase. Once declared, illumination is automatic and is maintained as long as the illuminator keeps the target in its regular radar arc (check at the end of each proportional move and/or game turn).

Limitations. An aircraft may only illuminate one target at a time. Only the aircraft which fired the missiles can illuminate a target for those same missiles. Even though only two missiles may be launched per turn, any number may be guided by an illuminating aircraft, thus additional missiles may be launched in later turns even if the first two have not yet reached the target.

Order Of Flight Effect. An illuminating aircraft has its order of flight modified so that it flies immediately after its target, even if it would have normally moved at another point in time, alternating proportional segments of flight with the target and guided missiles. The missiles and target move first, then the illuminator. This simulates the disadvantage of flying predictably while illuminating a target.

Note: Illuminating may be used to confuse or mislead an enemy. Anytime a missile is fired, even if only a heat seeking type, you may declare illumination and act as if you are guiding a radar missile.

17.5 — MISSILE SHOOT-OUTS

It often happens that opposing aircraft will fire and guide radar missiles at each other in the same game turn. In this case, a shoot-out occurs with both aircraft moving proportionally along with their missiles. Whomever's missile arrives first, attacks first unless some of each side's missiles can arrive in the same proportional move; in this case they all attack simultaneously.

Shoot-out Procedure. When a shoot-out situation occurs, each player secretly notes on paper whether he will engage his opponent's missiles or not; both reveal their choice in the Aircraft Decisions Phase. whoever engages, loses his lock-on and cannot illuminate and thus has his missiles removed from play. The other resolves missile guid-

ance and attack normally. If both engage, all missiles are removed, however both aircraft will still have to move in the engaged phase. If neither engaged, then a shoot-out occurs normally with both aircraft moving proportionally along with their missiles as described above.

17.6 — BRM, RHM, AHM COUNTERMEASURES

Chaff Decoys. Radar guided missiles are vulnerable to chaff just like IRMs are vulnerable to flares. Chaff may be dispensed manually or through a DDS program as described in Chapter 15 under IRM Countermeasures. Also see Chapter 19; Electronic Warfare.

Note: Expendable mini-jammers (introduced in the 1980s), function like chaff in the game but are superior against some missile types. See Chapter 19 for additional discussion.

Ground Clutter. Ground clutter affects radar guided missiles that attack targets close to the ground. If the target aircraft is within five altitude levels of the ground or less, and the illuminating or tracking aircraft which is guiding the missile is higher than the target, or if an active AH missile dives to attack a target (loses 2 or more levels in its move), a ground clutter modifier is applied to the hit die roll.

The modifier is determined first, by subtracting the target's altitude above the ground from six. Then subtract the missile's ECCM rating from the remainder. If the result is still positive, that is the die roll modifier.

You are now ready to play Training Scenario Four and all air combat only scenarios.

ADVANCED RULES

17.7.— SNAP-FIRING MISSILES

Snap-Firing allows BR, RH, and AH missiles to be launched even when a lock-on is not held against the target. Snap-firing is allowed if:

- the firer is using boresight or auto-track radar modes and;
- the target is in the firer's limited arc regardless of its normal radar arc.

Snap-fired missiles roll for launch with a +3 modifier as there is a possibility that they will be out of position to receive guidance signals when, and if, a lock-on is achieved to the target. If, in the immediately ensuing Air Radar phase, a lock-on is not achieved, the missiles are removed from play.

17.8 — RADAR MISSILE OUT OF ENVELOPE SHOTS

You may reduce the listed minimum range envelope of radar guided missiles by half (round up; i.e. half of 5 is 3) by accepting a +3 modifier to the launch roll.

You may extend the maximum range envelope of radar guided missiles to 4 times the radar's tracking strength by accepting a +3 modifier to the launch roll.

17.9 — AIM-26A Nuclear Falcon

The AIM-26A is a radar guided missile which incorporated a nuclear warhead.

Launch and Flight. In all respects, treat the AIM-26A as a regular RHM for launch and flight purposes.

Nuclear Attack. The AIM-26A has a nuclear blast zone exactly like the AIR-2 Genie. The AIM-26A detonates upon entering the target's position or upon the guiding player's command when within 3 hexes of the target. The blast zone affects the target aircraft and any others that have already moved in the turn of attack immediately. Other aircraft which move later in the turn, are attacked if they are still within the blast zone.

CHAPTER 18 — CREW QUALITY

This chapter details the effects of crew quality on aircraft operations. This entire chapter is an **ADVANCED RULE**.

18.1 — QUALITY LEVELS

Crew Quality. Pilots and other crewmembers are classified into one of four quality levels based on experience and training. These are:

- **Green:** A poor pilot/crewman due to lack of ability and/or incomplete training.
- **Novice:** A new pilot/crewman fresh out of normal training, a poor calibre regular, or a green starting to improve.
- **Regular:** An experienced pilot/crewman with good training who may or may not have seen combat, or an above average novice.
- **Veteran:** A well trained professional, possibly combat experienced pilot/crewman with superior skills (an older and wiser regular).

Crew quality, and any applicable attributes or characteristics are given in most scenarios. For general scenarios, or historical scenarios not providing aircrew information, use the Crew Generation Tables given in the play aids charts.

Aircrew Modifiers. The quality of a pilot/crewman in an aircraft may affect the die rolls for initiative, sighting, radar use, weapon launches, attacks, departed flight and recovery from departed flight. These actions and their associated die roll modifiers are summarized in the Aircrew Modifiers Table and other tables. In multi-crew aircraft, only the modifiers for the crewman that would logically be affecting or performing an action are used. The following are some guidelines:

Pilots affect:

- In flight: Initiative, departures, and recoveries.
- In combat: Gun attacks, visual bombing or rocket attacks, and IRM launches.

Crewmen affect:

- In combat: Guided weapon launches and attacks, radar bombing, and radar guided missile launches.
- For radar work: Radar searches and lock-ons.

Both pilots and crewmen affect:

- Sighting attempts as described in Chapter 11.

18.2 — AIRCREW FLIGHT RESTRICTIONS

Green and novice pilots are restricted in performing certain flight actions as follows:

Green Pilots. A Green pilot is extremely inexperienced and may not:

- perform ET (Emergency Turns) or Snap Turns.
- fly at Terrain level.
- use VIFF maneuvers or use VTOL flight.
- engage attacking missiles.
- attempt Vertical Reverse maneuvers.
- use High Pitch Rate capabilities of an aircraft.

A Green pilot risks **disorientation** if he:

- performs a rolling maneuver.
- performs Vertical Climbs or Vertical Dives.

A Green pilot receives a minus 2 die roll modifier when checking for **GLOC**.

Novice Pilots. A Novice pilot may not:

- attempt Vertical Reverse maneuvers.
- use High Pitch Rate capabilities of an aircraft.

A Novice pilot risks **disorientation** if he performs a Vertical rolling maneuver.

A Novice pilot receives minus 1 die roll modifier when checking for **GLOC**.

Regular and veteran aircrew are not restricted.

Note: Always check for disorientation immediately after a risky maneuver is performed, and/or at the end of the game turn if a risky flight type was attempted. Disorientation and its affects are described in chapter 30.

Crew Quality and Damage Control. Green pilots may not normally do damage control. Novice pilots must spend two consecutive game turns applying damage control to stop progressive damage.

In multi-crew aircraft, a regular or veteran crewman can compensate for a green pilot, allowing damage control to be done as if by novices. Likewise, they can compensate for a novice pilot allowing damage control to be done normally.

18.3 — AIRCREW ATTRIBUTES AND SPECIAL CHARACTERISTICS

Attributes of aircrew that can affect play are eyesight, fitness, and confidence. If not given in the scenarios, attributes are rolled for on the Crew Attributes Table.

- Eyesight affects visual sighting die rolls.
- Fitness affects GLOC and Post-Egress Fate rolls.
- Confidence affects initiative, departure recovery, and disorientation die rolls.

Special Pilot/Crew Characteristics Pilots and crew may have some of the following characteristics which benefit them in play. They are:

1) COMBAT HERO. This represents an ace or a highly decorated pilot/crewman who has been distinguished in combat. Combat Heroes get beneficial modifiers to the die rolls for combat and initiative due to their proven skills.

If a combat hero is leading a formation, all other nonhero crews in his formation have their initiative die roll increased by one. If shot down, a combat hero is worth more points to the other side. Also, anytime a combat hero is shot down, all nonhero crews in his formation (whether he was leading or not) immediately have their initiative rolls reduced by one.

2) TACTICS MASTERS. This is indicative of aircrew that have attended special schools such as the USAF and USN fighter weapons schools (Top Gun for example) or who have been members of the highly trained adversary squadrons. It also represents those rare gifted aircrew from any country that successfully grasp all the essentials of air combat. In the Warsaw Pact air forces, veterans who have achieved the rating of "Sniper Pilots" would be similarly skilled.

3) SIERRA HOTEL (Shit-Hot) Pilots. These individuals have the highest levels of confidence and skills in flying due to pure natural ability and/or relentless determined practice. Alternately called "Top-Guns", "Super-sticks", "Honchos", etc., these pilots get a special benefit of having their position of advantage raised one level for purposes of determining order of movement. That is, if they were disadvantaged, they would be considered non-disadvantaged and so on. An advantaged S.H. pilot is not increased to an unspotted one but would move after all other advantaged aircraft.

18.4 — FORMATION LEADER CONSIDERATIONS

Pilot Quality. A section or division leader must be of Regular or better quality. Aircraft with at least one veteran in the crew do not suffer the initiative penalty for not being in formation. Green pilots must always begin a general scenario game as a member of a close formation.

18.5 — CAMPAIGNS AND CREW EXPERIENCE

Players may wish to simulate a campaign wherein a group of pilots and crew are created using the Generation Tables, and their combat careers are tracked from game to game. These aircrew would have the opportunity to increase in quality based on accumulated experience.

Aircrew Quality Improvement. Pilots and crewmen may improve in quality or gain special characteristics after participating in a number of combat missions and/or gaining air to air kills and then successfully rolling the die for improvement. The improvement is rolled for at the end of each game after the minimum required amount of experience is garnered. If an aircrew does not improve after one game, he may roll again after the next and so on (some people take longer to absorb the lessons of combat).

To be considered a "combat" mission, the aircrew in question must have been engaged in offensive and/or defensive actions against opposing forces. "Milk-runs", or attacks against undefended targets do not count as a combat mission.

Minimum Requirements For Improvement:

- **Green to Novice:** After three combat missions or the gaining of one or more air to air kills - On a roll of 8 or less.

- **Novice to Regular:** After five combat missions as a Novice or the gaining of one or more air to air kills as a Novice - On a roll of 6 or less.

- **Regular to Veteran:** After five combat missions as a Regular or the gaining of one or more air to air kills as a regular - On a roll of 4 or less.

- **Combat Hero (ACE):** After gaining five or more air to air kills - on a roll of 9 or less.

- **Combat Hero (Decorated):** Upon rolling a 2 or less after any single game in which the players collectively feel the crew in question performed in such an extraordinary manner as to be deserving of medals. This is vague I know, but it usually is in real life too.

- **Tactics Master:** Upon improving to Regular or Veteran quality and rolling a two or less. This is a one-time roll at each stage and if missed after veteran status, it is never achieved.

- **Sierra Hotel:** Upon improving in quality to any level and rolling a one on the die. As above, this is a one-time roll at each level.

Attributes: Eyesight and Fitness never change during the course of a campaign, however, confidence can go up or down as follows:

- Confidence increases one level each time the aircrew improves in quality or gains an air to air kill.

- Confidence decreases one level each time the aircrew is shot down or their aircraft is damaged to the crippled state. The maximum is excellent confidence and the minimum is poor confidence.

Victory Points For Aircrew Losses. In campaign games, V.P.s are awarded to the opposing side for capturing or killing aircrew. An aircrew loss occurs when an aircraft is shot down or destroyed and the crew does not successfully bail out or eject, or if the Post-Egress Fate is to be captured. The Aircrew V.P.s Table indicates the values for lost aircrew.

18.6 — EJECTIONS AND BAILOUTS

In a campaign it is important to know if aircrew survive unfortunate incidents like being shot down and what happens to them after the shutdown.

Egressing Doomed Aircraft. Pilots and crew will automatically attempt to eject or, if not ejection seat equipped, bail out from destroyed aircraft the instant the kill occurs. They may also elect to abandon undamaged or damaged aircraft at any point in the game-turn (unless GLOC'd) during the aircraft's movement by simply declaring it. Once declared and after any proportional moves and/or attacks by pursuing missiles are resolved, the egress attempt is rolled for. Only one attempt per game-turn is allowed.

Egress Procedure. Roll one die for each pilot or crewman ejecting/bailing out and consult the Egress Success Table. If the result, after applying any required modifiers is less than or equal to the number given, the aircrew successfully eject/bailout. If the attempt fails in an undamaged or damaged aircraft, the aircrew may, if possible still try to fly the aircraft home.

If an egress attempt fails in a destroyed aircraft, the aircrew is killed.

Ball Out Restrictions. Bailing out of an aircraft is only allowed if the aircraft is or was at a speed of four or less, and if bailing out of a destroyed aircraft, only if it was four or more levels above the ground.

Post-Egress Fate. Due to the short time frame of most campaign scenarios or games, the fate of ejected or bailed out crew must be determined in order to see if they can be returned to combat. Once aircrew successfully egress, roll the die at the end of the game to see what their fate is on the Post-Egress Fate Table. Apply any required modifiers and read the result.

An aircrew will end up either MIA (missing in action) or as a POW (prisoner of war) or be RESCUED. An MIA aircrew is lost forever (drowned at sea or died on the ground or died in prison). A POW will be repatriated alive after the war ends but is out of the campaign game. Rescued aircrew may be able to re-enter the campaign. Roll one die, the result is the number of campaign days, that aircrew will miss due to injury or rescue delays. After missing the required number of days, the aircrew can be put back on the roster and resume flying missions.

CHAPTER 19 — ELECTRONIC WARFARE

This chapter details the procedures for electronic warfare, including jamming and deception. This entire Chapter is an **ADVANCED RULE**.

Because modern aircraft are highly dependent on electronic equipment such as radar, they are extremely susceptible to deceptive or disruptive signals. Electronic warfare makes use of such signals to mislead or blind enemy electronics.

ECM Pods. Aircraft may mount ECM pods on any station capable of carrying EP stores. ECM pods can provide an aircraft with DDS capability and Jammer capability if it does not already have any or improve upon what it has.

Internal ECM. ECM gear may be internally installed in the aircraft and is noted in the ECM section of the ADC. ECM gear is rated in its effectiveness by a letter codes of A or higher. An A indicates an early first generation system; other letters indicate increasing levels of sophistication and capability. The ECM section of the ADC indicates what internal ECM is normally carried by an aircraft. The effects of each type of equipment is detailed below.

19.1 — IDENTIFICATION FRIEND OR FOE (IFF)

An aircraft's IFF, when turned on, allows other friendly radar equipped aircraft and ground units to automatically identify it as a friendly. Also, when the IFF is on, all friendly radars automatically detect the aircraft when it is in their detection range and arc since IFF acts like a transponder.

This characteristic also helps the enemy. Any enemy radar searching or attempting lock-on against an aircraft equipped with operating IFF receives a modifier of minus 2 on the detect and the lock-on die rolls.

Because of the above, IFF is normally turned off when heading into enemy territory, and turned on when returning to

friendly territory or when engaged in a multiple aircraft battle. Friendly radar equipped units will not make mistaken attacks against an aircraft with an operating IFF. If IFF is off, the scenario will state what actions each side might take against unidentified friendly aircraft.

19.2 — DECOY DISPENSER SYSTEMS (DDS)

An aircraft equipped with DDS may dispense expendable decoys automatically or manually. A decoy (as used in the game) actually represents a cluster of 2 to 4 actual expendable decoys being dispensed.

Internal DDS. Internal DDS installations are identified on the ADC. Four types of internal DDS are available: A, B, C, D. The Internal DDS Table shows the possible loads of decoys available for an internal DDS but typically they are capable of holding between sixteen and twenty clusters of decoys.

External DDS. External DDS pods are identified on the External Pod Table, which shows the possible loads of decoys available.

Types of Decoys. Three types of decoys are available: flares (FL), chaff (CH), and jammers (JM).

DDS Programs. An aircraft may use automatic programs which provide continuous protection by dispensing decoys throughout a game turn. A program is declared as ON or OFF during the Aircraft Decisions Phase. When on, the program will provide a LEVEL of protection of from 1 to 6 depending on its design. This is the aircraft's PPL (Program Protection Level). A PPL is in effect from the time the program is turned on until it is changed, turned off, or available decoys are exhausted. A PPL number represents both the level of protection and the number of decoys dispensed in a game-turn when the program is on.

DDS Program Design. A DDS program design is noted on paper in the following format (in PPL numbers): Chaff / Flare / Mini-Jammer. The decoy program need not be symmetric; meaning the PPL for each type of decoy carried need not be the same. For example, 4/2/3 is a DDS program calling for 4 Chaff, 2 Flares, and 3 Mini-Jammers to be dispensed each turn providing a 4/2/3 level of protection.

When the decoys in the DDS run low and the remaining quantity of decoys is less than the PPL number called for, the PPL is reduced to equal the quantity of decoys remaining.

Decoy PPL Effects. The various EW tables detail the specific effects or die roll modifiers PPLs produce. The following is a summary:

- **Chaff PPL** may break BR and CG TTR lock-ons, may cause modifiers to RHM, AHM, and CG/CW SAM attacks, may break air to air radar lock-ons, or may spoof AAA radars.

- **Flare PPL** may cause modifiers to IRM and IR SAM launch attempts, may cause modifiers to IRM and IR SAM attacks, may break OG/LG SAM lock-ons.

- **Mini-Jammer PPL** may break CG, CW and TVM type TTR lock-ons, may cause modifiers to RHM, CG, CW and TVM SAM attacks, may break air to air radar lock-ons.

19.3 — RADAR WARNING RECEIVERS (RWR)

Radar Warning Receivers are designed to alert aircraft to hostile radar emissions and missile guidance signals. An aircraft's RWR, if any, is listed in the ECM section of the ADC. As for DDS, RWRs are classified as A, B, C, and D systems.

RWR Capabilities. The RWR Table lists ground unit radars (according to the frequency they use) and air radars (by modes) and indicates if that frequency or mode is detectable to each type of RWR.

RWR Benefits Against Radar Equipped Units. All RWRs have the ability to indicate the relative direction of incoming radar strobes. Thus, if an aircraft with an RWR is searched for and/or locked onto by a detectable radar equipped enemy aircraft or ground unit, that aircraft receives a -1 to any visual sighting rolls made against those radar equipped units.

RWR Benefits Against Missiles. If a SAM TTR, air radar illumination, or AHM active radar is detectable by the RWR, any missiles directed by those radars may be defensively engaged without being visually spotted.

RWR Benefits Against AAA Guns. If an AAA FCR (fire control radar) is detectable by the RWR, the aircraft may manually deploy 1 or 2 Chaff decoys (if so equipped) each time the FCR-equipped AAA unit fires at it. Roll one die, on a roll equal to or less than the number of chaff dropped, the FCR is "spoofed" and may not add in its hit modifier. Deploying chaff cancels any air-to-ground aiming the aircraft may have accomplished up to that point (the pilot was distracted).

Increased PPL Effectiveness. Due to the sophisticated logic interfaces of late 1980s and 1990s EW systems, DDS-C or DDS-D, when used with RWR-C or RWR-D have increased PPL effectiveness as follows:

- When a PPL is in effect against radar systems or missiles which are detectable to RWR-C or RWR-D, the selected PPL level is increased by +1 unless it was 0 to begin with. Decoy use is not increased, just the effective PPL number.

RWR Special Capabilities. RWR-A and RWR-B only indicate the general type of radar and frequency being used against an aircraft (i.e. CG SAM TTR, low freq.). RWR-C and RWR-D tells the crew the exact threat being employed against them (i.e. SA-11 SAM missile lock-on and launch). RWR-C and RWR-D can detect launches of CG and CW SAMs even when launched under OG.

RWRs Versus Hidden Units. If hidden initial ground forces are in use, a player using radars must reveal to the player with the RWR-equipped aircraft the angle-off arc in which the radar energy was detected.

If equipped with RWR-D, the radar player must also reveal the megahex in which the radar is located. The aircraft may then attempt to determine the exact hex on a die roll of 3 or less. If successful, the hidden unit is revealed and placed on the game map. If not found initially, the aircraft may (if the radar continues to operate) roll again in the SAM interaction phase of subsequent game-turns to locate the radar. A cumulative modifier of -3 per game-turn after the turn of initial detection applies.

19.4 — RADAR JAMMING

An aircraft may carry internal radar jammers or carry radar jamming pods to degrade the capabilities of enemy radars. There are three types of jammers: Barrage Jammers, Active Jammers, and Deceptive Jammers. Some ECM pods have multiple jammer capabilities and if so, all characteristics may be used simultaneously. The exact mode and frequency jamming capabilities of the various pods is listed in the external stores tables.

19.4.1 — BARRAGE JAMMERS (BJMs)

A Barrage Jammer floods enemy radar scopes with continuous noise to render them useless. This is the earliest type of jamming; it is countered by the use of home-on-jam missiles.

A barrage jammer has two modes: **Noise** and **Stand-Off**. The ability of an aircraft to switch between selected modes and jamming frequencies varies with the type of jammer and crew (pilot only or multi-crew) as detailed in the EW charts and EP tables.

- **Noise Mode.** The aircraft sends jamming signals into its allowed angle-off arcs. Any air or ground radar operating in the jammed frequency, located in the jammed arcs, and searching or attempting lock-ons against friendly aircraft also in those arcs (including the jammer) will be degraded.

Subtract the ECCM rating of the jammed radar from the barrage jammer rating and apply any positive results as a die roll modifier for any search, passdowns, and/or lock-on attempts by the radar.

- **Stand-Off Mode.** Instead of flooding an arc with noise, the BJM can be focused on particular enemy radars in a concentrated jamming attack. A successfully jammed radar is blind and may not search, lock-on, or guide radar missiles. Stand off jamming does not otherwise protect other aircraft. The EW tables indicate how many stand off attacks can be made by a single jammer and the die roll required for success. A radar's ECCM acts as a modifier against the jamming roll.

Barrage jammers making noise or doing stand off attacks are vulnerable to HOJ (home on jam) missiles which may be fired at them without the usual necessary lock-on and guidance signals since the missile flies up the jamming beam to the aircraft.

19.4.2 ACTIVE JAMMERS (AJMs)

These self-protection jammers confuse enemy radars by copying their signals and sending back false and/or additional misplaced radar echoes. This makes it harder for the enemy radar to find and lock-on to the real aircraft among false blips. Most active jammers only function in response to a radar pulse and thus do not provide a continuous beam for home on jam missiles to guide on. An AJM protects only the aircraft equipped with it, only from radars operating in the aircraft's protected arcs, and only against radars operating in a jamnable frequency. If an aircraft has both internal and podded AJMs, only the most effective AJM in the given frequency is used.

Subtract the ECCM rating of the jammed radar from the barrage jammer rating and apply it as a die roll modifier for any search, passdowns, and/or lock-on attempts by the radar.

19.4.3 DECEPTIVE JAMMERS (DJMs)

A Deceptive Jammer breaks radar lock-ons by shifting the radar beam off the intended target through sophisticated manipulation of the radar's signals. False timing of the radar returns gives the lock-on beam a perceived angular error and when it shifts to recenter the target, it actually shifts off the target losing its lock-on.

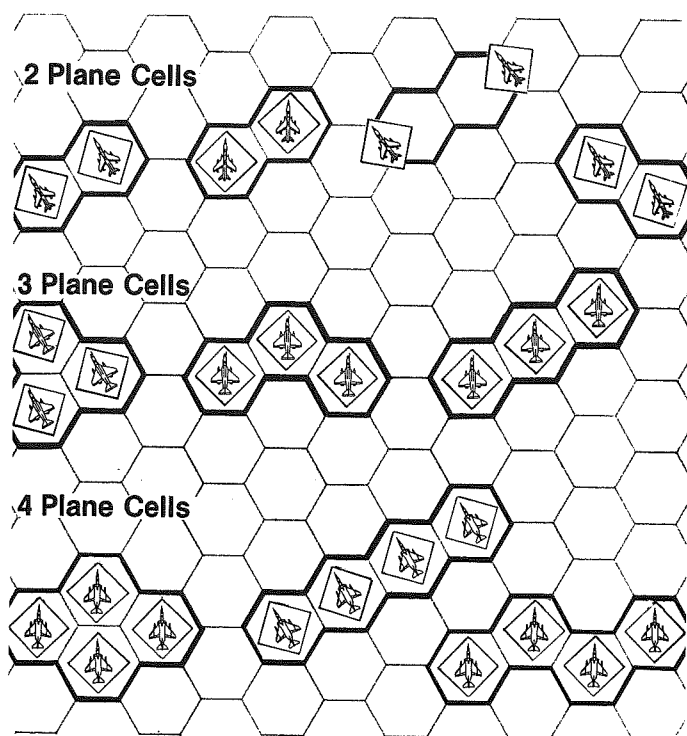
When an air radar or TTR lock-on is achieved against an aircraft, Deceptive Jammers come into play to break the lock. When a radar controlled AAA gun fires at an aircraft, a DJM may act to spoof the FCR adding adverse to hit modifiers.

Refer to the RWR/DJM coverage table to see if a DJM is effective against particular radars. If so, take the DJM's numerical self protection rating and subtract the radar's ECCM rating from it. If the result is positive, this is the number or less that must be rolled on one die to break the lock-on. DJMs also provide modifiers to radar guided missile attacks as detailed in the EW tables. If an aircraft has both podded and internal DJMs, only the most effective one in the given frequency is used.

19.5 — JAMMING CELL FORMATIONS

Jamming Cells. Two, three or four aircraft with identical BJMs, AJMs, or DJMs may fly in a "Jamming Cell" formation to get enhanced protection. Any time aircraft with identical jammers are positioned as illustrated in the jamming cell diagram, the effective rating of their jammers is increased as indicated in the diagrams.

JAMMING CELL FORMATIONS



CHAPTER 20 — GROUND TERRAIN AND TERRAIN FOLLOWING FLIGHT

This chapter details the effects of terrain features on aircraft operations. As an aircraft approaches the ground, it must take into account terrain elevation and terrain features and how they may interfere with flight and combat.

20.1 — GROUND TERRAIN

Terrain Elevation. Terrain occurs in, and is mapped in, levels. Each level represents an increase of 1000 feet of altitude (one altitude level). Each terrain level is defined by a solid contour line and a solid color printed over the entire area. The lightest color is the lowest level of terrain; terrain increases in level as the terrain color darkens.

An aircraft crossing a contour line or diving or descending to an altitude equal or less than that of the terrain in the hex it is in impacts the ground and is destroyed killing its crew. Exception; an aircraft may fly at ground level in Terrain Following flight.

Ridgelines or hills within a terrain level which rise less than a full altitude level are shown by a dashed contour line. Ridgelines and hills are obstacles to Terrain Following Flight.

Ground Level Altitude. The lowest level of altitude is Ground Level. On an unfeatured game map, ground level is altitude level 0. If terrain elevation is present on the map, ground level becomes equal to the elevation of the terrain in the hex.

Terrain Features. A map key is provided for all maps which have features. Terrain features, contours, and elevations apply exactly where they are printed on the maps. Terrain altitude only affects an aircraft if its flight path takes it across a contour line or terrain feature.

For the purpose of applying this rule, an aircraft in a hex is located in the exact center of the hex and an aircraft on a hexside is at the midpoint of the hexside. If aircraft are flying in a Close formation, they are evenly spaced about the centerpoints.

Terrain Effects Chart: The Terrain Effects Chart details the specific types of terrain and their effects on units on the ground. Terrain may affect the degree of camouflage of units, and may affect defensive abilities.

20.2 — TERRAIN FOLLOWING FLIGHT

An aircraft flying very near the ground may enter Terrain Following Flight (TFF). TFF represents flying at an altitude of less than 500 feet above the ground (usually 75 to 200 feet depending on size and speed of the aircraft).

Any aircraft may use TFF in daylight conditions. An aircraft with Terrain Following technology may use TFF at night or in Adverse Weather.

Entering and Exiting TFF. An aircraft may enter or exit TFF only once per game turn. To enter TFF, an aircraft must have begun the game turn in Level Flight and no more than one altitude level above the ground. At any point in the game

turn (while still in Level Flight), it may announce Entering TFF and descend to terrain level (at no cost in VFPs or Decel points).

To exit TFF, an aircraft must declare Exiting TFF. The act of exiting may be declared at any point in the aircraft's flight and costs no FPs. The aircraft rises to the level above Terrain level. An aircraft may remain in TFF from turn to turn. It may enter and exit TFF within a single turn but the opposite is not true: if it started the turn in TFF and then exited TFF, it may not return to TFF until the following game turn.

Contour Following. Although TFF is a form of level flight, an aircraft may change altitude while following rising or falling terrain contours. Changing altitude with rising or falling terrain is a form of climbing and diving while in T-level flight and like actual climbs and dives, only one or the other may be performed in a game turn.

Restrictions. Contour Following is conducted as follows:

- If the terrain drops 1 level in a hex, the aircraft drops with the terrain and receives 0.5 accel points. An aircraft may do this any number of times in a game turn.
- If the terrain drops 2+ levels in a hex, the aircraft must exit TFF. It may use diving flight to stay within 1 level of the ground.
- If the terrain rises 1 level in a hex, the aircraft rises with terrain and receives 1 decel point. An aircraft may do this any number of times in a game turn.
- If terrain rises 2+ levels in a single hex, the aircraft must avoid the obstacle, or exit TFF before entering this hex. If it intends to cross the rise it must climb to one level above the terrain before entering the hex.
- If the terrain contains a ridgeline, or is a built up area, the aircraft must exit TFF prior to entering the terrain hex.

An aircraft attempting to cross a ridge, or built-up area while in TFF crashes. An aircraft following falling contours which attempts to cross a rising contour in the same gameturn crashes. An aircraft entering a terrain hex that rises more than one level while in T-level flight crashes.

TFF Restrictions. An aircraft in TFF may not:

- Perform any rolling maneuvers.
- Declare or perform damage control.
- Use ET turn rates.
- Engage missiles.
- Laser designate targets.
- Use radar (if pilot only).
- Guide RG weapons.
- Padlock enemy aircraft in the sighting phase.
- Sight ground units or targets more than 12 hexes away unless they are on visible terrain higher than the TFF aircraft.
- Launch missiles.

TFF Benefits. An aircraft in TFF receives the following benefits:

- Attacking air to air missiles apply a modifier of +1 to the To Hit roll (in addition to modifiers for ground clutter).
- A SAM with a minimum altitude ability of greater than T may not track or be guided at an aircraft in TFF. Some

T-capable SAMs have die roll modifiers when engaging TFF aircraft.

- A ground unit cannot see TFF aircraft more than 12 hexes away unless they are on higher terrain.

- Regular Early Warning Radar cannot detect or track TFF aircraft.

- MTI Early Warning Radar can detect a TFF aircraft within 20 hexes (if at the same altitude) or within 60 hexes (if the radar is at a higher altitude, on higher terrain or on a tower or ship's mast).

CHAPTER 21 — AIR TO GROUND COMBAT

This chapter discusses ground and naval units and how they are targets of air attacks. Ground units range from army troops and vehicles, to anti-aircraft gun and missile sites, to ships at sea. Fourteen types of ground units and various naval units are identified by these rules. The specific types are shown in the Ground Units Table below.

21.1 — GROUND UNIT COUNTERS

Each ground unit counter or marker is printed with information which helps players identify it and its functions. The Ground Unit Identification Chart in the play aides shows the information format for each type of unit. The uses of the information are addressed in the individual rules.

Terrain. It may prove necessary to identify the type of terrain a ground unit is in. Each land unit is in the terrain type that covers the largest fraction of a hex. Naval units are always on water. The different terrain types can be identified from the TerrainEffects Chart.

Ground Units Table

Unit	Size	Description
Infantry	Platoon	Thirty to fifty soldiers.
Armor	Platoon	Three to five armored vehicles.
Artillery	Battery	Three to six guns with crews.
Inf. SAM	Section	Four to eight soldiers with one or more shoulder-fired SAMs.
SAM	Battery	A grouping of SAM launchers with a tracking radar or optical system.
Mob. SAM	Section	One or two vehicle-mounted SAMs with radar or optical systems.
FAC	Section	A forward air control team with two vehicles and radios.
AAA	Battery	Three to six antiaircraft guns.
Mob. AAA	Section	Two AAA guns mounted on vehicles.
Transport	Platoon	Four to six Trucks.
Radar	Platoon	One or more radars providing early warning (EWR), fire control (FCR), or target tracking (TTR) functions.
CCU	HQ	A Command and Control Unit that coordinates air defense activities.
Mobile CCU	HQ	A CCU mounted on vehicles.
Dummy Site	NA	A dummy marker indistinguishable (on its front) from a real unit.
Small Ships	One Vessel	A barge, gunboat, patrol-craft or similar small ship.

Navy ship	One Vessel	A frigate, cruiser, or standard merchant sized ship.
Capital	One Vessel	A battleship, carrier, or supertanker sized ship.

Ground Unit Movement. The scale of the game turn used when aircraft are in play is such that ground units will not normally move more than one or two hexes during an entire game. The scenario will specify if, when and how often ground units may move (always one hex at a time).

Ground Unit to Ground unit Combat. Some scenarios may involve ground units fighting each other. If this is the case, the scenario will specify if, when and how often ground units may fire on one another. The following are the rules for conducting ground unit combat.

- Each eligible unit may attack once during a turn of combat. The attack may be directed at any one enemy unit in its line of sight within a range of 3 hexes. (exception, artillery does not require a line of sight and has a range of 6).

- Combat is considered to occur simultaneously, and results are not implemented until all units have fired.

- Only infantry platoons, armored vehicle platoons, artillery and Lt. or Med. AAA units are allowed to fire in ground combat. Any unit may be attacked.

- Ground combat is resolved on the Air-To-Ground Attack Table. Suppression results are ignored. Each unit fires individually using its Final Attack Strength (FAS). Units may not combine their fire into a single attack, however, any number of units may fire on a single enemy in a combat turn.

- The FAS of a ground unit is equal to its unmodified defense strength. Attacked units use their defense strength modified normally by terrain or other factors.

- Ground combat die rolls have the following modifiers:

- Armor firing = -1
- Per hex of range over one = +1
- Same hex attack = -2

Note: Case b) does not apply to artillery.

Note: Naval vessels will have any necessary combat rules given for them in the scenarios. This game system will not normally address ship to ship combat.

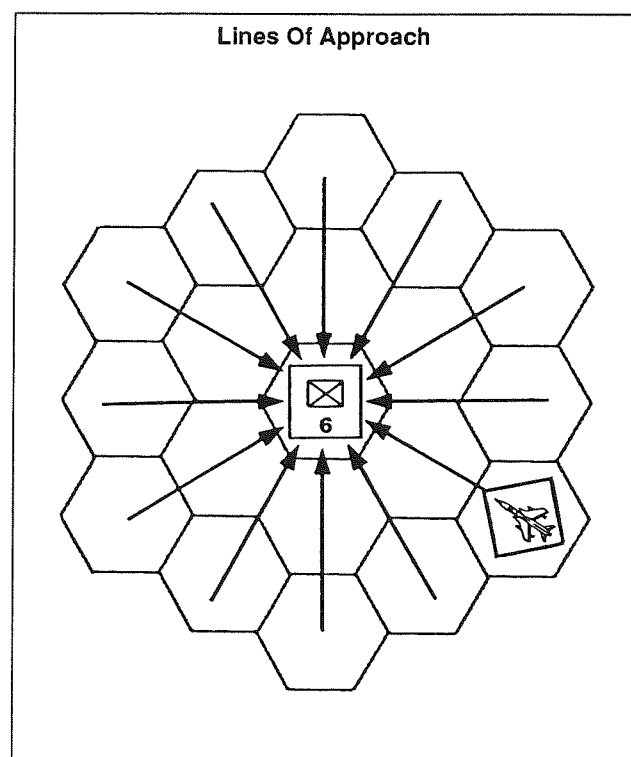
21.2 — ATTACKING GROUND UNITS

Aircraft may attack ground units with guns, air to ground rockets, bombs, or air to surface missiles.

Attack Parameters. To perform an air to ground attack, an aircraft must:

- be on a *line of approach* (LOA) to the target,
- accomplish *aiming*,
- and reach a valid *release point* on that LOA for the kind of ordnance being employed.

Line of Approach. An aircraft is on a line of approach to a target hex if a line extended forward along the aircraft's flightpath passes through the center of the hex containing the target. The line of approach diagram below and in the play aids illustrates this concept.



Aiming. An aircraft aims its weapons by approaching a sighted target along an LOA in level or diving flight. It must maintain its approach for a specified period of time expressed in terms of FPs expended in flight while on the LOA. The Aiming Time Table shows the time required (which depends on the type of bombsight used).

Aiming Table

Bombsight Type	Minimum Aiming (in FPs)
Manual	2/3 aircraft's speed (round down).
Ballistic	1/2 aircraft's speed (round down).
Computed	1/3 aircraft's speed (round down).
Advanced	1/3 aircraft's speed (round down).

- Minimum aiming is at least 1 FP while on an LOA.
- If full aiming not accomplished, apply a modifier of +3 to the attack die roll.
- If full aiming is accomplished, apply the bombsight modifier from the aircraft's ADC.

Aiming Limits. A minimum of one FP must be expended while aiming to make any kind of ground attack. Aircraft that attack without completing aiming for the type of sight they have, suffer a +3 modifier to their die roll on the Air-To-Ground Attack Table. Aiming must be done while wings level. FPs expended for aiming cannot be used a prep-moves or counted toward turning. Beginning to aim aborts any turns or maneuvers in progress.

Aiming Duration. Aiming at a target may be continued from game turn to game turn. Beneficial modifiers apply for tracking time above and beyond the minimum required by the aircraft sights. Once an attack is executed, all aiming modifiers accrued up to that time are lost, and subsequent attacks (even against the same target) require that startover.

Release Points. Release point charts are provided in the play aids for Level bombing, dive bombing and rocketry. There are two columns in each of the bombing charts; one for high drag weapons and one for low drag weapons.

The proper release point for the type of attack in progress is determined by cross indexing the horizontal range from the target with the type of attack. The result will be a range of altitude levels. The attacking aircraft must be at one of those levels at that distance from the target to be at a proper release point. Attacks made from other than a proper release point automatically miss.

Attack Procedure. An attack may be declared after the expenditure of any FP while in the appropriate attack parameters, assuming minimal aiming was accomplished.

Attack Restrictions. An aircraft may make only one ground attack per game turn. An attack normally affects only the target of the attack even if other units are in the same hex.

An aircraft may not make an air to air gun attack against enemy aircraft in the same game turn in which it makes an air to ground attack. When an aircraft makes a ground attack it may not launch air to air missiles or do air radar searches or attempt lock-ons in that same game-turn.

Attack Resolution. Ground attacks are resolved using a final attack strength (FAS) for the weapons used and the Air To Ground Attack Table as follows:

- Determine the FAS involved using the FAS Calculation Chart which is based on the number of weapons dropped or fired in the attack and their listed attack strengths.

- Compare the FAS to the Target Defense Strength (TDS) to create an attack ratio (FAS: TDS). This ratio is then rounded down to one of the ratios on the Air To Ground Attack Table.

- Roll the die and modify as required. At the intersection of the ratio column and the modified die roll row is an attack result, which is implemented against the target.

FAS Example: The FAS of cluster bombs is the sum of the dropped bomb's individual attack strengths. Four weapons released at once, each with an attack strength of 4.0, would provide an FAS of sixteen. If the target's defense strength were five; The FAS: TDS ratio would be three to one (3:1) and the die would be rolled referencing the 3:1 column of the Air to Ground Attack Table.

Combat Results. There are five possible results of any ground attack, these are:

- "-": No effect, the target survives unscathed or with insignificant damage.

- "S": Suppressed, the target takes cover and may not function, move or attack aircraft for the rest of the current game turn and through the following game turn. Place a "Suppression" marker on them immediately. At the end of the current turn, flip the marker to the "Suppression Removal" side. At the end of the following game-turn, remove the marker.

- "D": Target is damaged and suppressed. Place a hit marker and a suppression marker on the target. This

represents about a third of the unit's men, vehicles, and/or guns being put out of action. Damage is permanent. Damaged units may resume functioning when unsuppressed. Being damaged imposes modifiers to units firing on aircraft and may impose other restrictions on the unit. When a ground unit or target takes a total of three hits, it is eliminated.

- "2D": Target is damaged twice. The target is damaged to the equivalent of two hits and suppressed as above. If it was already damaged from before, it would now be eliminated.

- "K": Killed, the target is destroyed outright.

Exceptions: Any ground unit or target marker with an asterisk by its defense strength is eliminated after only two hits.

Ground Attack Modifiers. The following is a summary of the most commonly required die roll modifiers:

- Range to target: Use the modifier listed on the release point chart next to the release point used.
- Bombsights: If aiming was completed, use the bombsight modifier listed on the ADC. If not completed, a +3 modifier applies to the attack.
- Damage to Attacker: +1 if attacker "L" damaged, +2 if "H" damaged, +3 if "C" damaged.
- Tracking Time: For each 1/3rd of an aircraft's speed in FPs expended as additional aiming beyond the minimum required, a -1 is applied. Up to a maximum of -3 may be accrued by extra aiming.

All these, and other modifiers explained in later rules are summarized in the Ground Attack Modifiers Table. All modifiers are cumulative.

Terrain Effects. Targets in certain terrain may have their defense strengths modified or cause modifiers to be applied to the attack roll of an aircraft as indicated on the terrain effects chart. Targets in entrenchments have their defense strengths doubled and targets in bunkers have their defense strength quadrupled.

Target Type Effects. Targets are also classified as being SOFT or HARD. Any ground unit or target with an underlined defense strength is considered to be a HARD target (armored). All weapons have an attack strength for each type of target. Use the appropriate attack strength listed for each type of target in the external stores tables for each type of weapon.

ADVANCED RULES

21.3 — COLLATERAL DAMAGE

Multiple Targets. If more than one possible ground target is in a hex under attack, the attacker must specify the actual target being aimed at. This becomes the primary target, all others are secondary targets. Secondary targets are subject to possible damage from attacks on the primary one.

A primary target is attacked normally. Secondary targets are attacked using one-third or two-thirds (depending on the type of weapons used as indicated on the FAS computation table) of the FAS applied to the primary target (adjusted for soft/hard target types). Roll separately for each attack on secondary

targets and apply a +3 modifier. No other modifier applies to attacks on a secondary target.

21.4 — FORMATION EFFECTS ON GROUND ATTACKS

Combat Restrictions. The formation leader is not restricted. Wingmen in close formation are restricted as follows;

- A pilot only aircraft may not make any air to ground attacks unless performing Formation Bombing / Rocket Attacks.
- In multi-crew aircraft; If a weapons officer is present, the aircraft may do air to ground attacks using BB, BG, BS, ARM, ASM, RS, or RG weapons.

Aircraft that begin the turn as wingmen but intend to detach may participate in the visual sighting phase if the intent to detach is declared then. On the turn an aircraft detaches, attacks and weapons launches, other than those allowed to multi-crewed aircraft in close formation, may not be done.

Formation Air to Ground Attacks. Whenever the leader of a close formation makes a Bombing attack using BB or BG class weapons, any wingmen in the formation carrying identical weapons may also attack the same target. All the weapons dropped by the formation are totaled into one attack. Only the leader's bombing and aiming modifiers are used. The modifier for each three BB class weapons in a ripple is determined only from the leader's weapons.

Formation Rocket Attacks using RK, RP and RPT type weapons may be made in a similar fashion except that only half the value of each wingman's rockets is added in.

CHAPTER 22 — STRAFING AND AIR TO GROUND ROCKETS

22.1 — STRAFING

An aircraft may attack a ground target with its guns. This is called **strafing**. An aircraft may strafe if it is on a line of approach to the target, within strafing range, and in level or diving flight. Aiming is required. The attack is resolved the instant it is announced.

Strafing Range. Aircraft cannons have a range of 4 hexes; aircraft machine guns have a range of 3 hexes. Two altitude levels of difference between the firing aircraft and target equals one hex of range. A strafing attack may use up either one regular shot, or a snap shot worth of ammo.

Altitude Requirements. A strafing aircraft in level flight may not be more than one level above the target. A strafing aircraft in diving flight must spend at least one VFP to lose altitude while on the line of approach either before or after firing. An aircraft in climbing flight may not strafe.

Strafing Final Attack Strength. The FAS of a strafing attack is determined by summing up all the air to ground attack ratings of the internal guns and/or gun pods being fired by the aircraft in the attack. If using a snap shot, divide the result by two (retain fractions). The final sum is the FAS.

Die Roll Modifiers. A number of factors affect strafing runs. Refer to the Air to Ground Modifiers Table and apply any required modifiers to the attack roll. Note; the bombsight modifier does apply when strafing as does the gunsight modifier if any turns were done prior to strafing and a recovery period has not passed.

Hard Target Effects. If the straffer's air to ground gun's or pod's attack rating is asterisked once (*), its rating is halved when strafing HARD targets. If asterisked twice (**) the gun or pod has no effect against HARD targets. If the straffer's air to ground gun's or pod's attack rating is underlined, it is extra effective against HARD targets and gets a -1 modifier to its attack roll.

Multiple Strafing Attacks. Aircraft are allowed to fire twice in a game-turn while in their strafing run provided at least one FP is expended prior to and between each shot. The two shots may be taken at the same target, different targets in the same hex, or at different targets in different hexes. Treat the entire strafing run as the one ground attack allowed for the turn even though up to two separate targets may be attacked.

Aiming always ceases as soon as the aircraft commences firing, however, the aiming modifiers may be retained for both shots and over into the next game-turn for additional shots as long as all the shots are still at the original target. If strafing is shifted to a different target in the same or different hex, aiming must be done anew.

22.2 — AIR TO GROUND ROCKET ATTACKS

The parameters for making an air to ground rocket attack are the same as those for strafing except that rockets (RP or RK class weapons) may be fired from a range of up to nine hexes. The attack is resolved the instant it is announced. Multiple rocket attacks in a single game turn are not allowed.

Slant Range Modifiers. Additional modifiers for a rocket attack are based on slant range. Slant range is the horizontal range plus the altitude difference counting each two levels difference as another hex of range.

Die Roll Modifiers. A number of factors affect rocket attack runs. Refer to the Air to Ground Modifiers Table and apply any required modifiers to the attack roll. Note; the bombsight modifier does apply when rocketing as does the gunsight modifier if any turns were done prior to strafing and a recovery period has not passed.

Altitude Requirements. Diving rocket attacks use the rocket release point table. Level rocket attacks are allowed if the firer is at the same level, or no more than one altitude level above the target. Aircraft in T-level flight may only fire rockets at targets at the same altitude and must add a +2 modifier to their attack due to the grazing angle.

Rocket Attack Restrictions. All rockets fired in a single attack must be the same size: Small, medium, large, or heavy. Rocket pods of different size rockets may not be fired at the same time. Different sized rocket pods may be fired at the same time if all rockets fired are the same size.

Single rockets may not be fired at the same time as rocket pods. Any number of single rockets (of the same size) may be fired in the same attack.

Safe Carriage Speed Limits. A streamlined rocket pod (indicated by an asterisk on the weapons tables) may be carried safely at speeds up to 8.0. An unstreamlined rocket pod may be carried safely at speeds up to 6.0. Single rockets mounted on an aircraft may be carried at any speed. An aircraft which exceeds the rocket pod's carriage speed causes the pod to become misaligned or unreliable: reduce FAS of all subsequent rocket attacks by 1/2.

Rocket Final Attack Strengths. For an individual rocket pod or single rocket, use the listed strength. For multiple pods, use the sum of their strengths. For volleys of single rockets, use 2/3 the sum of all rockets fired (round fractions up).

CHAPTER 23 — BOMBING ATTACKS

This chapter details the methods used to resolve air to ground attacks with ballistic bombs. Aiming and being at the proper release point as described in rule 21.1 is required in order to declare a bombing attack.

Bombing Parameters. Aircraft may drop bombs from level or diving flight while on a LOA to the target. Aiming and reaching the proper release point for the attack must occur from the same flight type. A level bomb attack requires level flight aiming, and a diving attack requires aiming while in diving flight. The release point charts differ for level and diving bomb attacks.

BB Weapon Final Attack Strengths. The final attack of a bombing attack is determined as follows:

- For HE, Fire and Napalm bombs: Sum the attack strengths of all the individual bombs released at the time of the attack. Take two thirds of that number (rounded up) and that is the FAS. (As bombs are dropped in strings, some will fall short of or past the target, so the full values are not used.

- For Cluster bombs: Sum the attack strengths directly and that is the FAS. (The vast number of bomblets the cluster bombs release make up for the ones falling long or short).

Bomb Types. BB class weapons are either LOW DRAG or HIGH DRAG weapons depending on type and/or whether they are or are not fitted with parachute or pop-open fin (snake-eye type) retardation devices.

Low drag weapons are those of normal aerodynamic shape with stabilizing fins; mainly HE, AP, AT, cluster bombs and FAE bombs. High drag weapons are those which lack fins and tumble when dropped (napalm and fire bombs), or runway cratering weapons, or any of the above Low drag weapons that have been fitted with retardation devices.

High drag weapons use different release parameters than low drag ones as indicated on the release point tables. High drag weapons were developed to allow T-level laydown attacks as described below.

Multiple Bombs. When a bombing attack is declared, any number of weapons of the same type may be dropped; meaning all are either low or high drag AND all are of one class (HE or AP for example). Different sized weapons of the same type may be dropped together.

Bomb Time Of Fall. When a bomb attack is declared, it does not occur instantly. It takes time for the bombs to reach the target. To reflect this; place a marker on the line of approach under the aircraft the instant it declares the attack. For every FP the aircraft expends after the marker is placed, advance the marker one hex down the line. Do this until the marker reaches the target hex or the aircraft ceases moving (ignore bomb altitude).

If the bombs reach the target while the aircraft is moving, the attack is resolved at that instant. If the aircraft is destroyed for any reason prior to the bombs hitting, they are unaffected and can continue moving down the line for as many points as the aircraft had left. If they do not reach the target, the attack is resolved at the end of the turn after all aircraft have moved. Targets may continue to function normally until the instant of attack (for example, AAA guns can track and fire until hit).

Carriage Speed Restrictions. The maximum safe speed which bombs may be dropped at is High Transonic. The maximum safe speed for carrying bombs on external weapons racks or stations is 6.0.

If the safe carriage speed is ever exceeded, some of the weapon fuze mechanisms will suffer damage. To reflect this, when an attack is made dropping bombs whose safe carriage speed was exceeded use the following;

- If a single weapon was dropped, it duds (automatically misses) if the attack roll is odd.
- If multiple weapons were dropped, halve the FAS determined for the group of bombs.

Additionally, if the aircraft is above high transonic speed when the bomb attack is made, some of the bombs may pitch up and bounce off the aircraft upon release. To reflect this, roll for damage to the aircraft as if it had been hit by a weapon with an attack rating of "1" after declaring the bomb attack.

Additional Bombing Modifiers. In addition to the usual bombsight, release point, tracking time and aircraft damage level modifiers, the following apply to bombing attacks:

- Sticks of bombs: For every three BB weapons dropped in a single attack subtract one from the attack roll (better target coverage).

- Napalm and Fire bombs: These are not very accurate weapons. For each altitude level greater than one above the target, add one to the attack roll.

- Miscellaneous Weapons Effects: Some weapons are more effective against different target types. See the modifiers table under the release point tables for additional modifiers which may apply against targets.

Laydown Bombing Attack Runs. Only aircraft in T-level flight are allowed to execute laydown attack runs. Laydown attacks may only be done with high drag weapons, napalm and fire bombs, runway cratering weapons and area weapon dispenser pods.

The release point of a laydown attack is always the target hex itself and aiming is still required.

Aircraft with computed or advanced sites may attack multiple targets during their run. One target in each of up to three different hexes may be struck. If the targets are in adjacent

hexes, one after another in a row, relative to the aircraft's flight path, aiming is only required on the first target to start the attack and those in the other hexes are attacked using the same modifiers.

If the targets are not in adjacent hexes, aiming is required to be done anew prior to attacking subsequent hexes. The laydown attack run, be it against one or more hexes, is considered to be the single air to ground attack allowed an aircraft per turn.

Exception: Aircraft using an area weapon dispenser pod (WP) are allowed to attack as many hexes as its listed capacity (see weapons tables) in a single run.

ADVANCED RULES

23.1 — ADVANCED BOMBING TECHNIQUES

The following sections detail bombing techniques that have been developed since World War Two due to the advent of ballistics computing weapons systems.

23.1.1 — TOSS BOMBING

Aircraft with computed or advanced sights may "TOSS" low drag bombs at targets by lofting them out of a zoom climb.

Procedure. Announce the toss attack prior to moving the aircraft. Aiming is required to be done normally by expending HFPs on the line of approach. After aiming is complete, the aircraft may expend VFPs in the zoom climb. The weapons may be released after the expenditure of any VFP.

Toss Release Point. The release point, in terms of hexes away from the target, is always the sum of the levels zoomed prior to release plus the aircraft's height in levels above the target at the start of the turn.

Toss Restrictions and Modifiers. Toss bombing may not be done if the release point is more than six hexes away from the target. Toss bombing keeps you further away from point defenses but is less accurate. There is a Toss bomb attack modifier to the die roll of +1 per hex away from the target at release.

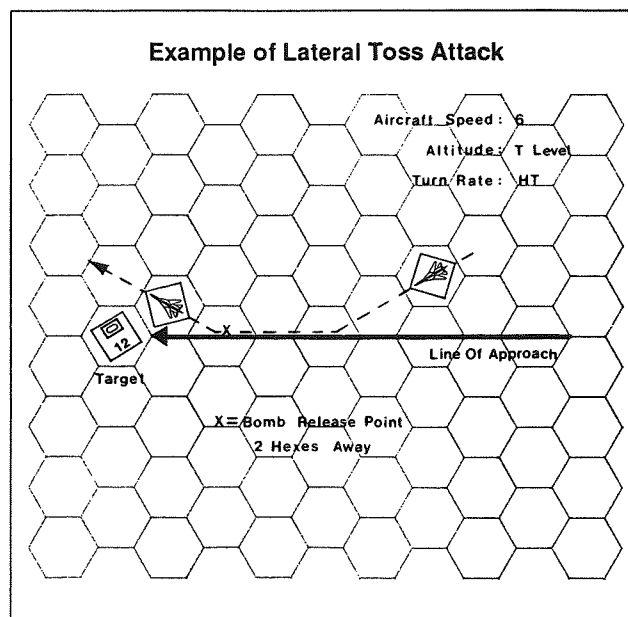
23.1.2 — LATERAL TOSS BOMBING

This is a variation of toss bombing but done in the horizontal. Aircraft with computed or advanced sights, in T-level flight or level flight not more than one altitude level above the target may do lateral toss bombing. The aircraft uses the turn to "sling" the bombs horizontally at the target, hence the term "lateral toss".

Procedure. The aircraft approaches a target not on a line of approach but parallel to one so that it will intersect an actual line of approach. It MUST commence an HT or BT turn so that when it faces, it is on the intersecting LOA pointed at the target. It then continues down the line of approach toward the target and still in the turn. The instant it faces again, the bombs are considered released at the target (even though the aircraft is not facing it anymore).

Aiming. Aiming is considered to occur while the aircraft is in the turn and facing the target. This is a deliberate exception to the rule that aircraft must be wings level while aiming.

Lateral Toss Release Point. The release point for lateral toss bombing is one, two or three hexes from the target. Tracking time is not allowed. The modifier for this attack is +2 per hex of range. Its daring but not accurate! Below is a diagram of lateral toss attack. Lateral toss bombing can only be done visually and was developed to allow aircraft to stay low and throw low drag bombs at a target without blowing themselves up.



23.1.3 — OFFSET AIMPOINT BOMBING

Aircraft with computed or advanced sights may attack a target whose geographic coordinates (fixes) are known before the mission, without having to see it. This is done by aiming off another prominent location whose coordinates are also known.

Known Target Coordinates. You may assume that mission planners know the fixes of all bridges, dams, runways, airport facilities, piers, small islands, and any other hex marked on the game map by a black triangle. Scenarios will state if any other target units or counters have had their locations fixed by reconnaissance prior to play.

Offset Aiming Procedure. To bomb a target with offset aiming, an aircraft must first pass over a known fix, or obtain a radar lock-on to a known fix in order to update its inertial navigation system (present on any aircraft with computed or advanced sights). The update fix must be within 12 hexes of the intended release point. Updates may be obtained while the aircraft is in a turn as long as it is of HT or less rate. The update is automatic upon flying over the fix.

After updating, the aircraft may then position itself on a line of approach to the target and perform level bombing or toss bombing. Aiming is performed on the line of approach to the target but the target does not have to be visually sighted or locked on by radar.

Offset aiming is generally used when adverse weather prevents accurate visual bombing and the target itself is not radar significant but something near it is.

FAS and Modifier Effects. All normal modifiers for level or toss attacks apply except that the FAS is determined as if the target were a secondary target.

23.1.4 — BLAST AND FRAGMENTATION DANGER ZONES

HE bombs and other highly destructive weapons have been known to blast their fragments and debris thousands of feet into the air. In fact, attack aircraft bombing from low level have blasted themselves out of the sky so often that tactics and maneuvers are devised with the primary purpose of avoiding the blast zones of weapons dropped.

Blast Zone (BZ) Markers. BZ markers are used to identify fragmentation danger areas for aircraft. Place a BZ marker in any hex which is:

- attacked by HE bombs, Runway Cratering weapons, Rocket Pods or rockets with an unmodified soft FAS of 6 or more.
- attacked by individual smart or guided weapons with an unmodified soft FAS of 12 or more.

Place the marker the instant the attack is resolved. It is removed in admin phase of the same game-turn. If no markers are provided, use blank counters.

Blast Zone Effects. The blast zone consists of the hex the marker is in and the hexsides forming it from ground level to two altitude levels above that. Any aircraft expending a flight point to enter or cross a BZ hex or hexside undergoes a check for a chance hit just as if it were in an AAA barrage fire zone of effect. If a hit occurs, resolve damage using an attack rating of "1".

High Drag Weapon Effects. Aircraft using high drag weapons have the following benefits for avoiding Blast Zones:

- If doing other than laydown attacks, a bomb fall marker is not placed on the line of approach to a target at the release point until after the aircraft has expended one FP since release (in effect, the bombs are slowed by the retardation devices).
- If doing laydown bomb attacks, the BZ marker is not placed in the target hex, and the attack is not resolved until after the aircraft has expended one FP since release.

CHAPTER 24 — ANTI AIRCRAFT ARTILLERY (AAA) UNITS

AAA unit counters are distinguished by class (H= heavy, M= medium, L= light) and gun type (85mm, 57mm, etc.).

Each counter is two sided. The "unfired" side has three rows of numbers on it. The "fired" side shows a gun silhouette and indicates the class and type of unit as well as its defense strength and spotting range. See the unit identification chart for an example of how to read the counter.

At the start of each game turn, the units are flipped to their unfired side. When they make an attack, they're flipped to the fired side as a reminder that they've been used.

Maximum Effective Range/Altitude. There are three range categories for each AAA unit; short, medium and long. The maximum range in hexes for each category is indicated by the top row of three numbers on the unit's unfired side. When figuring range, each two full altitude levels up equals one hex of range. If the target is on a hexside, treat it as being in the hex closest to the AAA unit.

AAA units also have a maximum effective altitude. The bottom left hand number on the unfired side of the unit lists its maximum effective altitude. This is the maximum number of levels above the unit that a target can be fired at.

Example: The range to an aircraft three hexes away from, and ten altitude levels above an AAA unit is eight. Even if an AAA unit has an effective range better than eight, it may not hit the above target unless its maximum effective altitude is also ten or greater.

AAA Roll To Hit. The three numbers appearing in the middle row of the unfired side of the unit are the base "Roll to hit" numbers corresponding to each of the three effective ranges. When an AAA attack is announced against an aircraft, these numbers are referenced and a die is rolled and modified as appropriate. If the result is less than or equal to the Roll to Hit number, a hit is achieved.

Note: If the roll to hit number is a zero, this means the gun cannot normally hit the target without the help of die roll modifiers which reduce the roll to zero or less.

Attack Rating. The middle number on the bottom row of the unfired side of the AAA unit is its listed attack rating. AAA units have variable attack ratings however. The listed attack rating represents the maximum allowed attack rating that the unit can have. Each time a hit is achieved Through aimed or plotted fire, roll the die again. If the result is greater than or equal to the AAA unit's maximum rating, then the rating is used in conjunction with the damage tables. If the second roll was less than the maximum rating, then the number on the die roll is used for the unit's attack rating. Once the attack rating is determined, roll for damage normally.

Chance hits achieved in barrage fire zones or plotted fire zones are always resolved with an attack rating of "1" or "2" (depending on gun size), regardless of the unit's maximum allowed attack rating.

AAA Damage. Damage to aircraft is determined using the Damage tables as per chapter 10.

24.1 — AAA UNIT FIRE MODES

AAA attacks can occur in three ways; through AIMED fire, BARRAGE fire, or PLOTTED fire. Each is a distinct mode and eligible AAA units may use only one of these modes each turn.

Light AAA units may use only aimed or barrage fire. Medium AAA units may opt for any mode. Heavy AAA units may use only aimed or plotted fire. AAA units desiring or required to use barrage or plotted fire modes are designated in the AAA Interaction Phase of the game-turn. All other AAA units are considered to be in the aimed fire mode.

24.1.1 — AIMED FIRE MODE

Aimed fire represents the deliberate engagement of a single aircraft by an AAA unit. All AAA units may use this mode.

Aimed Fire Procedure. Aimed fire attacks are announced and resolved during the Flight Phase. As an enemy aircraft is moved, unfired AAA units using aimed fire may track and attack the aircraft. Only the currently moving aircraft is eligible to be fired on. Aimed fire may not be used against aircraft which have not yet moved, or which have already completed their moves that game turn.

The aimed fire attack may be made the instant that tracking is completed, or anytime thereafter during the target's move. When an aimed attack is announced, the target's flight is temporarily halted and the attack is resolved. Damage effects are applied immediately, then the target completes its move (if able).

Tracking. To track a target, the AAA unit must have a line of sight to it, and the target must be within one and a half times the AAA unit's maximum effective range. Tracking begins when the AAA unit declares it is doing so. Tracking is considered complete for **manually aimed** guns the moment a tracked aircraft expends FP's equal to 1/2 or more of its speed (round fractions up) in the AAA unit's line of sight. Tracking is considered complete for **radar directed** guns the moment FP's equal to 1/3 the target's speed (round fractions up) are expended.

Exception: Heavy AAA units must track a target for two thirds its speed in FP's (round fractions up) before firing whether manual or radar guided.

Tracking may be carried over from turn to turn but must begin anew after each aimed shot taken. AAA units may still only fire once per game-turn.

Switching targets. AAA units planning to use aimed fire which track but do not shoot at one aircraft in a game turn may switch to and track subsequent aircraft that move. Each switch within a game turn however, carries a cumulative +1 modifier to the aimed fire die roll.

24.1.2 — BARRAGE FIRE MODE

When faced with multiple attackers, AAA gunners often resort to the simple expedient of filling the sky in and around their position with large amounts of "lead" (bullets) in the hope that an aircraft will run into one. This unaimed form of panic fire can be effective due to the sheer density of fire.

Only Light and Medium AAA units may use barrage fire. Designate during the AAA Interaction Phase which units will use barrage fire by placing a barrage marker on them.

Zone Of Effect. Barraging units have a zone of effect about them for the entire game turn. This zone consists of the hex the unit is in plus the six adjacent hexes and the hexsides forming them, from the ground level up to the maximum altitude above the unit the weapon can reach.

Aircraft which fly into this zone of effect (whether friendly or enemy) must check for chance hits. Roll the die once for each FP expended in the zone. On a roll of 1 a chance hit occurs. Resolve this hit immediately using an attack rating of "1" for Lt. AAA and small arms, and a "2" for Medium AAA on the damage

tables. If more than one zone of effect overlaps a hex, each zone is rolled for separately.

Ammo Effects. AAA units which use this tactic run out of ammo at the end of the game-turn. Flip the barrage marker to the out of ammo side to reflect this. They may not fire again until they are resupplied. During the End Of Turn Admin Phase of each game-turn (including the current one) roll one die for each out of ammo unit. On a 2 or less, it is resupplied.

Non-AAA Unit AntiAircraft Fire. Some non-AAA ground units and naval units are capable of using barrage fire against aircraft. Armored vehicle units, vehicular HQ units, regular infantry platoons and infantry headquarter all have barrage fire capability due to small arms fire. Infantry small arms fire reaches to two altitude levels above the unit, while vehicular small arms fire reaches to three levels above (greater proportion of machine guns). In all respects small arms fire is treated as barrage fire except that non-AAA units never run out of ammo.

24.1.3 — PLOTTED FIRE MODE

Plotted fire represents the use of preplanned area flak barrages. Plotted fire creates a zone of effect which remains in play for one whole game-turn. Only Medium and Heavy AAA units may use plotted fire.

Plotted Fire Procedure. During the AAA Interaction Phase, a target hex and altitude is secretly noted for each AAA unit using plotted fire.

In the Ground Unit Interaction Phase of the game-turn, the target hex and altitude is revealed. A plotted fire zone of effect is considered to now exist in the target hex and the six adjacent hexes and any hexsides that form them at the plotted altitude, plus or minus two levels.

Any and all aircraft, friendly or enemy, that are caught in the plotted fire zone are immediately subject to one attack. Resolve the attack as if by aimed fire but with an additional +1 modifier to the hit roll. If plotted fire cannot normally hit due to modifiers, the target is not attacked but is still subject to chance hits during its movement next game-turn.

Plotted Fire Marker. The plotted fire zone's location is noted by placing an area fire marker in the plotted target hex. The fire zone remains in effect from the current Ground Unit Interaction Phase to the next turn's Ground Unit interaction Phase. Any aircraft which later expends flight points in a plotted fire zone, must check for chance hits for each FP so expended, as for barrage fire.

Concentrated Fre. more than one AAA unit of the same or different types (heavy or medium) may be plotted to the same target hex/altitude. In this case, only one attack per plane caught in the zone is still allowed. Use the least accurate AAA unit's to hit numbers but allow a -1 to hit modifier for each firing unit over one. If a hit is scored, the highest maximum attack rating of all the AAA units involved is utilized to determine actual attack rating.

24.2 — FIRE CONTROL RADARS (FCRs)

FCRs are used to increase the accuracy of AAA guns. Some AAA units may have built in "integral" FCRs and others may be allowed to use "add on" FCRs.

Integral FCRs. AAA units that have integral fire control radars are indicated by an "R" or "W" in the bottom right corner of the unfired side of the unit counter. These units have the radar's effects already figured into the to hit numbers. If an integral radar is jammed or turned off for any reason, a +2 to hit modifier is applied to the unit.

Add-On FCRs. Other non-mobile AAA units may be linked to an FCR at the start of play by stacking an FCR counter on the AAA unit. Only Medium and heavy units of 30mm size or greater may utilize add-on FCRs. The AAA unit stacked with the FCR automatically gets the FCR's to hit modifier bonus as long as the radar is not jammed or turned off and a line of sight exists to the target aircraft. An FCR can only be linked to one AAA unit at a time and this is designated at the start of a game. FCRs cannot be switched to other AAA units even if in the same hex within the course of a game.

Weather Effects (Advanced Chapter 30). Add on FCRs are all weather capable and allow the AAA unit to track and fire on enemy aircraft at night and in adverse weather even if not visually sighted.

Integral FCRs marked by a "W" are all weather capable and function as above. Integral FCRs marked by an "R" are range only radars and function only against visually sighted targets.

24.3 — AAA and Aircraft Sighting

Sighting Restrictions. AAA units and small arms capable ground units are assumed to automatically sight aircraft and may begin tracking them at any point in the Flight Phase in which the aircraft becomes or is visible to them based on line of sight restrictions and the following limitations;

- No aircraft may be visually sighted beyond four times its visibility number.
- No aircraft in TFF may be visually sighted by units at the same or lower altitude until within 12 hexes of range (assuming a line of sight exists).
- In HAZE, (see chapter 30), no aircraft may be sighted beyond twice its visibility number in range.
- AAA units not using an FCR may not fire on units, although they may track them, until within twice the aircraft's visibility number in range.

You may now play Training scenario five and all scenarios except those involving Surface to Air Missiles (SAMs)!

ADVANCED RULES

24.4 — AIRCRAFT JINKING

Maneuvering aircraft are more difficult targets for AAA guns. A good strike pilot will develop his own pattern of jinks to fool enemy gunners.

Jinking Parameters. To be considered jinking, an aircraft must meet one of the following parameters:

- If the AAA range was **short**; the aircraft must be in a BT or greater turn rate or just have faced due to a turn at BT or greater rate or; The aircraft must be prepping for or just have executed a snap-turn, roll maneuver of any sort, or Viff maneuver of any sort.

- If the AAA range was **medium or long**; the aircraft must be in an HT or greater turn rate or just have faced due to an HT or greater turn rate or must be prepping for, or executing snap-turns and maneuvers as above.

Jinking Effect. A jinking aircraft which is hit by AIMED or PLOTTED AAA fire is allowed an immediate die roll to negate the hit; meaning the gunners actually missed. Roll a die before any attack rating or damage is determined.

If the roll is a 6 or more against manually directed guns, or 8 or more against radar directed guns, the hit is nullified and becomes a miss. Consider it a paint scorching "Close but no cigar" shot. The aircraft size modifier is applied to this roll. Jinking aircraft taking a Chance hit from a barrage or plotted fire zone, do not get a nullifying die roll.

24.5 — HEAVY AAA UNIT FACING

Heavy AAA units, due to the size of the guns they represent, must be set up facing a specific hexside or juncture. This facing can be changed by up to 60 degrees each game-turn in the AAA planning phase. Consider the top of the counter to be the front of the unit. Heavy AAA units may only shoot at aircraft or do plotted fire in their field of fire which consists of their 180+ arc, relative to their facing (front), and their own hex (straight up).

24.6 — SOLITAIRE AND RANDOM AAA FIRE

Some scenarios call for AAA to be fired randomly, or to be played solitaire. In these cases, AAA units fire only when determined by a die roll on the Random AAA Fire Tables as described below.

Aimed Fire. Light and Medium AAA will always use random aimed fire in solitaire play.

Whenever an aircraft expends an FP in the range of an unfired AAA unit, roll one die. Check the result with the Random Fire Table and if a shot is indicated, resolve it via the normal AAA rules. The probability of a unit firing increases at closer ranges. Remember to check for each AAA unit separately and begin with the unit closest to the moving aircraft, then moving out to the next closest and so on. As long as AAA units remain to be fired, check for each subsequent aircraft that moves in range.

Barrage Fire. Any non-AAA units capable of barrage fire are considered to use it all times.

Plotted Fire. Heavy AAA will always use plotted fire. The target altitude and hex are determined randomly as follows in the Ground Unit Interaction Phase:

Start with the nearest Aircraft to which the unit has a line of sight and which is sighted (If the AAA unit is equipped with an FCR, the aircraft does not have to be sighted). Roll the die once and consult the plotted fire direction diagrams to determine the direction the plotted fire hex will be from the aircraft. A zero indicates the plotted hex is the aircraft's hex.

On any result other than a zero, roll the die again and halve the result dropping fractions to determine how many hexes in that direction the plotted fire hex lies.

To determine the altitude of the plotted fire; roll the die twice halving each result (drop fractions). Subtract the second result from the first. Add the target aircraft's start altitude for the current turn to the final result (+ or -) to get the altitude of the plotted fire. Repeat the procedure for each heavy AAA in play.

24.7 — CLOSE FORMATIONS AND AAA FIRE

Aimed AAA fire treats the whole close formation as a target. A minus one is applied to the to hit roll and if a hit occurs, randomly determine which aircraft takes the hit. When a hit does occur, the other aircraft in the formation must each roll a die and if a one results they are also hit. Saving rolls apply and damage is resolved normally. Barrage and plotted fire attacks each aircraft normally.

CHAPTER 25 — SURFACE TO AIR MISSILES

Surface to Air Missile (SAM) units consist of one or more self contained launch vehicles, or an infantry fire team with man portable SAMs, or a group of launchers clustered about a target tracking radar (TTR).

SAM Types. SAMs may be IR guided, radar guided, optically guided or laser guided. Some SAM unit counter specifics are described in the sections pertaining to the different SAM types and an example is given in the unit identification chart of how to read the information from a counter. The rules below are applicable to all types of SAMs.

SAM Missile Data Tables. There are several tables detailing the characteristics of specific SAM types. The tables are organized and read in a manner similar to the air to air missile data tables. The *Boost* and *Minimum Altitude* entries are unique to SAMs however.

SAM Missile Flight. SAMs fly and attack aircraft using the air to air missile flight rules. The following sections cover the minor differences between air to air and SAM missiles.

- **Launches.** SAMs are launched in the SAM Interaction Phase and not the air to air missile launch phase. A launch roll is used as for air to air missiles. When successfully launched, missiles are placed in the launch unit's hex with any initial facing desired.

- **Boosted Flight.** On the game turn of launch only, SAMs have a booster phase during which the missile is accelerating and/or being gathered under guidance control. The missile is not armed nor can it begin maneuvering until a number of FPs have been expended in boosted flight equal to the amount listed under "boost" on the SAM missile data table.

While in the booster phase, the missile may only expend FPs to move forward and/or gain altitude. Aircraft may not be attacked by missile's in boosted flight. The missile is armed immediately upon expending the first FP after completing boosted flight and may then commence flying normally. They may also opt to snap-turn immediately once they are armed as for air to air missiles.

- **Speed.** A SAM missile's start speed is always equal to its listed speed on the first turn of launch and on each turn of sustainer flight. SAMs do not use the speed attenuation tables and factors until the first game turn of unpowered flight. This is different than for air to air missiles which must take into account the varying aircraft launch speeds.

SAM Interaction Phase. The exoanded sequence of play outlines the order of actions to be taken in the SAM interaction phase. The sequence must be followed exactly to allow for the proper representation of electronic warfare effects and SAM unit capabilities.

SAM Unit Characteristics And Damage Effects. SAM units may have one or more of the following characteristics:

- **Quick Reaction Capability.** There are two different times in which lock-ons may occur in the SAM interaction phase. SAM units with a "Quick-Reaction" capability may attempt lock-ons in both. Other SAMs may only attempt lock-ons in the second. As the first lock-on attempts will occur before SAM launch attempts; it may be possible for quick reaction SAMs to acquire and launch at a target in the same game turn.

Note: All man portable SAMs are considered quick reaction capable.

- **Volley Capability.** Each SAM unit is given a volley number as indicated on the counter. This is the maximum number of missiles that may be launched in a single game-turn. It is also the maximum number of missile's that may be guided at any one time by the unit. IR and CW guided missiles are excepted see below. When more than one SAM is launched in a single turn at the same target from the same unit, the "follow-on" missile rules apply.

- **Ready Missiles:** Each SAM unit is given a ready missile number as indicated on the counter. This is the total number of missile's it has ready to launch at the start of each game. During play, keep note of the number of missiles expended by the unit. Each missile that is launched or fails to launch is counted as a ready missile expended. When all have been fired, the unit is considered out of missiles and may no longer fire on aircraft though it remains in play as a target.

Note: Infantry SAM units have as many ready missiles as they have launchers as stated in the scenario. If not stated, the default value is always two missile launchers.

- **SAM Reload Capability:** All infantry SAMs, and SAM units indicated as having an auto-reload capability may attempt to replenish expended ready missiles during play. SAM units which do not launch or guide missiles during a game turn may perform reloading. They are allowed to replenish expended missiles as follows:

- Infantry SAMs: Roll one die in the admin phase of the turn for each empty launcher. A result of 3 or less means the launcher is reloaded.

- Auto-Reload Capable Units: Up to two expended ready missiles may be replaced automatically from the unit's supply of reloads on each turn of reloading.

The scenario will usually list the number of reload missiles available to a unit. If not, the default value is two reloads per

ready missile originally available.

• **Multitarget Engagement Ability.** If the volley number of the unit is underlined, it is multitarget capable and is allowed to attempt and obtain lock-ons to as many different targets as its volley number. It may also launch and guide missiles simultaneously at as many different targets as it has lock-ons to with one or more missiles being assigned to each target as they are launched. The volley number is still the limit on how many missiles may be in the air at once.

Damage Effects On SAM Units. SAM units may not launch or guide missiles while suppressed. Each "D" hit on a SAM unit destroys half of any remaining ready missiles and reloads if it does not also destroy the unit. Radar SAM units may be disabled if an ARM hit destroys their radar (see rule 25.3).

25.1 — EARLY WARNING RADARS AND SAM TARGET PASSDOWNS

Early Warning Radar (EWR). EWRs assist SAM units in achieving lock-ons. If an EWR as part of an Integrated Air Defense System (IADS), it may provide radar passdowns to units in the IADS. If EWR is integral to the SAM unit, it may provide radar passdowns to its own Target Tracking Radar (TTR). The scenario defines the radar passdown chain of command. A scenario may indicate that a CCU counter may also be required to conduct passdowns.

Passdown Procedure. An EWR may attempt one passdown to each unit in its IADS per game turn. A single target may be passed down to one or more different SAM units or different targets may be passed to different units.

EWRs perform a passdown by announcing the EWR detected target and the unit it is being passed to. Roll the ten-sided die and apply any applicable modifiers. A result of 7 or less indicates success. A successful passdown provides a minus 3 modifier to the SAM unit's lock-on attempt.

EWR Target Detection. EWRs detect aircraft using the same procedure as aircraft radars except they use the EWR line of the Radar Table. Any aircraft within the line of sight of an operating EWR (not jammed, suppressed or shut down), is an eligible target as EWRs have a 360 degree sweep.

Radar Horizon. Aircraft in TFF may not be detected or locked onto by radars until within 20 hexes of an "MTI" (moving target indicator) capable EWR or "T" level capable SAM unit having a line of sight to them. The detection range is increased to 60 hexes if radar is elevated (on higher terrain than aircraft or on ships mast or high tower).

25.2 — IR GUIDED SAMs

Missile Data Tables. There are separate tables for man portable and vehicle mounted IR SAM units. Unlike for Air to Air IR missiles, IR SAMs are not given launch envelopes. Instead they are given a maximum lock-on range.

The Seeker head type is used exactly as for air to air missiles. IR SAMs must meet the same angle-off launch restrictions and tracking requirements that apply to IRMs with the same seeker head.

Target Acquisition And Launch. All IR SAM units are quick reaction types. In order to launch missiles in the SAM

interaction Phase, they must have previously acquired seeker Optical lock-ons to the target.

Seeker Lock-on Procedure. If a target is visually sighted and within maximum lock on range (two altitude levels difference equals a hex of range), roll the die during either or both lock-on times of the SAM interaction phase.

One lock-on attempt is allowed per launcher or launch vehicle in the unit. Each may only maintain one lock-on at a time. A result equal to or less than the optical lock-on number given on the counter means target acquisition (lock-on) has occurred. A lock-on is retained until the line of sight is broken or the aircraft is further away than the maximum lock-on range.

Command and Control Units The presence or absence of a command and control unit (CCU) working with the SAM unit may affect the die roll for target acquisition. IR SAM units with a CCU within command range (always 4 hexes or less) may also benefit from Early Warning Radar information passdowns. See scenario specifics.

25.3 — TARGET TRACKING RADARS AND RADAR GUIDED SAMs

Radar Guided Surface-to-Air Missiles consist of those with the following guidance methods; Beam Riding (BR), Command Guidance (CG), Continuous Wave Radar Homing (CW), and Track-Via-Missile data link (TVM).

Target Tracking Radars (TTRs). All radar guided SAM units utilize TTRs to lock-on to targets and guide their missiles. The presence of a TTR with the unit is indicated by the inclusion of a radar frequency code on the front of the counter and a radar lock-on number on the back of the counter across from any optical lock-on numbers.

TTR Lock-Ons. TTR lock-on attempts are allowed at the appropriate lock-on times of the SAM interaction phase, assuming the radar is not stand-off jammed or suppressed by previous attacks. There must be a line of sight to the target (meaning it is not terrain masked per chapter 21) although it need not be sighted, and the target must be within tracking range of the TTR.

Roll the die and modify the roll as required for the presence of active and barrage jamming taking into account the SAM unit's missile's ECCM rating. A result less than or equal to the lock-on number on the counter means the target has been locked-on to.

EW Jamming Effects. TTRs blinded by BJM stand off attacks may not attempt lock-ons. Aircraft with AJMs and aircraft in the protected arcs of BJMs used in the noise mode, get to use the jamming number as a modifier to the die roll of any lock-on attempts made against them. The modifier may be reduced to zero by the ECCM capability of the SAM unit TTR.

HOJ Capability. Any radar guided SAM unit with HOME ON JAM capable missiles may opt to launch them in the HOJ mode at aircraft conducting BJM noise or stand off jamming attacks in the following cases:

- If blinded by a stand-off attack, the unit may launch at the aircraft which did the stand-off attack.
- If a regular lock-on attempt failed against an aircraft using a BJM in either mode, HOJ missiles may be

fired at it anyway.

Note: Home on Jam capable missiles launched under normal guidance at a barrage jamming target may switch to the HOJ mode if their lock is broken by any means in mid-flight.

Whenever a target of a HOJ missile elects to stop using its BJM (announced in the SAM Interaction Phase), the missile will be removed from play unless a lock-on by the original launch unit is obtained by the end of the SAM Interaction Phase so that normal guidance can be resumed.

Tracking Requirements. Radar SAMs must meet the following criteria at the end of each proportional move and at the end of the game-turn for the missile to continue tracking its target. If the criteria can not be met, the missile is removed from play (loses guidance and self destructs).

- **Beam Riders (BR):** Must keep the target within the missile's 180 degree arc, and be no further than two hexes away from any hex which is touched by a straight line extending from the center of the SAM unit hex to the center of the target's hex/hexside.
- **Command Guided (CG):** keep the target within the missile's 120+ arc.
- **Continuous. Wave Guided (CW):** keep the target within the missile's 150+ arc.
- **Track-via-Missile (TVM):** As for command guided.
- **HOJ mode:** As for Beam Rider.

Additionally, the TTR must maintain a lock-on (HOJ SAMs excepted) and the missile must end each game turn no further from the target than when it started.

Breaking TTR Lock-ons. TTR lock-ons can be broken as follows during the SAM interaction Phase:

- When target has a CHAFF PPL present and a break lock roll succeeds against CG and BR SAM units.
- When target has a MINI-JAMMER PPL present and a break lock die roll succeeds against CG, CW, and TVM SAM units.
- When target is equipped with DJM working in the SAM unit TTR's frequency and a break lock die roll succeeds.
- When the SAM TTR is jammed by a stand-off Jamming attack.
- If the SAM player opts to break lock, or shuts down the radar (see chapter 26: ARMs).

TTR lock-ons are broken in the flight phase when:

- the SAM unit suffers a combat result of suppressed or greater or is still suppressed from a previous attack.
- the SAM player opts to break lock.
- the target successfully terrain masks.

However, the following consideration is given to a missile beginning the instant terrain masking occurs:

- the missile may no longer climb, dive or maneuver, but only fly forward in its proportional moves. It is not removed from play. If the aircraft reappears from masking during or at the end of its current flight, the

original launching SAM unit is immediately allowed a reacquisition die roll, conducted as a normal lock-on roll. If successful, the missile may resume normal flight. If not, the missile is then removed from play.

Dirty Tricks Department. If desired, CG and TVM SAMs may be launched unguided (without a lock-on). The missile when launched is assigned a climb ratio in the form of levels climbed to hexes entered (2 to 1, 3 to 1 etc.); meaning it will expend FP's as necessary to meet the ratio. The missile may not do anything else until brought under guidance in a later game turn. It may not be brought under guidance in the same turn it is launched unguided, however it is not removed from play until after 5 game turns of being unguided or its TOF is up whichever is less.

To be brought under guidance, the original launch unit must obtain a lock-on to a target and the missile must meet the tracking requirements. If a lock-on is obtained with the missile out of tracking parameters, the missile is removed from play. Missiles may not be launched guided and then revert to unguided modes. When a SAM is launched unguided, no launch signals are received by aircraft RWRs, hence no launch warning.

25.4 — OPTICAL AND LASER GUIDED SAMs

Optical and/or laser guided SAMs are those with OG or LG guidance codes. Some radar guided SAMs have optical backup modes.

OG/LG Target Acquisition. Like IR SAMs, OG and LG SAMs must have an optical lock-on to the target. To obtain a optical lock-on, the target must be sighted and within the maximum lock-on range of the missile. For man portable OG missiles, the max lock-on range is listed, for others which use TV and sometimes IR optics systems, the lock-on range is six times the aircraft's visibility number.

The die is rolled as for IR SAM lock-ons except the lock-on modifiers will include the V.A.S. range modifiers on the sighting tables when attempting locks with non infantry OG/LG type SAMs.

Guidance Requirements. Optical and laser guided SAMs are basically short ranged line of sight weapons. Most OG SAMs are tracked via a flare in the rear of the missile. Therefore they must stay in the line of sight of the optical target tracker. Laser guided SAMs ride a laser beam pointed at the target. Both are therefore treated as having to meet the same tracking requirements as BR type radar guided SAMs.

OG Guidance Limits. A SAM unit may never keep more than one OG missile in the air at a time. Therefore OG missiles may not be volleyed unless stated otherwise in a unit briefing or scenario.

OG and LG Advantages. OG/LG SAMs cannot be jammed and are not very susceptible to decoys. A target aircraft will receive no RWR indications of OG/LG SAM meaning it must be sighted to be engaged.

Dual Guidance Modes. Many radar guided SAMs have an optical backup capability. These dual mode SAMs are allowed to obtain simultaneous optical and radar lock-ons, but only against the same target. The optical lock can be obtained

on earlier or later game turns.

If both locks exist at launch, radar guidance always takes priority and must be used until forced into the backup optical mode. If no radar lock is achieved, or if broken prior to launch (due to jamming, shut downs or other reasons) and an optical lock exists, the SAM may be launched and guided optically. If a radar lock is lost during the missile's flight and an optical lock already exists, it may revert to OG mode, otherwise it is removed from play. If more than one missile was under guidance, all but one are removed from play due to the OG guidance limits. Once in the OG backup mode the SAM unit may not revert back to the radar mode until the optically guided missile's flight is concluded for any reason.

CHAPTER 26 — ANTI-RADIATION MISSILES

Anti-radiation missiles (ARMs) are used to attack enemy radars. ARMs may only attack radars operating in a frequency detectable to the ARM's seeker head. The types of seeker heads available to an ARM vary from simple single frequency types to sophisticated multiple frequency ones. The exact types of seekers associated with each kind of ARM are detailed in the ARM Data Table.

Launching ARMs. ARMs may be launched at one of three times during a game turn depending on the mode of launch. There are three modes not all of which are available to all ARMs. The modes are:

1) **Self Defense Mode:** The ARM is launched in SAM interaction phase in response to a SAM TTR lock-on held or obtained against the ARM equipped aircraft. Aiming is not required but few ARMs are allowed this mode.

2) **Straight Shot Mode:** The ARM is launched at any point in the aircraft's flight after aiming requirements are met. The Missile may not climb after launch. Firer must be in level or diving flight.

3) **Lofted Shot Mode:** The ARM is launched in the Air to Air Missile Launch Phase using an extended range loft profile. Firer must use climbing flight that turn.

Note: All ARMs may use straight or lofted shots except the AGM-122 Sidarm which can only do straight shots.

ARM Launch Procedure. Firing ARMs is a three step process. First a target must be detected. Second, a fix must be obtained on the target radar. Third a successful launch roll must be made while in the listed range envelope of the ARM. ARMs may be fired at unsighted radars..

- **Target Detection:** Any EWR or TTR radar that is active at the end of the SAM interaction phase, or any FCR which is used with AAA plotted fire or that is in use to allow aimed fire at night or adverse weather, that is in the ARM seeker's lock-on arc is automatically detected for the entire turn. Any FCR that participates in aimed fire, and which is in the seeker's lock-on arc, is detected from the moment of firing until the end of the game turn.

- **Target Fixing:** ARM missiles are not aimed like other weapons. ARMs usually require the aircraft to perform a range and bearing check to get a fix on the radar.

To perform a range and bearing check, the aircraft must first maneuver or turn so that the detected radar unit is in its limited arc, regardless of the ARM's normal lock-on arc and must then steep dive for a number of FP's equal to half its speed while keeping the radar in its limited arc.

Some ARMs do not require range and bearing checks at all. They are noted on the ARM table and may achieve a fix against detected radars anywhere in their lock-on arc any time after spending FP's in wings level, non-maneuvering flight (climbs and dives okay) equal to the normal aiming requirements for the type of bombsight they have.

Self Defense Capable ARMs get an automatic fix on detected radar SAM units which obtain lock-ons on their carrying aircraft.

Fix Duration. Once a fix is achieved, the ARM is ready to be fired. Firing may be delayed for as long as to the air to air missile launch phase of the next game-turn provided the fix remains valid. To remain valid the aircraft must fly so that the targeted radar remains in the ARM's lock-on arc until launch and no other attacks, air to air or air to ground of any sort are made. If a fix is invalidated, it must be reacheived before ARMs may be launched again.

Launch Limits. One or two ARMs may be launched at a time. Regardless of when in the game-turn the ARMs are launched, they count as the aircraft's one air to ground attack and no other air to ground weapons may be used that turn. Generally, if two ARMs are fired, they must be at the same target. However, ARMs not requiring range and bearing checks may be fired at seperate targets.

26.1 — ARM FLIGHT

ARMs determine start speeds and fly exactly as air to air missiles, except rolling maneuvers are not allowed since their targets are stationary. Also, most ARMs are not given a turn ability rating except in the case of a few advanced weapons. Instead of turning, ARMs fly forward until intercepting a line of approach to their target, at which time they are allowed to turn up to 60 degrees to fly down the line to the target. They may also utilize one snap turn in their flight to help reach a line of approach.

Self defense capable ARMs have a turn ability which is used normally to allow them to turn after launch to attack radar sites off to either side of the firing aircraft.

ARM Flight Restrictions. There are certain restrictions on ARM flight for each mode of launch. They are as follows:

- **STRAIGHT SHOT MODE:** Firing aircraft must be in level or diving flight, not turning or maneuvering at the time of launch and within the listed range parameters. Launch is allowed after the expenditure of any FP in the aircraft's move in which these criteria are met. When fired, the ARM is immediately flown its full move, and then the aircraft finishes its move.

Shoot-out Exception: If the launching or other aircraft is under SAM attack, and the ARM was fired at the guiding SAM unit, then a shoot-out is resolved exactly as for air to air missile shoot outs. During their flight ARMs may not climb if at or above a target's altitude.

• **LOFTED MODE:** By lofting an ARM the maximum launch range parameter may be doubled. The launch aircraft must utilize a zoom or sustained climb on the turn of launch. The ARMs are launched in the air to air missile launch phase and began moving in the following game turn (which is considered their first for TOF purposes).

Note: Since aircraft may not do diving and climbing flight in a game turn, it will take two game turns to set up a lofted shot if the aircraft must do a range and bearing check first.

Lofted ARMs are restricted as for straight shots except that they are allowed to climb as per normal missile flight rules while in the loft phase of their flight. The loft phase can consist of up to the first half of their TOF in game-turns (rounded down). After that, or if in any game-turn the missile does not climb or it expands an FP to lose altitude or opts to lose altitude in forward flight, the loft phase immediately ends and the missile is no longer allowed to climb. During the loft phase, there is no restriction on how high the ARM may climb except for its available FPs and the altitude level 100 maximum limit.

• **SELF DEFENSE MODE:** This mode is treated exactly as a straight shot except that the ARMs are fired in the SAM Interaction Phase. They move when it is the launch aircraft's time to move. If not involved in a shoot-out, they move immediately after the launch aircraft does. Otherwise the shoot-out procedure is followed.

LOA Intercept. During flight, all ARMs must intercept the first available line of approach to their intended target. Once established on it, they may not leave it unless the target shuts down and the ARM is capable of switching targets.

ARM Attacks. ARMs always use their full attack strength against radar targets. ARMs attack only the primary target in the hex. Against vehicle units, the most damage a single ARM can do is "2D". ARM attacks are resolved the instant the missile reaches the target's hex and altitude. If multiple missiles hit at the same time, each is resolved as a separate attack. ARMs which do not reach their target in a game-turn remain in play unless their TOF is up or no available targets exist anymore.

Target Radar Loss. When an arm attacks a radar equipped unit, there is the chance the radar will be destroyed even if the unit is not. This can disable some SAM units. To simulate this, target radars are destroyed if:

- the die roll of an ARM attack was even and the level of damage was "D" or more.
- the die roll of an ARM attack was even, and the target was suppressed, AND an additional die roll results in a "3" or less.

Note: No modifiers apply to the attack die roll for ARMs.

Operative Radars. For purposes of ARM detection and attacks, radars are considered to be on and operating (even if jammed) as follows:

• **Regular EWR** - On continuously from start of game due to its mission unless shutdown in response to a recognized ARM attack.

• **SAM EWR/TTR** - Silent until the first passdown received from a regular EWR or until the player declares it on, then continuous after that unless subsequently shutdown.

• **AAA FCR** - On at start of AAA planning phase until end of game turn if used for plotted fire. If used for visual aimed AAA fire, on only from time of firing until end of game-turn. If needed so that AAA unit may utilize aimed fire at night and/or adverse weather, on continuously as for EWRs.

Radar Shutdowns. Radars may attempt to shutdown to avoid ARM attacks. A radar may attempt to shutdown in the SAM interaction phase if alerted to ARMs (EWRs excepted below), or in the flight phase if it recognizes an ARM launch against itself.

ARM Alert. All radar units in play on one side are alerted to ARM attacks the instant one of them is attacked by ARMs or recognizes an ARM launch. Operating EWR radars are not allowed to shutdown on the basis of an ARM alert. They are allowed to shutdown only upon recognizing an ARM launch against themselves.

ARM Attack Recognition. To be able to recognize an ARM launch, the radar equipped unit must be the target of the ARM and have the launch aircraft either:

- visually sighted.
- or detected if an EWR.
- or locked up if a TTR.
- or have fired at it already this turn if an FCR using aimed fire.

Note: FCRs used for all weather purposes and/or plotted fire, may never recognize an ARM launch (they may still be alerted to them).

ARM attack recognition is not automatic. A die roll as explained below must be made and only one attempt at the instant of ARM launch is allowed.

SHUTDOWN Procedure. An alerted radar wishing to shutdown in the SAM Interaction Phase, or a target radar meeting the recognition criteria in the flight phase wishing to shutdown must roll a die. On a "6" or less, the radar is immediately shutdown and goes off the air. This is done before the ARM moves.

REACTIVATION Procedure. Shutdown radars may attempt to reactivate in the SAM interaction phase of any game-turn after the one in which they shutdown. A die roll is required as above. On a "6" or less, the radar is switched back on and may be operated normally.

Shutdown Effects. Shutdown radars lose all contacts, lock-ons, and SAMs under radar guidance (optical back-ups excepted). SAM units with both EWRs and TTRs in them are required to shutdown and reactivate both simultaneously (only one die roll required).

ARM Target Switching. Whenever the original target of ARM shuts down, one of the following events occurs:

• If the ARM has no switch or no memory capability, it is removed from play (see ARM data table).

• If the ARM has switch capability, it is allowed to continue flying straight ahead until intercepting the line of approach to another detectable and active radar, at which time it may pivot up to 60 degrees to get on that line of approach. ARMs with a turn ability, may use that to change course to get on a line of approach to a new target.

Note: Normally, only one switch is allowed. Some ARMs may be allowed more (see ARM data Table Notes).

- If the ARM also has target memory capability and was already on a line of approach, it may opt to continue down the original line until the target is reached, at which time it is attacked at 1-2 odds regardless of the ARM's regular attack strength.

Note: if the memory option is taken, the switch option is no longer allowed to an ARM.

- If all targetable radars are shut down, all ARMs in flight except those with memory are removed from play. The memory capable ones may fly one more turn waiting for new radars to activate. If at the end of the additional turn, no targets are available, then the memory ARM is removed also. Regardless of its capabilities, no ARM may ever fly longer than its listed TOF.

You may now play Training scenario six and all scenarios except those involving Guided or Smart air to ground weapons.

CHAPTER 27 — AIR-TO-GROUND GUIDED WEAPONS

As air defenses became more sophisticated, incorporating radar-guided guns and SAMs, aircraft were supplied with guided weapons to improve stand-off capability and enhance survivability. The following sections describe the various guided weapon developments.

27.1 — COMMAND GUIDED ROCKETS

Command-guidance provides a flying weapon with course corrections from an external controller. There are two types of CG rocket weapons.

1) Radio Command Guidance (RCG). The pilot or the weapons officer of the launching aircraft visually tracks the weapon (which carries a flare to make it highly visible) and provides guidance commands to the weapon through the use of a joystick and a radio data link. Accuracy depends on the skill of the controller.

2) Automatic Command Guided (ACG). The pilot or weapons officer of the launch aircraft tracks the target (not the weapon) in his sights; the weapon is automatically tracked by an optical sensor which provides guidance commands through the use of a radio data link. The crew of the aircraft merely had to keep the sights on the target until impact.

Launching CG Weapons. The aircraft must steep dive on an LOA to the target and be within the rocket's minimum and maximum launch ranges (counting altitude). The rocket may be launched after any expenditure of FP while wings level (not turning or maneuvering). Only one guided rocket may be launched in an attack.

Note: Aiming need not be completed but if not, the +3 attack modifier applies and all bombsights degrade to manual. A die roll is required for successful launch.

CG Rocket Flight. Upon launch, a CG rocket immediately flies its full speed along the LOA toward the target. The rocket and aircraft alternate expending FPs as if proportionally moving with a missile (rocket moves first). Shoot-outs are resolved normally if need be. In some cases the aircraft will run out of FPs early since it fired in mid-flight. On the first turn of flight, the rocket's start speed is its base speed plus that of the aircraft. If the rocket needs additional turns of flight to reach the target, it begins to attenuate speed just like an air to air missile.

CG Rocket Guidance. As long as the rocket is moving toward the target, the guiding aircraft must be in steep diving flight and must remain on the line of approach. If the aircraft does not meet either of these criteria before the rocket hits, the rocket will miss automatically. Note that guiding aircraft move before other free aircraft.

CG Rocket Attack. Attacks are resolved normally using the weapon's attack strength. Only the primary target can ever be hit. Against vehicular units, the highest result that can be achieved is a "D" for weapons of 1000 lbs. or less and "2D" for larger weapons. For guided rocket attacks, only the aircraft damage, bombsight modifiers are used. Tracking time and rocket attack slant range modifiers do not apply.

27.2 — LASER GUIDED WEAPONS

Laser guided weapons have a seeker head that homes in on laser energy (a laser spot) reflected off the target. A laser designator capable aircraft or a FAC unit must designate the ground target before laser guided weapons may be used.

Laser Designators. Ground FACs and aircraft with either laser designator technology or equipped with laser pods (LP) are allowed to place laser spots on targets. A ground FAC may place a spot on any enemy target in its line of sight within six hexes. Aircraft designators vary in capability depending on type. There are three types:

- **Type-A:** These may place a laser spot anywhere in the aircraft's 180+ arcs if operated by the pilot, or within the 120+ arcs if used by the weapons officer. The maximum range a laser spot may be placed from the aircraft is 18 hexes (counting altitude).

- **Type-B:** These may place a spot anywhere within the aircraft's 90+ arcs out to a range of 24 (counting altitude).

- **Type-C:** These may place a spot anywhere about the aircraft out to a range of 36 hexes (counting altitude) due to telescopic sighting equipment.

Laser Spots. FACs place their spots in the Visual Sighting Phase. Aircraft may place their spots at any time during their movement prior to any laser weapons being released. The spot must be maintained until the weapons impact. The act of designating counts as the aircraft's ground attack, it may make no other attacks except to drop laser guided weapons on its own spot. Laser spots are removed at the end of the game turn unless weapons are still in flight. In this case the spots may be left but the FAC or designating aircraft must maintain them in the next game turn until weapons impact.

Laser Spot Trackers: Aircraft with LSTs can utilize laser spots for accurate aiming and are thus allowed the die roll modifier shown on the attack table when laser spot marks their target whether they use conventional or laser guided weapons.

Joint Attacks. A designator equipped aircraft is allowed to place laser spots for other aircraft to drop bombs on. This is called a joint attack and is declared in the aircraft decision's phase by identifying the participating aircraft.

Order of flight is determined normally but the designator aircraft's order of flight is changed to occur before any of the other attackers who will use his spot. If the designator is already going before, no changes need be made.

The designating aircraft must place the spot at the start of its move, or the instant it is within range to do so, and then maintain it until the end of its move. If the designator aircraft survives its move and does not violate the parameters of its designator, the spot is considered to exist until the end of the game-turn even if the designator aircraft is destroyed later in the same game turn by enemy aircraft.

Once placed, other aircraft are allowed to utilize the spot for attacks. Aircraft designating for joint attacks may themselves drop laser guided weapons on the same spot.

Designator Limitations. Engaged, stalled and departed aircraft may not designate. Using a designator imposes the following maneuver restrictions on free aircraft for as long as they are maintaining a spot:

- **Type-A:** No maneuvers except slides, no turns of greater than TT rate.
- **Type-B:** No maneuvers except slides, no turns of greater than HT rate.
- **Type-C:** No maneuvers except slides, no turns of greater than BT rate.

Laser Guided Bombs. Laser guided bombs (BG) are aimed and dropped just like BB class weapons including the use of regularly allowed modifiers except;

- The maximum damage result allowed against a vehicle unit attacked by a single bomb is "D" for HE weapons of less than 1,000 lbs. and "2D" for 1,000 lb. or larger bombs.
- If the dropping aircraft is not also the designator and has laser spot tracker technology or a pod allowing it that, an additional -1 to the attack roll is allowed.
- If no laser spot is available, the weapons may be dropped as regular BB class weapons using the BB attack strengths.
- If the laser spot is lost after the weapons are dropped under guidance, they revert to regular BB class weapons but incur the +3 modifier for not being aimed.

Note: Laser Guided Glide Bombs, move and attack per the glide bomb rules for smart weapons.

Tossing Laser Guided Bombs. Laser guided bombs may be tossed per the toss bombing rules. Lateral Toss Bombing is not allowed, however offset aimpoint tossing is. The release point requirement is not as stringent with laser bombs. Aiming is still required and tracking time modifiers are not allowed.

Toss Procedure. Aiming is accomplished by expending HFPs on the line of approach to the target. The aircraft must then expend VFPs in a zoom climb and may release weapons between three and eight hexes away after any VFP is spent. The aircraft must be further away in hexes than it is in altitude levels above the target at time of release.

The tossing aircraft may not be its own laser designator unless equipped with a model-C designator and a line of sight can be maintained on the target from weapons release to impact. The modifier for laser tossing against a sighted target is +1 per two hexes distance away and +1 per hex if the target is unsighted.

Laser Guided Rockets. Laser guided rockets (RG) must be launched from aircraft in level, descending or steep diving flight while wings level (not turning or maneuvering). The aircraft must be on a line of approach to the target and within the minimum and maximum launch ranges of the rockets (counting altitude).

The rockets may be launched after the expenditure of any FP while in the above parameters. Up to two laser guided rockets may be fired in an attack. Both attack the same target. The attacks are resolved separately. A launch roll is required as for other guided weapons.

A laser guided rocket is flown exactly as a CG rocket (including shoot-out procedures) except that the aircraft is free to maneuver after launch as no guidance inputs are required unless it is designating as well. If aiming is not completed, the +3 modifier applies and the bombsight is considered manual. The following also apply:

- The maximum damage result allowed against a vehicle unit attacked by a single RG is "D" for weapons of less than 1,000 lbs. and "2D" for 1,000 lb. or larger ones.
- If the firing aircraft is not also the designator and has laser spot tracker technology or a pod allowing it that, an additional -1 to the attack roll is allowed.
- RGs may be fired even if no laser spot exists. In such a case they are treated as an unguided heavy rocket and use the RK's attack value and all the normal unguided air to ground rocket modifiers.
- If a laser spot is lost before RGs already in flight reach the target, they revert to being unguided rockets as above but with a +3 (no aiming) modifier and the bombsight modifier is manual.

CHAPTER 28 — AIR TO GROUND SMART (SELF-GUIDING) WEAPONS

TV and IR guided glide bombs and TV and IR guided rockets are considered smart weapons as they are self guiding requiring no outside inputs. Smart weapon codes are BS and RS.

Allowed Targets. Smart weapons can only be used against well defined targets. These include the following:

- For TV GUIDED: (all uncamouflaged) AAA sites, SAM sites, Artillery sites, vehicle units, ships, locomotives, trains, buildings, hangars, shelters, urban areas, built up areas, POL sites, towers, radar units and bridges.
- For IR GUIDED: (all uncamouflaged) Vehicles, ships, locomotives, radar units, buildings, hangars, shelters, towers, urban and built-up areas.

Launch Procedure. For any smart weapon, the aircraft must be on an LOA, in level flight or steep diving with wings level and within the minimum and maximum launch ranges of the weapons. A launch roll is required. Aiming is also required and if not completed the weapon cannot be launched (smart weapons must be locked-on to the target to self-guide).

Only one smart weapon may be launched per attack, however, if the aircraft has computed or advanced sights, it may make two attacks in the same game-turn against the same target only, provided it completes aiming anew for the second attack. This is a deliberate exception to the one attack per turn limit normally imposed on aircraft.

Note: if a data link pod is in use, only one weapon may be launched per turn period, and the data link cannot be used for additional weapons until the first weapon has attacked or is aborted.

Smart Weapon Attacks. Smart weapons only use the modifiers for terrain the target is in and damage to the aircraft at time of launch. If a data link pod is in use, then the aircraft's bombsight modifier may also be applied. The maximum result a weapon of under 1,000 lbs. can achieve against a vehicle unit is "D", and for a weapon equal or greater in size; "2D".

28.1 — SMART GLIDE BOMBS

Launching Glide Bombs. Glide bombs must be dropped within the weapon's minimum and maximum ranges (counting altitudes) and from above the minimum release altitude for the horizontal distance in hexes. Minimum release altitude is one level above the target per six or less hexes of horizontal distance.

The maximum and minimum speeds a glide bomb can be launched at is 6.0 and 2.0 respectively. If launched at less than 2.0, the weapon stalls out and is removed from play. If launched at 6.5 or greater it will pitch up and strike the launch aircraft inflicting a hit with an attack rating of "2" while sending itself out of control (remove from play). The same occurs if jettisoned at speeds greater than 6.0.

Glide bombs may be carried at speeds up to 8.0, however if carried at a faster speed, they become damaged and will automatically fail upon launch.

Glide Bomb Flight. A glide bomb is given a speed equal to the aircraft's on the turn of launch. On its first turn of flight, it will only fly down the LOA for as many FPs as the aircraft had left to it upon launch. After that it will fly each turn an amount equal to the aircraft's speed upon launch. The weapon may fly forward and/or steep dive, it may not turn or stray off the LOA.

Note: If used against a target that is moving, the weapon may do slide maneuvers as necessary to stay on an LOA.

The glide bomb is not required to lose altitude on the turn of launch, however, it must lose at least one altitude each turn thereafter. Careful planning of where to launch from will prevent a weapon impacting short.

Data Link Pods. Some smart weapons may not be used at all unless a data link pod is carried by the aircraft. These weapons are noted as such in their data tables.

Lofted and CG Glide Bomb Attacks. Certain glide bombs may be used in conjunction with data link pods to perform

lofted glide bomb attacks or command guided glide bomb attacks. Such weapons are also noted in the tables. These attacks are performed as follows:

- **Lofted Glide Bomb Attacks.** A lofted glide bomb may be launched from below the minimum release altitude. The aircraft must aim and then zoom climb as in toss bombing attacks. The glide bomb may be released after the expenditure of any VFP. The lofted glide bomb must expend available FPs to climb at least as many additional levels as the aircraft did that game-turn prior to launch (one VFP can gain one or two levels). The rest may be used as HFPs. On following game-turns, the bomb moves normally.

- **Command Guidance Glide Bomb Mode.** Use of this mode allows the launch aircraft or other aircraft equipped with a data link pod to aide the glide bomb in acquiring the target after launch.

With command mode, a glide bomb may be lofted at unsighted targets using offset aimpoint bombing techniques, or dropped normally at out to 1.5 times its normal maximum range. However, an additional launch roll, over that used to launch it, is required on the second turn of its flight if lofted, or on the first turn in which it enters normal maximum range. This is to see if it acquires a lock-on to the target. In this case the pilot or weapons officer in the data link aircraft is trying to get the weapon a lock-on after launch via the data link. If the roll fails, the weapon is removed from play. If it works, the weapon flies normally.

28.2 — SMART ROCKETS

Smart Rocket Specifics. Smart rockets (RS) must be launched from within the minimum and maximum range parameters. No minimum altitude restrictions apply. Smart rockets move down the LOA and conduct attacks just like command guided rockets except of course, that no guidance inputs from the launch aircraft are required.

Extended Flight. If a smart weapon (BS or RS) does not reach a target on the first turn of its flight, it will move in subsequent game-turns according to the flight phase order of movement sequence (see sequence of play in play aids) unless involved in a shoot-out which is conducted normally.

ADVANCED RULES

28.2 — AIR TO SURFACE MISSILES

Air to Surface Missiles (ASMs) are generally large anti-ship weapons which function in a manner similar to smart weapons. They are usually very long ranged and rely on programmed flight profiles until within a terminal homing range.

ASM Launch. An aircraft must be in level flight and wing's level, not turning or maneuvering at the end of its flight. ASMs are launched in Air to Air Missile Launch Phase. An aircraft launching ASM's may not launch other missile types. Up to two ASMs of identical types may be launched in a turn. A launch roll is required as for other missile launches.

Enroute Guidance Modes. ASMs may be capable of the following enroute guidance modes. The following are addi-

tional launch requirements for each mode:

- For Inertial Navigation mode; target coordinates must be known before hand and fed into the missile. If the target is radar significant and its position is known (stated in the scenario), one such target may be preprogrammed into the ASM before play. Otherwise, the aircraft must lock the target up on radar and roll a 9 or less to complete targeting.

- For Autopilot mode; no targeting is required, missiles can simply be launched straight ahead. Targeting before launch as for INAV ASMs is allowed as well. Post launch target acquisition may be through the ASM's own terminal guidance mechanism or sent via data link if the ASM is Midcourse Guidance Capable (MCG).

- Terminal Mode; if target within ASM seeker's terminal guidance range, and a weapon lock-on is obtained, the ASM will self-guide like a smart weapon. Terminal guidance methods and their associated rules will be given as necessary in the scenario booklet.

Flight Profiles. When launched, ASM's will utilize either surface skimming, or terminal dive profiles (SS, SS+, or TD).

- Surface Skimming missiles must immediately steep dive or level descend after launch to altitude level one or one above the ground. On the next turn they enter terrain following flight. Only SS+ missiles may operate over land. Regular SS missiles crash if they pass over land terrain. SS missiles remain in T-level until reaching their target. SS+ missiles may climb and dive along terrain contours in the same turn and will if necessary exit T-level to cross a terrain rise of more than two levels in a single hex. They would reenter T-level in the next game turn.

- Terminal Dive missiles are restricted to level flight until within terminal Homing range. Once target lock-on is achieved, the missile's may steep or vertical dive into their target's.

ASM Speed. ASMs have a first turn of flight speed equal to their listed cruise speed plus half the launch aircraft's speed. On subsequent turns they fly at cruise speed. This speed never changes except during terminal dives into a target where normal accelerations are allowed.

ASM Course Changes. An ASM in INAV mode may use turning flight on each of 3 separate game-turns (player's choice) while enroute to affect course changes on the way to its target. An ASM in autopilot may only fly straight ahead until targeting is completed. It is then allowed one game-turn of turning to make a course correction. An ASM that receives a mid-course update may use turning flight on each turn it receives the update in addition to normal turning. In all cases, once in terminal homing phase, the missile's may fly normally to attack their targets.

ASM Attacks. ASMs attack upon entering the target's hex at zero altitude. Roll to hit as for air to air missiles and modify the roll for the presence of target launched decoys and ECM as given on the ASM modifiers table. A hit allows an air to ground attack using the listed attack strengths.

Note: For more information on ASMs, other naval weapons and attacking ships; GDW's "Harpoon" game by Larry Bond is an excellent reference. "Harpoon" is not directly compatible

with Air Power though the scales and subject matter are similar.

You may now play all scenarios at the basic level.

CHAPTER 29 — AIRCRAFT FUEL USAGE

This chapter details the restrictions imposed on aircraft operations by their need for fuel. This entire Chapter is an **ADVANCED RULE**.

29.1 — FUEL CONSUMPTION

Fuel Points. Fuel is measured in fuel points. Each fuel point is equal to approximately 20 pounds of JP4 jet fuel (in some aircraft each point represents a lesser amounts).

Internal Fuel Tankage. The ADC shows the internal fuel tankage (in fuel points) for an aircraft.

External Fuel Tankage. Fuel may also be carried in external fuel tanks. When an external fuel tank (FT) is attached to an aircraft, the aircraft can carry additional fuel points.

Starting Fuel. If a scenario indicates that starting fuel is greater than internal tank capacity, the excess fuel is in the external tanks. If the tanks are jettisoned, the total fuel available is immediately reduced to internal tank capacity. If starting fuel is less than internal capacity, the external tanks are empty. They may be jettisoned without penalty.

Fuel Usage. An aircraft uses fuel points each game-turn based on its power setting for the turn. The power chart on the ADC shows the fuel usage for each power setting. In the Aircraft Admin Phase of a game-turn, the aircraft notes the fuel used and subtracts it from the previous game-turn's fuel remaining.

The power chart assumes that all engines for the aircraft are operating. If one or more of the aircraft's engines are not operating, fuel use is multiplied by the fraction of engines still running. For example, if one of two engines is running, fuel use is half of the amount indicated.

Exhausted Fuel. If, at any time, an aircraft's fuel points are reduced to zero, its engines flame-out and cannot be restarted. The aircraft, if not landed before then, glides to its destruction being considered a kill for the enemy.

Bingo Fuel. The quantity of fuel required to return safely to base is bingo fuel. This quantity is provided in the scenario. When an aircraft ends a scenario or disengages, the fuel it has remaining is noted and compared with the bingo fuel figure. Roll one die and consult the appropriate column on the bingo chart to determine the aircraft's fate which will be either a safe return, divert to an emergency landing strip, or a crash. If a crash occurs V.P.s equal to an aircraft kill are awarded to the other side in lieu of the crashed aircraft's end game damage. If the aircraft diverts, bonus points equal to L damage on the aircraft are awarded to the other side.

29.2 — PROLONGED SCENARIOS

When fuel usage is in effect, players may continue to play a scenario without regard to its specified length in game turns. Instead, the scenario continues until all aircraft of one side have been destroyed or have disengaged from battle.

Disengagement. Aircraft generally disengage because of damage or fuel considerations. An aircraft may disengage at the end of any game turn in which one of the following apply:

- It is not visually spotted and not radar contacted and rolls an 8 or less.
- It has flown out of spotting range and is not radar contacted, and the player rolls 8 or less.
- The aircraft is spotted but out of enemy cannon range and outside IR missile maximum lock-on range and no radar lock-ons with the potential of guiding radar missiles are held against it and the player makes a disengagement roll of 6 or less.
- The aircraft declares an intent to disengage, and subsequently avoids getting shot at by missiles or guns for three game-turns running and makes a disengagement roll of 4 or less.
- The aircraft has agreement from all other players that it can disengage.

Aircraft which intend to disengage may not make attacks of any sort. Aircraft which successfully disengage are removed from play.

29.3 — AIR TO AIR REFUELING

Tankers. Some scenarios may specify that air to air refueling tankers are available to one side or another. If that is the case, aircraft that are capable of air to air refueling, may seek to refuel from a tanker at the end of play.

Refueling Procedure. The scenario will give a tanker availability number. When play ends, a die is rolled for each group of aircraft that disengaged together or ended play together. If the result (after individual modification) is equal to or less than the tanker number, an aircraft in that group is considered to reach the tanker and will receive enough fuel to bingo home safely regardless of their fuel state at the end of play.

A die roll modifier of +1 to reach the tanker exists for each 20 percent below bingo fuel an aircraft exits the game with. Apply this modifier individually to the group roll for each aircraft.

CHAPTER 30 — NIGHT AND ADVERSE WEATHER

This chapter details the effects of various weather phenomena on aircraft flight and combat. This entire chapter is an **ADVANCED RULE**.

Weather is an important consideration in air combat. Clouds offer concealment from visual and IR guided weapons, contrails give away aircraft positions, night or adverse weather conditions can hinder or limit aircraft flight, or the Sun can

dazzle a pilot or draw off an IR missile. The following rules address these factors.

30.1 — COMMON WEATHER

Contrailing. Aircraft or missiles at high altitude and high speed can leave contrails in the air. Anytime an aircraft or missile is at a speed of 4.0 or more and within the Contrail Levels, it leaves a contrail.

To determine the contrailing levels, roll one die and add the result to the base contrail level given on the weather chart for the geographic region of play. The result is the lowest level contrailing occurs. Contrails occur up to 25 levels above the lowest contrail level.

Any aircraft or missile that is contrailing, is automatically sighted, assuming no cloud layers are between it and a searching aircraft, out to a range of 150 hexes. (90 hexes for missiles) regardless of normal visibility limits.

The Weather Table. The game weather is either given in the scenario notes or can be generated by the weather table. To use the table, roll one die and consult the appropriate geographic area column. The result will be either, Clear, Broken, or Overcast skies. Roll again under the appropriate heading to determine if Haze and/or any Cloud Layers exist.

Haze Layers. If Haze is indicated for some altitude band, it exists in all levels of that band and down to ground level. Haze reduces visibility. The maximum visual sighting range to and from aircraft in Haze is twice the target's visibility number in hexes. The sighting range to ground units in Haze is halved.

Cloud Layers. Two types of Cloud Layers may be called for; Stratus and Dense. More than one layer of each type may be called for. When the Weather Table result includes Cloud Layers determine their exact altitudes as follows;

• **Stratus Layers**— Put all the Stratus information counters in a cup, randomly pick one for each layer called for and flip the counter like a coin. The number on the resulting Face up side is the altitude level the Stratus Layer occupies. Each Stratus Layer is only 1,000 feet thick.

• **Dense Layers**— Put all the Dense information counters in a cup and randomly pick two for each Dense Layer called for. Refer to the "Low Ceiling" side of the first counter drawn and the "High Ceiling" side of the second drawn for each Dense Layer. The indicated numbers are the lowest and highest levels of the Dense Layer. Dense clouds exist in those levels and all levels in between. Dense Layers which overlap simply combine into a larger Dense Layer.

Stratus Layer Effects. Aircraft above or below Stratus may not sight aircraft on the other side. Aircraft in a Stratus Layer may be sighted and may sight targets above or below but with adverse sighting die roll modifiers (see Sighting Modifiers Tables). Two aircraft in the same Stratus Layer may not sight each other unless they are in the same or adjacent hexes.

IRM Effects. IRMs may pursue and attack aircraft in Stratus Layers. However, anytime both target and an IRM end a proportional move in the same Stratus Layer and the missile is not in an adjacent hex, it loses seeker lock-up and is removed from play. If, at the end of a proportional move, the target and IRM are on opposite sides of a Stratus Layer, the missile loses

seeker lock-up and is removed from play.

Dense Layer Effects. Aircraft in dense layers may not sight or be sighted. IRMs pursuing aircraft that enter a dense layer may attack them only if they can reach their target during their very; next proportional move. If they cannot, they are removed from play.

An aircraft entering a dense layer becomes unsighted unless; It is daytime and an enemy aircraft can establish tailing parameters on it. Only the tailing aircraft can sight it on the following turn. Gun combat is allowed only in daytime and only to the tailing aircraft. In dense clouds collisions remain possible even to tailing aircraft and friendly aircraft not in Close formations.

Dense clouds are considered adverse weather for purposes of pilot disorientation. At night, aircraft under a dense cloud layer are considered in adverse weather. TV/IR optics, illumination flares and laser designators do not function in dense clouds.

Sighting / Combat Effects of Cloud Layers. It is easier to see aircraft against white backgrounds. When looking for aircraft whose altitude level is between the sighting aircraft and the clouds apply the silhouette modifiers given in the sighting table.

Bright sunlight reflecting off clouds can distract IR guided missiles. When launching IR missiles at a "lower" target which is above the highest cloud layer in play, add 3 to the missile's launch roll.

WEATHER GENERATION TABLES

GEOGRAPHIC AREA

(roll one die for sky condition)

Sky Type	Far North/South	Middle Regions	Desert Areas	Tropical Areas
Clear	1 to 4	1 to 5	1 to 8	1 to 6
Broken	5 to 7	6 to 8	9 to 10	7
Overcast	8 to 10	9 to 10	NA	8 to 10
Contrail Alt.	20	25	30	25

ACTUAL WEATHER

(roll die to determine haze and cloud layers)

Die Roll	CLEAR	BROKEN	OVERCAST
1	LO Hz	LO Hz, 3 Str.	LO Hz, 3 Str., 1 Dns.
2	ML Hz	ML Hz, 1 Dns.	LO Hz, 3 Str., 1 Dns.
3	1 Str.	MH Hz, 1 Dns.	LO Hz, 2 Str., 2 Dns.
4	1 Str.	1 Str., 1 Dns.	1 Str., 3 Dns.
5	2 Str.	2 Str., 1 Dns.	2 Str., 2 Dns.
6	—	3 Str.	2 Str., 2 Dns.
7	—	4 Str.	2 Str., 3 Dns.
8	—	HI Hz, 1 Str.	ML Hz, 1 Dns.
9	—	LO Hz, 1 Str.	2 Dns.
10	—	2 Str.	1 Dns.

30.2 — THE SUN

The Sun has always been a factor in air combat. Pilots often try to maneuver so that enemy pilots or AAA gunners are dazzled by the glare. The Sun may also draw off IR guided missiles.

Sun Position. The sun is always considered to be off map. a Sun Arc is defined from each aircraft extending away from the Sun's position, East in the morning, West in the Evening. Think of the Sun arc as where the aircraft's shadow would go. Any units in the Sun arc and in the Sun Angle altitudes of a target aircraft, will suffer Sun Clutter Effects.

Sun Arc. The Sun arc equals a limited radar arc in size.

The Sun Angle. To be effected by Sun Clutter, a unit must be in some vertical position relative to the target which depends on the time of day. The Sun angle is defined in terms of an Altitude level per hex away ratio. Mutually agree on, or roll the die to determine a time of day. refer to the table below to get the Sun Angle ratio.

SUN ANGLE CHART

Die Roll	Time Of Day	Sun Angle
1	Dawn	0 levels per hex away.
2 to 3	Early Morning	1 level per two hexes away.
4	Late Morning	1 level per hex away.
5 to 6	Noon	Any level below target if within two hexes of target.
7	Early Afternoon	1 level per hex away.
8 to 9	Late Afternoon	1 level per two hexes away.
10	Dusk	0 levels per hex away.

For Example: to be affected by Sun Clutter in the early morning, an aircraft six levels below a target would have to be West of the target, in its Sun Arc and either 12 or 13 hexes away. Sun Clutter is only possible if the involved aircraft are all above the highest cloud layers and the target is not in Haze.

Sun Clutter Effects. Units in Sun Clutter may not be used to visually search for or padlock the target. If an enemy ends a turn with all opposing aircraft in its Sun Arc, it becomes unsighted.

IR missiles launched in target's Sun Clutter add 3 to the launch roll. IR missiles ending a proportional move or game-turn in target's Sun Clutter must roll a die to see if they are decoyed by the Sun. Use the Flare Vulnerability number +3 as the die roll or less needed.

AAA Units firing from target's Sun Clutter, add 1 to their hit die rolls.

30.3 — NIGHT AND ADVERSE WEATHER FLIGHT

Night and Adverse weather conditions severely limit what a pilot can or will do with his aircraft. Night flying in Clear Conditions is less restrictive.

Clear Weather Night Flight. An aircraft above all dense layers, and not in haze or stratus is considered in the Clear. The following limitations apply to Clear Wx night flying:

- ET turns, Roll Maneuvers, Viff Maneuvers, Vertical Climbs and Dives, and Vertical Reverse Maneuvers are allowed only at the risk of Pilot Disorientation.

- IRMs may not be fired unless the target is visually sighted or an IRSTS or Radar Assist is used.

- Visual sighting ranges for all aircraft is 2 hexes unless the target used A/B power or is contrailing in which case the sighting range is 6. Sighting modifiers for paint

scheme, relative altitude and smoking do not apply at night.

- Missiles may only be sighted on the turn after launch and on each turn a sustainer is burning. The visibility numbers are halved and the Just Launched modifier does not apply.

- Missiles or aircraft contrailing above the highest cloud layers are spotted automatically up to 24 hexes away due to moonlight reflections.

- Tailing is not allowed, TFF is not allowed unless Terrain Following Technology exists. Note, being equipped with TV/IR optics capability confers Terrain Following-A technology on the aircraft.

- Visual Aiming for ground attacks is allowed only if the target is illuminated by parachute flares, or the aircraft has TV/IR optics, or a Laser Spot Tracker with a laser spot.

- Only Laser Designator Types B and C may be used at night.

- Only Novice or better quality pilots may fly at night.

Adverse Weather Flight. Aircraft in Dense Clouds or below any cloud layers at night or in haze at night are in Adverse Weather. The above restrictions apply as well as the following:

- Viff, Roll, and Vertical Reverse Maneuvers are not allowed.

- Turns at greater than TT rate risk Pilot Disorientation.

- Turn Rates of HT or greater while in TFF flight risk fatal collisions with the ground for Terrain Following-A capable aircraft.

- Turn Rates of BT or greater while in TFF flight risk fatal collisions with the ground for Terrain Following-B capable aircraft.

- Turn Rates of ET while in TFF flight risk fatal collisions with the ground for Terrain Following-C capable aircraft.

Check for fatal ground collisions each time the aircraft does a facing change at a rate in excess of the safe limit. On a die roll of "1" the aircraft crashes killing the crew.

Pilot Disorientation. Anytime an aircraft performs an action which risks disorientation or faces while turning at a rate that risks disorientation, roll the die. On a modified "3" or less, the pilot becomes disoriented and the aircraft conducts the rest of its move as if the pilot were GLOC'd.

The disorientation die roll is modified for the following:

- + or - pilots Confidence.
- +1 for Veteran Pilots.
- -1 per facing in a sustained turn (cumulative).

Disorientation Recovery. Recovery from Disoriented flight requires a die roll as if recovering from departed flight with all the appropriate departure recovery modifiers.

Nigh and Adverse Weather Effects on Ground Units. The following limitations are placed on units attempting to engage aircraft at night and/or in adverse weather:

- AAA may not use aimed fire unless stacked with an FCR or having "W" type integral FCR, or if they visually sight the aircraft and can track it long enough to fire (night sighting ranges = 2 or 6 hexes as described above).

- AAA may conduct plotted fire but if not radar equipped, each unit may only plot one target hex and altitude before a game begins and may not vary from that.

- IR SAMs may only attempt lock-ons against visually sighted targets (night sighting ranges = 2 or 6 as described above).

- IR SAMs may operate normally if equipped with Night IR sights against targets in AB power and may attempt lock-ons on others out to six hexes.

- OG and LG SAMs may only operate at night if equipped with Night IR sights as above.

- Only Radar Guided SAMs and Radar Guided AAA may fire on aircraft in Dense Clouds.

30.4 — AIR TO GROUND NIGHT AND ADVERSE WEATHER ATTACKS

Aircraft need help in locating targets at night. FACs and target marks have been previously discussed. Other aids for night attack include; illumination flares, TV/IR Optics, and Ground Attack Radar.

30.4.1 — ILLUMINATION FLARES

Aircraft equipped with Illumination flare pods may drop parachute flare clusters which light up the hex they are dropped in and the six adjacent hexes as if it were daytime.

Illumination Flare Pods (IP). Illumination Flare Pods may be carried on stations capable of carrying EP pods. There are four flare clusters per pod. The parachute flares are distinct from decoy flares and may not be used as such. Parachute flares become effective when within 5 levels of the ground.

Procedure. Aircraft with IPs may initiate a flare run which counts as the allowed air to ground attack for the turn. In a flare run the aircraft may dispense up to four flare clusters, one per hex, in any hex it passes through in its flight. The aircraft may fly level, climb, or dive, but it must be wings level, not turning or maneuvering when it actually releases flares. It may turn and maneuver between flare releases in a game-turn.

Duration. Parachute flares last for 10 turns including the turn in which they were launched, or until they hit the ground, whichever occurs first. The flares descend at a rate of one level per odd numbered game-turn, starting the turn they were launched.

Effects. Ground targets in illuminated hexes may be sighted and attacked normally by aircraft as if it were daytime.

30.4.2 — TV/IR OPTICS CAPABILITY

Aircraft with TV/IR Optics technology or that carry Optics pods are considered to have the following capabilities:

- They may visually sight into their 180+ arcs out to a range of 18 hexes (count 2 levels of altitude as one hex) as if it were daylight. They may visually attack sighted targets within

that range as if it were daylight.

• If they are designator equipped (via technology, or by carrying an LP pod, or dual capable OP/LP pod), they may opt to visually sight and attack sighted targets as if it were daylight into any single arc that the designator can place a laser spot in. instead of their 180+ arcs. As above the range is 18 hexes.

30.4.3 — RADAR BOMBING

Aircraft with ground Nav and Attack radars, or with air to air radars of 150+ arc capability, or multi-crewed with radars of 180+ capability, may do radar bombing.

Radar Bombing Options. Radar bombing allows level bombing attacks with BB class weapons against radar significant targets which have been radar detected. If the radar significant target is locked-onto and the aircraft has computed or advanced bombsights, dive bombing, toss bombing and laydown attacks are allowed as well.

Radar Significant Targets. The following comprise radar significant targets:

- In any terrain; building counters, locomotives, trains, POL sites and bridges.
- In Clear terrain or on roads and trails; Vehicle units, AAA and Arty. sites, SAM sites, and radar units.
- Naval units at sea, on rivers, or in ports. Docks, Piers, and Dams.
- Aircraft on runways, in revetments, and all airport facilities (hangers, shelters, towers).
- Isolated urban areas of not greater than 3 hexes in size and not adjacent to built up area, built up area hexes, and runway hexes.
- Any hex with a black navigation point triangle in it.

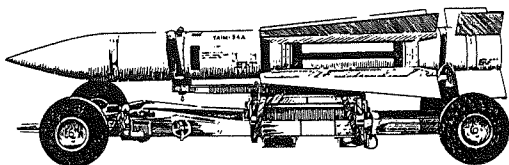
Radar Detection Procedure. If the target counter, or hex is in a line of sight, within the aircraft's radar arc and detection range, roll one die. On a 7 or less the target is detected. Air to air radars used in the air to ground mode halve their maximum detection range. Ground Nav and attack radars have no strength ratings and may never be used in an air to air manner. Their lock-on numbers are asterixed as a reminder.

Radar Bombing Procedure. Normal aiming is required against the target. Tracking time does not apply. If a lock-on is held, then the bombsight modifier is applied otherwise it is ignored. Attacks are resolved through normal procedures.

Ground Radars and Laser Designators. Aircraft that have locked up a radar significant target and that have Designators type B or C, may place a laser spot on the target without visually sighting it and may conduct laser guided weapon attacks.

CONGRATULATIONS!!

You have now learned all the rules (it's Miller time)!
You may now play all scenarios.



AIR POWER TACTICAL HINTS

This is a game of jet fighter tactics. Your success or failure in battle will rest entirely on the decisions you make and the tactics you use and not just on the hardware you fly (though good hardware helps).

OFFENSIVE HINTS

In the Korean War era (early to middle 1950's), you have only guns to fight with. There will be many aircraft in close proximity, therefore you must destroy any foe you engage quickly. Doing this requires getting as many beneficial to hit die roll modifiers as possible. Strive to shoot from in close with as little deflection as possible, use radar ranging and steady state gunsight tracking. This is particularly important with early model MiG fighters and their inaccurate guns. Take any reasonable shot you can. Remember, in multi-aircraft battles do not spend much time pursuing a single foe as others will soon gather on your tail if you do.

In the Cold War era (late 1950's through early 1970's), interceptors will usually have some leisure time in which to set up their attacks. However, it is vital that a good intercept flight path be flown because if you turn late, or bleed off too much speed rolling in behind a jet bomber, you may find yourself eating vapor trails as it rapidly heads into the sunset. This is especially true with early transonic interceptors that don't have the acceleration to salvage a botched approach. Bomber players should try to maneuver in such a way as to spoil any initial pursuit curves. Against supersonic interceptors, bombers will have to rely more on jamming and decoys to break past and survive.

In the Vietnam era, (1960's to early 1970's) one side often has missiles and the other doesn't. In this case, it is extremely important for the non-missile player to close with his opponent and force a dogfight. While this is dangerous, in most cases it will nullify the missile threat and equalize the situation. If the missile armed fighters break away to gain separation, the gun armed fighters must pursue them even if they can't shoot so that they will be close enough to re-engage in a dogfight if and when the missileers try to turn back.

In the modern post-Vietnam era (1975+), When both sides have good missiles, it is important to force the enemy onto the defensive early. Get the first shots in even if they aren't good ones, but use the distraction they cause to follow up with better shots. With missiles you must fly to a position from where they will have a good chance to intercept the target. Too close, and the missile will be dodged. Too far and it will be outran. If you have guns and missiles, maneuver to employ the guns and you will find that you often end up in good missile envelopes anyway. Doing this without guns is not recommended as you just increase the chances of ending up in a dogfight where your missiles aren't as effective. Employing missiles without a gun is best done via high speed slashing attacks. The speed allows you to more easily evade gun armed enemies if a missile shot fails.

As you play the game, you will develop a better feel for how to employ the various capabilities of the different jets. However, some good basic offensive principles to always follow are:

1. Point your nose at the enemy!
2. Strive to shoot first!
3. Use your best weapons first!
4. Fight using your aircraft's best characteristics!
5. Divide the enemy and conquer him piecemeal!
6. Watch your fangs! and don't get greedy.

DEFENSIVE HINTS

The missile age has not ended the dogfight, it has just made it more dangerous! If you are defensive, your immediate priority is survival. That is accomplished by getting out of your opponent's weapons parameters as quickly as possible.

Your first goal after that is to neutralize the situation. If you can do this by facing your foe; even better. Being in the same initiative category prevents you from automatically moving first and winning an initiative roll could be the key to gaining the offensive and reversing the situation. Good defensive principles to follow are:

1. Never give up! You can always get lucky.
2. Make the enemy work hard for his victory; he may give up first.
3. Maintain mutual support. Always aid your wingmen.
4. Generate angle-off, never give the enemy an easy shot.
5. Use every defensive countermeasure at your disposal. Never conserve decoys, you might not be there later to use them!

MANUEVERING HINTS

Most battles begin from a head on approach. Prior to shooting, maneuver out to the side of your approaching enemy and swing back in to fire from his side or rear so that when he detects you he cannot return fire. If you have time, split your forces to hit the incoming enemy from both sides in a sandwiche. In a split, everybody must arrive to attack at the same time; otherwise, the enemy can counter your attack.

When you detect a split, counter by turning obliquely into it so as to face the threat while not being caught in the middle. Maneuver to pass through or destroy one side of the split while keeping the other side out of position to attack.

Your options when you pass an enemy jet are twofold; you may commence reversing or you may extend away gaining separation. There are advantages to both.

If you can turn better or have an angles advantage at the pass, go for the reversal. If you are fast, zoom climb to reduce speed and turn radius. If slow, dive to maintain speed as you turn. Beware of special maneuvers which seem good. The half roll and dive will allow you to pass an enemy and quickly turn to face him but you will be much lower and out of the fight for several turns.

If you cannot turn well, only reverse if you will be able to get a quick shot off. Otherwise, extend away from your opponent to get separation prior to turning. If fast, do a shallow zoom climb as you pass and start an easy turn to keep your opponent out of your blind spot. Follow this with a vertical climb and vertical roll back into him. If you don't have enough speed for vertical climbs, half roll and dive back into him.

Don't forget to look at the overall situation. When you pass an opponent, it will take him two or three turns to get back around to shoot at you. It may be better to ignore him to take a quick shot at some other foe across the battle area. Perhaps your wingmen will be in similar position and can turn on the one that just passed you.

DISENGAGING HINTS

In Korea, it was easy to disengage. You just had to get out of gun range and run. In the missile age this is more difficult as getting out of missile range is tough and outrunning missiles is even tougher. The best way to disengage is to kill off all your opponents first. This is not always possible.

To escape a missile armed foe, you need time and speed! Disengage when it is prudent and not after you are in trouble. Plan your pre-disengagement moves to gain a speed advantage over the enemy. When he is momentarily out of position, such as after passing head on, plug in afterburner, do an unloaded dive and run! Head down for ground clutter and only turn enough to keep your foe in sight so you can engage any shots he manages to get off. You will need some luck too! But we gamers are full of that anyway aren't we?

GROUND ATTACK HINTS

As an attack pilot, it is your job to get in, hit the target hard, and bring your aircraft back to base in one piece. This requires good mission planning which is a three step process.

STEP 1: CLASSIFY THE THREAT ENVIRONMENT.

STEP 2: WEAPONER THE TARGET.

STEP 3: CHOOSE INGRESS AND EGRESS ROUTES.

Begin by examining all available intelligence of the target area. Classify it as either a "low", "medium", or "high" threat environment.

A low threat environment is one where aircraft can be expected to operate with only brief exposure to enemy fire. A medium threat environment is where aircraft will be exposed to enemy fire most of the time but the fire is not exceedingly lethal. A high threat environment is one having highly accurate and lethal defense systems in it, or being densely populated with less lethal systems. It also includes any target where enemy fighters abound in quantities sufficient to get through any escorts.

You must next choose from available weapons, those whose attendant delivery requirements offer the best balance between probability of target destruction and exposure to defenses.

The best route and altitudes to fly will be dictated by the defenses and the weapons chosen. Go in high if the threat is low or medium. The benefits are threefold; target acquisition and tracking is easier; a lot of AAA fire can be avoided; and SAMs or fighters can be spotted with sufficient time to be countered.

If the threat level is dangerously high, then go in low. Terrain following flight might be in order. Study the terrain near the target carefully to see if it affords you any protection from the defenses and use it if it does. The attack pilot must do his utmost to hit the target but must not be suicidal. Part of his job

is to get back. Since there comes a time in every attack where the aircraft must expose itself, the following principles should be followed to increase probability of survival:

1. Attack at the highest possible speed. Speed is life!
2. Make only one pass, minimize your exposure to enemy defenses.
3. Use teamwork; overwhelm the defenses.
4. Always suppress the defenses. Have some aircraft attack threatening AAA and SAM sites.
5. Don't loiter; act decisively!

To summarize: The faster your jet is, the less time the enemy has to react. High speed will get you through enemy gun and missile envelopes in less game-turns. Never attack alone. The SAM or fighter that will get you is the one you didn't see (and thus couldn't engage). A wingman nearby can keep an eye on your tail while you are in your attack. There is no countermeasure for a lead bullet. When engaged by AAA, Jink! If attacked by SAM's, engage them using all possible countermeasures. If a fighter threatens you from behind, jettison ordnance and defend yourself. If the fighter is to your side or front, keep your ordnance; shoot him if you can; let him go if you can't.

Once you have made your main attack, runaway. This is not a matter of cowardice, it is good sense. Well, these are just some simple basics to get you started. Good luck. Experience is the best teacher and you will figure out more tactics as you play!

DESIGNER'S NOTES

These game rules have been a long time in the making and are certainly a labor of love on my part. The original **Air Superiority** game by GDW appeared in 1987 and over the years numerous suggestions for improvement have been recieved. I have also been able to sit back and with the help of many key individuals, think of better ways to approach certain aspects of the game which make it more playable and allow it to better portray the essence of modern fighter combat. This set of rules incorporates those changes and also includes the rules that appeared in the **Air Strike** and **Desert Falcon** modules, also by GDW, which expanded the original game's scope from simple air combat to total air warfare and power projection against ground units.

Modern air combat, is an area that recieves very little attention in wargaming. **Air Superiority** was not the first game to cover the subject and **Air Power** won't be the last either, but this set of rules is the first to successfully cover air warfare in such rich detail. I wish it could be an easier game to master. Unfortunately it is not, but I have tried to make it learnable in stages. If you are willing to take the time to delve in the system you will be rewarded with knowledge and insight into the fighter pilot's world. The game is accurate and provides the correct feel. Of this I am certain because I have been a military jet pilot for over twelve years and a wargamer even longer. The game system has even been used as a training tool in some military bases. I hope you enjoy the time you spend with the game because it should be fun.

God bless, and thanks for buying the game!

J.D. WEBSTER

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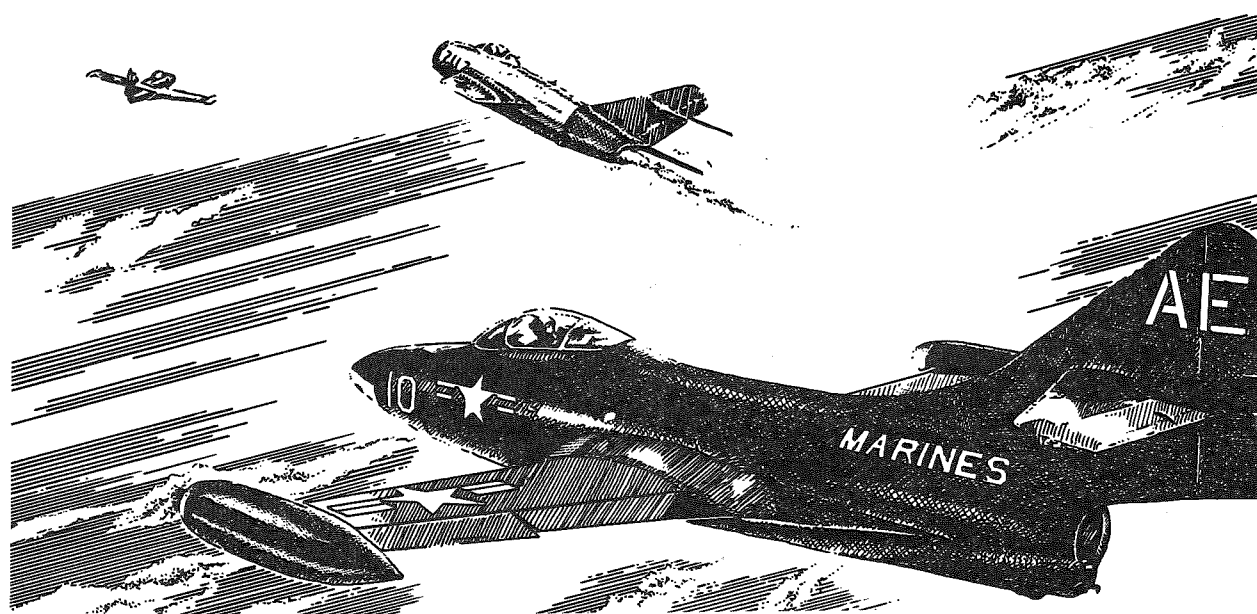
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RS (Smart Rocket): Rule 28.2	Page 63	Visual Sighting: Rule 11	Page 23
S (Suppressed Combat Result): Rule 21.2	Page 49	Volley No., SAM Characteristics: Rule 25	Page 56
SAM (Surface-to-Air Missile): Rule 25	Page 56	VPs (Victory Points): Rule 4.2	Page 06
SAM Dual Guidance Modes: Rule 25.4	Page 58	VR (Vertical Roll): Rule 13.3.4	Page 29
SAM Unit Reloads: Rule 25	Page 56	Vulnerability; Aircraft: Rules 4.1, 10.1	Page 22
SAM Target Passdown: Rule 25.1	Page 57	Weather; General, Night, Adverse: Rule 30	Page 65
SC (Sustained Climb): Rule 8.1.2	Page 16	WP (area Weapon dispenser Pod):	Ext. Stores Tables
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Sequence of Play: Rule 2.1	Page 03	ZC (Zoom Climb): Rule 8.1.1	Page 16

... *The Speed of Heat!*

An Air Power Series Game

A Clash of Arms Game



"...THE SPEED OF HEAT!"

JET FIGHTER COMBAT
KOREA TO VIETNAM 1950 - 1975

INTRODUCTION

This is a game of tactical air combat in which players control one or more jet fighters in scenarios recreating the actual situations faced by American fighter pilots, in combat, from the earliest days of jet fighting in Korea through to the big air battles of the latter days of the Vietnam War. In this time frame, between 1950 and 1975, the speed and performance of jet fighters trebled and their armament underwent a number of significant evolutions. Initially, jet aircraft were armed with only guns and simple gunsights. However, jet fighters soon incorporated newly developed radars and rockets, then guided missiles, and finally, a mix of guns and missiles when it was discovered that guns were still a necessary and vital instrument of aerial warfare.

In the Korean War, cannons and machine guns were the only weapons available. Guns however, were useful only in clear skies, at close ranges and were not very effective against the equally fast and very tough jet bombers of the day. The speed at which jet fighters fought also provided only the briefest of opportunities to score in battle. Unguided rockets were substituted for better hitting power at one point, but it was the air to air guided missile, which became operational in 1956, that significantly altered the nature of aerial warfare. Missiles it was believed, would put an end to the need to dogfight. By 1960, at the height of the Cold War, almost every jet fighter was supersonic, carried radar, and used guided missiles. Intercepting nuclear armed bombers in any weather was their primary mission and traditional dogfighting took a deep, deep backseat to high speed, radar controlled intercepting. In many fighters, guns were not even installed in the mistaken belief that close air combat was totally obsolete.

The U.S. experience in Vietnam soon proved that the "dogfight was dead" theory was quite false. The restrictive rules of engagement there, and the usual confusion of combat combined to repeatedly pitch pilots into close combat situations where the need for dogfighting skills and a gun became readily apparent. It was found that the early missiles, designed to shoot down lumbering bombers at long range, could not cope with agile enemy fighters at short ranges. Missiles also suffered severe reliability problems in the hot, humid, and wet environment of Southeast Asia. Many well trained interceptor pilots, caught in dogfights with agile MiGs would curse their lack of air combat training and inadequate weaponry. The rapid return of the gun and the creation of formal air combat schools for U.S. pilots soon followed with the result that U.S. kill ratios more than tripled in the final year of the Vietnam war.

This game is designed to take you through these evolutionary periods of jet air combat. As you play the various scenarios, hopefully you will gain an insight into what it was like to be a fighter pilot then and on how improved technology has shaped air combat tactics over the last three decades. To be successful in play, just as in real life, you will have to be aggressive, cunning and willing to take an occasional chance. As veteran jet pilot Col. Frederick "Boots" Blesse (10 MiG kills in Korea) would say: "No guts, no glory!". Enjoy the game!

J.D. Webster

COMPONENTS

"...The Speed Of Heat!" game contains the following:

A. Maps: Six separate map sections labeled A1, A2, B1, B2, C1, and C2. Printed on the maps are terrain features whose effect on play is summarized in the terrain effects chart. A hexagonal grid is superimposed on the maps to regulate positioning and movement of the game pieces. The hex-grid is further broken out into larger outlined hexes. Each of these larger hexes (henceforth called "megahexes") is equal to five regular hexes in width. Megahexes are printed to ease the counting of large distances in play. The maps are also geomorphic in that any single one can be placed above, below or on either side of any other. This allows for the variety of terrain depictions called for in the different game scenarios.

B. Counters: One counter sheet with 240 counters representing various aircraft, missiles, ground units, and informational markers.

C. Rules Booklet: One Air Power Flight and Combat Rules booklet.

D. Scenario Booklet: This booklet containing the game scenarios, historical briefings, and aircraft briefings.

E. Play Aid Charts: One sixteen page set of game charts, and play-aides charts.

F. One die: One ten sided die used to generate random numbers between 1 and 10. Always treat a roll of "0" as 10.

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CHAPTER FORMAT

Learning the game rules should be an enjoyable and fun affair. The "Flight School" chapter is intended to help keep it that way by instructing you in only a portion of the **Air Power** system rules at any time. After reading each portion, you will be cleared off to play a solitaire training scenario. After that you may play any of the scenarios in other chapters of this booklet which are at the same level of play as your training experience.

It is also the designer's intent to educate the player about air warfare in the jet age. Therefore, each historical chapter includes a history brief, a description of the planes involved then, and a number of scenarios, each of which constitutes a separate game to be played.

SCENARIO FORMAT

The scenarios can be of the following types:

- 1) Training (Instructional and practice games).
- 2) Air to air combat with guns and/or rockets only.
- 3) Air to air combat with guns, rockets and missiles.
- 4) Air to Ground facing enemy A/C and/or AAA only.
- 5) Air to Ground facing enemy A/C, AAA and SAMs.

Needless to say, the more complex the scenario, the longer it will take to play. Some scenarios will involve few units while others will require a lot. Some will require a working knowledge of only a few rules while others will require that the player be familiar with all rules.

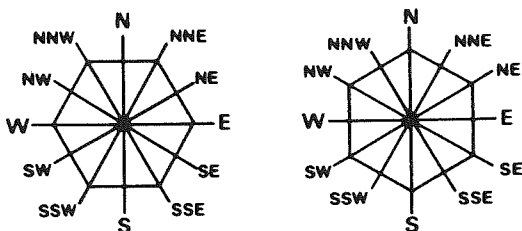
Note: Solitaire scenarios will be marked by an asterix to identify them as such.

The **Air Power** rules booklet and this booklet will direct you to the appropriate scenarios as the various rules are learned. Each scenario includes a background brief followed by the map layout diagram, the aircraft set ups, and if required, the ground unit set ups.

Aircraft and ground units always begin play in specific map hexes. Aircraft never set up initially on a hexside. The aircraft's set up code indicates the map and hex it starts in, its facing relative to North, its altitude and speed, and its load and configuration. Scenario notes add additional information as required.

The map layout diagram will define which direction is North relative to the hex grid. Consult the diagram below as necessary to determine the other directions. To align the maps correctly when setting up, simply make sure the map identifier letters are oriented the same as in the map layout diagram.

Map Facings Direction Diagram



WINNING SCENARIOS

Victory is determined by the number of victory points each side accumulates in play. V.P.s are awarded as follows:

For Destroyed or Damaged Aircraft: Consult the aircraft data card, the VP line indicates the points to be awarded for the level of damage (K, C, H, or L respectively) an enemy aircraft has when play ends.

For Destroyed or Damaged Ground Units: Consult the VP chart in the appendices to determine the points awarded for the level of damage an enemy unit has at the end of play.

Missiles Lost or Destroyed: The following points are awarded for each enemy missile jettisoned or lost when an aircraft or SAM site is damaged or destroyed.

Missile Types	V.P.s
IRM-E, IRM-I, BRM	1
IRM-M, RHM	2
CG, or OG SAM	2

ECM and Gun Pods: 2 points are awarded for each EP or GP jettisoned or lost on a destroyed enemy aircraft.

Reusable stores: 1 point is awarded for every 5 load points or less of reusable stores brought back from a mission by friendly aircraft. Reusable stores include Drop tanks, rocket pods, dispenser pods and weapon racks.

Jettisoned Ordnance: 1 point is awarded for each 5 load points or less of enemy air to ground weapons jettisoned or lost on a destroyed aircraft.

Other Points: The game scenarios may specify other methods of gaining points and other conditions for winning.

LEVEL OF VICTORY

Generally, the side with the most points will win. However, the level of victory is determined as follows:

Draw: Both sides scored points but the higher score is less than 10 percent greater than the lower.

Marginal Win: Both sides scored points and the winner's score is 10 to 25 percent higher.

Substantial Win: (3 cases)

a) Both sides scored and the winner's score is more than 25 percent and up to 50 percent higher.

b) Both sides scored and the winner's score is more than 50 percent higher but less than one-third the value of the opposing side's force.

c) Only the winner scored points but the score was less than one-third the value of the opposing force.

Decisive Win: (2 cases)

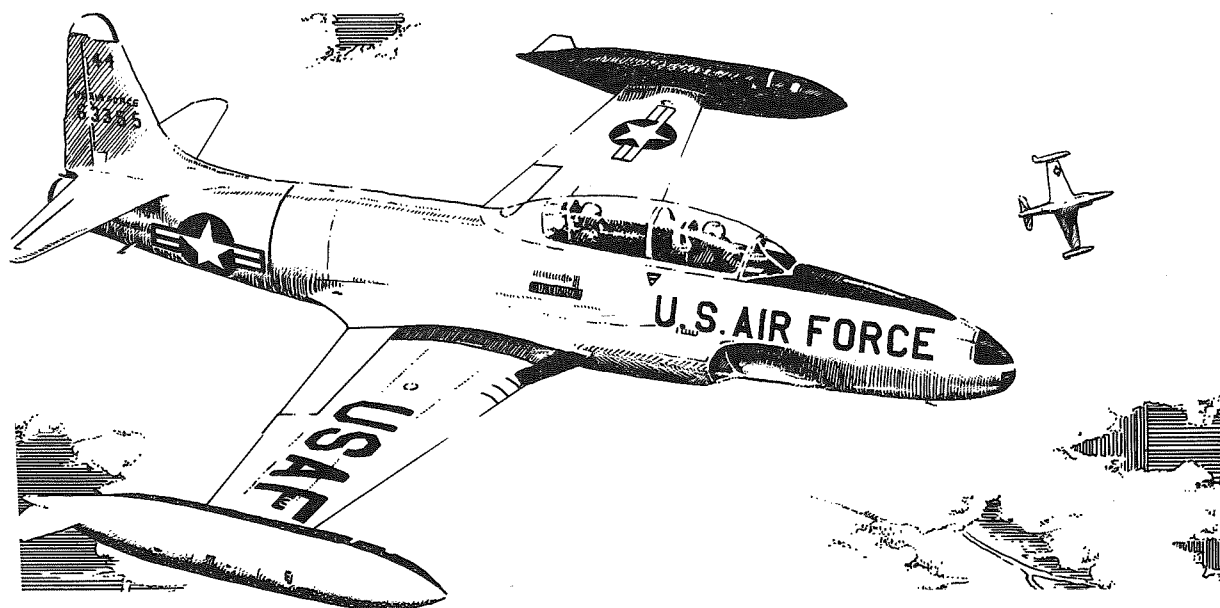
a) Both sides scored and the winner's score is more than 50 percent higher and equal to one-third or more of the opposing force.

b) Only the winner scored points and the score is equal to one-third or more of the opposing force.

"NO GUTS, NO GLORY!"

Col. "Boots" Blesse, F-86 pilot, Korean War.

CHAPTER 1: FLIGHT SCHOOL, LEARNING THE ROPES!



SOLITAIRE TRAINING SCENARIOS

Read Air Power rules 1 through 7

Scenario T1: Air Training Command, Spring 1950.

Background: You're a young Air Force 2d Lt. in the new jet transition syllabus at Randolph AFB, Texas. Today you have a check ride in which you must maneuver a T-33 jet trainer through two exercises;

- 1) a double pylon turn, and
- 2) an off-target rendezvous, one after the other.

Agruff cigar puffing WW-II veteran, Major "Grit" Skywarden, is in your rear seat grading you. A good check means you'll be a step closer to flying the Air Force's hottest operational jet fighter, the F-86A Sabre. A bad check, and its off to cargo command to fly rusty old C-47 transports with the reserves in Kansas.

Maps:



Aircraft Set Up: Place an F-80 counter (representing your T-33 trainer) in hex A1-1507, place a second F-80 in hex 1203, both facing S. The second T-33 is the one with which you are supposed to rendezvous after doing the pylon turns.

Pylon Set Up: Place spare or blank counters in hexes 1708 and 2108 to represent the turn pylons.

Game Length: 15 game-turns.

Notes:

1. Your T-33 (described on the F-80 data card) begins the game with a speed of 4.0, disregard altitude. the second T-33 has a speed of 3.0. Both aircraft are CL configured.

2. The object of the game is to fly a figure "8", using the

turning rules and LO/ML band Turn Charts, around the two pylons and then to join up in formation with the second T-33 as quickly as possible.

3. The initial turn will be to the left to pass south of the first pylon then between the two making a right hand circle about the second pylon and back to pass around the north side of the first pylon. Entering the Pylon's hex results in a crash with the pylon. It is allowed to fly along hexsides forming the hex the pylons are in.

4. As you are circling the pylons, the second T-33 will move 3 hexes every turn. Beginning with the second game-turn, it will face 30 degrees to the left at the end of each move in order to describe a rendezvous circle.

5. To join up with the other T-33, your T-33 must end a game-turn in the same hex with exactly the same facing and at exactly speed 3.0.

6. "Grit", will award you points based on how many game-turns it takes to do the two tasks and on how safe you were while doing the turns and joining up with the other T-33 as follows;

- +1 for each game-turn under 15.
- +1 for each game-turn in which the maximum turn rate used was TT or less.
- 1 for each game-turn Idle power selected.
- 1 for each facing change done at the BT rate.

If the net score was:

- +5 or more: Great! Off to advanced training lad!
- +2 to +4 : Weak but qualified! Good luck!
- 0 to +1 : Further training required.
- -1 or less: Hopeless for fighters, Off to Kansas!

7. Recommended Variation: Try the same scenario but adding Advanced rules 05.4, and 07.2 to 07.5.

Read Air Power rule 8

Scenario T2: The Gunnery Pattern, Summer 1950.

Background: Having passed your T-33 check ride, you are assigned to advanced jet training at Edwards AFB, California. There you must master the air-to-air gunnery pattern in an F-84 Thunderjet before reporting to an F-86 squadron in Misawa, Japan. The gunnery pattern requires precise flying so that the jet towing the target banner is not endangered. Your task is to start from the "perch", a position ahead and to the right of the banner, then to dive down making a gun pass, followed by a recovery to an identical "perch" for another pass.

By the way, the pilot of the banner aircraft, Col. "Buzz" Wiedhopper, happens to be "Grits" brother in law. Major Skywarden has warned him about you so a poor showing here can still get your Sabre orders canceled for a two-year staff posting in Guam as the billing officer.

Maps:



Aircraft Set Up: Place an F-80 counter (representing a T-33) in hex 5508, facing N at altitude 12 and speed 3.0 with a blank counter directly behind it (the banner) in hex 5509.

Place an F-84E (you) in hex 5809, facing N at altitude 15.

Game Length: 10 game-turns.

Notes:

1. The banner aircraft always goes first moving forward three hexes and facing 30 degrees to the right in the last hex/hexside entered to describe a continuous gunnery circle. The banner counter follows the towplane but must always end up in a hex (never on a hexside). This will always be the hex directly behind the towplane, or to the right of any hexside directly behind the towplane.

2. To make a "gun pass", the F-84 must enter or pass through the banner's hex at the banner's altitude with any facing. While in the banner's position, a shot may be declared for score. The less the turn rate in use when the shot is made, the better the score. Your F-84 is CL configured.

3. A second gun pass may not be made until the F-84 first returns to the "perch"; meaning it ends a game-turn in a position defined as follows:

- 3 hexes away from the banner to the inside of the gunnery circle and at altitude 15,
- with the same facing as the towplane,
- and abeam either the towplane or banner or between the two lines defining those abeams.

4. To qualify in the gun pattern, you must make two passes and return to the perch within the 10 game-turns and have a passing score.

5. Gun pattern points are scored as follows:

- +1 for each rate of turn less than BT at the time each shot is declared.
- +1 for returning to the perch before turn five and before turn ten after each pass.
- 2 for each time you passed through the towing aircraft's position (safety violation!).

If your net score was:

- +5 or more: Great Job! Enjoy the Sabres!
- +2 to +4 : You qualified, but be careful in Sabres.
- 0 to +1 : Have you reconsidered Kansas?
- -1 or less: Have you ever been to Guam?

6. Recommended Variation: Give the F-84 a start speed of 4.5 and replay the same scenario using advanced rules 05.4, and 07.2 to 07.5.

DESIGNER'S SOLUTIONS TO TRAINING SCENARIOS ONE AND TWO

Each solution is presented as a description of the aircraft's moves each game-turn using a coded format with amplifying remarks added. Power is Mil unless noted otherwise. The illustrated solutions are but one of several possible. No advanced rules are used in doing these.

Movement Codes: H = forward horizontally one FP.
L = face left 30 degrees.
R = face right 30 degrees.
C = climb for one VFP.
D = dive for one VFP

Note: The number following the C or D codes indicates how many altitude levels were gained or lost.

SCENARIO T-1 SOLUTION

Your T-33's moves:

Game Turn	Start Hex	Start Fac.	Start speed	Your Move
1	1507	S	4.0	HL, HL, HL, HL (HT turn with each FP)
2	1809	NE	4.0	H, H, HRR, HRR (2 BT turns, normal power)
3	2208	S	4.0	HRR, HRR, H, H (2BT turns, normal power)
4	1908	NW	3.5	H, HLL, HLL (HT left, normal power, carry 1 Decel)
5	1608	S	3.5	HLL, H, HL (Ignore half FPs, HT left, normal power)
6	1810	E	3.0	H, H, HL (EZ left, normal power)
7	2109	NE	3.0	HL, H, H (TT left, normal power)
8	2307	NNE	3.0	H, HL, HL (TT left to rendezvous)
9	2405	NNW	3.0	Rendezvous complete.

Other T-33's move:

1	1203	S	3.0	H, H, H
2	1206	S	3.0	H, H, HL
3	1209	SSE	3.0	H, H, HL
4	1411	SE	3.0	H, H, HL
5	1712	E	3.0	H, H, HL
6	2012	NE	3.0	H, H, HL
7	2310	NNE	3.0	H, H, HL
8	2408	N	3.0	H, H, HL
9	2405	NNW	3.0	Rendezvous complete.

TOTAL SCORE = +7 for finishing on turn 8
 +3 for using a turn rate of TT
 or less on three turns
 -4 points for the four facing
 changes at the BT rate.

NET SCORE = +6, Off to advanced Training!

Note: If played using advanced rules, the rendezvous can still be effected by turn 8 for a net score of +5. Mil power will be required more often to compensate for sustained turn drag.

SCENARIO T-2

Your F-84's move:

Game Turn	Start Hex	Start Fac.	Start Alt.	Start Speed	Your Move
1	5809	N	15	4.0	H, D2L, H, H (Normal power, TT turn left)
2	5706	NNW	13	4.0	H, HR, D1, HR* (TT turn right, *declare gun pass)
3	5604	NNE	12	4.5	HRR, H, HR, H (BT on first FP)
4	6004	SE	12	4.5	H, C1, C1, C1 (zoom to perch)
5	6104	SE	15	4.0	H, D2L, H, H (start from perch)
6	6405	E	13	4.5	H, HR, D1, HR* (Normal power, *declare 2d gun pass)
7	6705	SSE	12	4.5	HRR, H, HR, H (BT right as before)
8	6508	SW	12	4.5	H, C1, C1, C1 (zoom to perch)
9	6409	SW	15	4.0	Finished!

Target Banner's Position at end of each game-turn:

1. = 5506	2. = 5604	3. = 5902
4. = 6202	5. = 6503	6. = 6705
7. = 6708	8. = 6611	9. = Finished.

TOTAL SCORE = +4 points for using a turn rate
 less than BT when firing,
 +2 for returning to the perch
 early. No minuses.

NET SCORE = +6! Off to F-86 Sabre land!

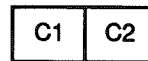
Note: if played using the advanced rules, it will take a turn or two longer as the increased penalties for turning force the F-84 not to cut back inside the banner as sharply to avoid excessive speed loss. You will also have to stay at Mil power the whole time and may need to use half FP carry's.

Read Air Power rules 9 and 10

Scenario T-3: First Air Combat! Korea, Jan. 1951

Background: Having demonstrated your prowess in gunnery training, you join your F-86 outfit in Japan where conversion training goes smoothly. In the meantime, however the Korean War has heated up. Your outfit is ordered to the front and you soon find yourself flying missions in MiG Alley. As luck would have it, the same day you are promoted to 1st Lt. you get into your first dogfight and find yourself behind two inexperienced Chinese MiG pilots who panic and run. Here is your chance for glory! However, you've lost sight of your leader and you're low on gas... so take care.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-86E	C1	6914	NE	20	6.0	CL	0
MiG-15b #1	C2	5127	N	18	5.0	CL	0
MiG-15b #2	C2	5228	N	18	5.0	CL	0

Game Length: 10 game-turns.

Notes:

1. The two MiGs always move first and fly using the RANDOM MOVEMENT rules given below.

2. If a MiG's move causes it to exit either map, it has escaped. If by chance, at the end of all movement, a MiG is in position to shoot at the Sabre it will.

3. To win, you must destroy at least 1 of the MiGs without running out of fuel on the way home or getting shot down.

4. Fuel: You may end play after any game-turn by declaring a disengagement. If you do so after game-turn six, you may not have enough gas to reach home base. Roll one die, on a one or less, you flame-out short of home. Modify the roll by -1 for each game-turn after 7 you've been in play.

5. Other MiGs: Going alone in a combat zone is dangerous, the longer you chase the MiGs the greater the likelihood of being surprised and shot down by a third MiG. At the end of each game-turn after six, roll one die and modify as per note 4. If the result is one or less, you are suddenly blown out of the sky by an unseen attacker and will spend 2 years in a North Korean POW camp.

RANDOM AIRCRAFT MOVEMENT RULES

The following Tables provide randomly moving targets for the training scenarios. Randomly moving aircraft need only have their speed and altitude recorded each game-turn. A full log is not required.

To use the tables, reference the angle-off position the attacking missile or aircraft is in with regard to the randomly moving one. Roll one die and consult the appropriate column of the chart.

The result will be a series of coded actions, separated by commas, that the randomly moving aircraft must perform. Aircraft perform as many commas worth of actions from left to right as it has speed points. The codes are as follows:

- H = Move forward one hex or hexside.
 L = Face left 30 degrees.
 R = Face Right 30 degrees.
 C = Climb one altitude level.
 D = Dive one altitude level.

Note: Damaged aircraft always perform one action less than their listed speed and have all "C" codes changed to "H".

RANDOM MOVEMENT TABLES

Die Roll Random Aircraft Moves

Attacker in Target's 150 to 180 Arcs	
1, 2 =	H, H, H, HL, H, H
3, 4 =	H, H, H, HR, H, H
5, 6 =	H, HD, HD, HL, H, H
7, 8 =	H, DR, DD, H, H, H
9 =	H, DDL, H, DD, H, H
10 =	H, DDR, H, DD, H, H

Attacker in Target's 90 to 120 Arcs	
1, 2 =	H,H,HL,H,HL,H
3, 4 =	H,H,HR,H,HR,H
5, 6 =	H,C,HL,CL,H,H
7, 8 =	H,CR,H,CR,H,H
9 =	H,DD,DL,H,HL,H
10 =	H,DD,DR,H,HR,H

Attacker in Target's 60 or Less Arcs	
1, 2 =	H,HL,HL,H,HL,H
3, 4 =	H,HR,HR,H,HR,H
5, 6 =	H,HL,CL,H,H,HL
7, 8 =	H,HR,CR,H,HR,H
9 =	H,HL,DD,DL,H,HL
10 =	H,HL,DD,DR,H,HL

Read Air Power rules 11, 12, and 13

You are now ready to play all guns only air combat scenarios in any Chapters. If you read advanced rule 9.3 you may also play scenarios involving air to air rockets.

Read Air Power rules 14, 15, 16 and 17

Scenario T-4: The Missile Age! 1956.

Background: Having returned from Korea as a combat veteran, you've decided to make a career of the Air Force. Now a full Captain, your latest assignment is with an Interceptor outfit stationed in California that has just converted to F-102A Delta Daggers. The Dagger is the Air Force's first delta winged jet; and its first interceptor capable of supersonic speeds. It is well armed with six guided missiles. You have been scheduled to lead a section of Daggers in a live fire test against target drones in order to evaluate intercept tactics.

Maps: A2 C1 B1



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-102A #1	A2	2622	E	35	8.0	CL	3
F-102A #2	A2	2522	E	35	8.0	CL	3

Game Length: 15 game-turns.

Notes:

1. The Daggers are loaded with three AIM-4A Falcon RHMs and three AIM-4B Falcon IRMs. Because the weapons are carried in an internal bay, the load is halved from 6 to 3.

2. Place three TU-95 counters representing drones simulating Soviet Bombers in the following positions;

Drone	Map	Hex	Fac.	Alt.	Spd.	Target hex
#1	B1	3308	W	35	4.0	A2-1523 (City)
#2	B1	4204	W	40	4.0	A2-2219 (RR yard)
#3	B1	4909	W	30	4.0	A2-2324 (Airbase)

3. Your mission is to destroy all drones before they "nuke" your airbase and the nearby city. The drones move first every game-turn flying four hexes forward if undamaged and three hexes forward if damaged. They do not maneuver or change altitude but continue straight ahead until reaching their target hex where atom bombs would be released.

4. To win, the Daggers must destroy all 3 drones before they drop their "bombs" and without both being "eliminated" by the drone's defenses.

5. Gun Defenses: All drones have simulated tail-gun turrets which will fire on any Dagger that ends a game-turn in the 90 or less arc of a drone within two hexes of range. Roll a die, on a one, the Dagger is "eliminated" and may no longer participate in the test.

6. ECM Decoys: Additionally, drone #3 is equipped with 4 chaff and 4 flare decoys which will be expended two at a time against incoming missiles of the appropriate type.

7. Recommended Variation: Read advanced rule 9.3 (Air to Air Rocketry) and try the same scenario including the 2 factors of rockets each Dagger carries; or if you want to really appreciate the USAF's desire for guided missiles and fast jets, try the same scenario using two rocket armed F-89 Scorpions instead of Daggers.

Read Air Power rules 18 and 19

You are now ready to play all Air to Air scenarios.

Read Air Power rules 20, 21, 22, 23, and 24

Scenario T-5: Operation Farm Gate! Vietnam, 1964.

Background: Now a Major with several tours under your belt in a variety of jets, you feel a yen for some real excitement and volunteer for an unusual (secret) tour of duty in an exotic far east country (Vietnam). The outfit you end up with is the 1st Air Commando Squadron which has been flying combat missions in support of South Vietnamese soldiers since 1962. Under the guise of being an "advisor" you soon find yourself in one of two prop-driven Skyraiders, helping to defend an Army Green Beret outpost from being overrun by communist soldiers. Ground attack is new to you but combat is not! As you roll-in for a bombing run you realize that this could be the start of something big!

Maps:



Ground Forces Set Up: Green Berets = One Green infantry counter in hex 6008. Viet Cong = Four Tan infantry counters, two each in hexes 5907 and 6007. VC Anti-aircraft gun units = Two ZPU-1 14.5mm LT AAA, one each in hexes 5807 and 6012. One ZU-23 23mm LT AAA in hex 6611.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
A-1H #1	C1	5211	E	5	2.5	DT	21
A-1H #2	C1	5112	E	5	2.5	DT	21

Game Length: 15 game-turns.

Notes:

1. A-1H Loads: Stations 1, 3, 5, 11, 13, 15 = one 500lb HE bomb each, stations 6, 10 = one LAU-10 Zuni RP each, stations 7, 8, 9 = one 750lb Napalm each. Total load = 19.5, total weight = 5600.

2. The object of the game is to prevent the four VC infantry units from inflicting casualties on the Green Berets. The VC units and AAA guns may be bombed, rocketed and strafed to accomplish this.

3. At the end of game turns 6 and 12 any surviving VC units adjacent to the Green Berets will attack them. To determine the results of the VC attack, roll one die and reference the air to ground attack table odds column that equates to the ratio of VC units to Green Berets (for example 3 VC units attacking would use the 3-1 odds column). Modify the die roll by +1 for each suppressed unit attacking and +1 for each "D" hit existing on the attacking units.

4. AAA units: At the end of each game-turn, or when attacked, any unsuppressed AAA units will fire on the nearest A-1 in range. Do not use the random AAA fire tables in this scenario.

5. Victory: Victory is based on points. The VC side gets points normally as described at the beginning of the Flight School Chapter except that the Green Berets are worth triple points. The USAF side gets points normally, however, if the Green Berets are killed, the USAF cannot win, but they can get a draw by scoring more points.

You are now ready to play all scenarios except those involving SAMs, ARMs and guided weapons.

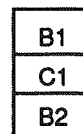
Read Air Power rules 25 and 26

Scenario T-6: Wild Weasels! Vietnam, 1967.

Background: Your hunch that something big was about to happen was right. The U.S. became fully involved in Vietnam within six months of your arrival there. You, having survived a year with the First Air Commando, returned to the States in 1965 for retraining in jets. A promotion to Lt. Col. soon followed and you were selected to become the Deputy of Operations of an F-105 "Wild Weasel" squadron based in Thailand. After special training in electronic warfare and the use of ARM missiles, you join up with the outfit in early 1967. Your mission

is to seek out and destroy enemy SAM sites over North Vietnam. It is a dangerous mission and odds are that you will be shot down and sent to the Hanoi Hilton. If not, you can look forward to completing this tour and returning Stateside for a cushy staff job and retirement in a few more years.

Maps:



Ground Forces Set Up: Two SA-2B SAM fire units, one each in B1- 4409 and C1-5506. One S-60 57mm AAA unit in B1-3907. One ZU-23 23mm AAA unit in B1-4213. One M-38 37mm AAA unit in C1-6008. One KS-12 85mm AAA unit in C1-6612.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-105G #1	B2	4030	N	20	6.0	DT	18
F-105G #2	B2	4130	N	20	6.0	DT	18

Game Length: 15 game-turns.

Notes:

1. F-105G Loads: Stations 1, 5 = one LAU-10 Zuni RP each. Station 2 = Short range ARM (AGM-45 Shrike), station 4 = Long range ARM (AGM-78), station 3 = one triple rack plus three 750lb. HE bombs. Total load = 18, weight = 5,550.

2. The two Wild Weasels are tasked with softening up enemy defenses along the route of flight of a group of F-105D "bombers" which enter play on game-turn 5. At the end of turn 4, set up four F-105Ds on map B2, hexes 3730, 3830, 4129 and 4230. AAA defenses fire at the nearest aircraft as in training scenario 5. The SAM units will always seek to lock-on and fire at the nearest visible F-105.

3. The "bombers" start at speed 5.0, altitude 10, facing North. They are not controlled by the player but simply move straight ahead each game-turn until exiting the play area to the north, they never turn or change altitude unless fired on by a SAM missile. If one is fired on by a SAM, it moves randomly using the random movement table until the missile hits or misses. If it misses, the aircraft will turn in the shortest direction to face North and continue flying North. Aircraft logs are not required for these aircraft.

4. Any bomber that randomly exits the play area at other than the North edge, is assumed to be shot down. Each bomber that exits the North edge, even if under SAM attack, is assumed to escape and gives the USAF player 10 points.

5. Terrain: Each Contour line on the game-maps represents an altitude increase of 1.

6. Victory: Victory is based on points accumulated normally by the end of play.

Congratulations! You have completed the entire series of Training scenarios. You may play all scenarios except those involving smart and guided weapons.

Read Air Power rules 27, through 30

You are now ready to play any and all game scenarios.

GENERAL SCENARIOS

The following scenarios provide the players with typical air combat set ups for creating their own games. When creating general scenarios, it is recommended that each side's point value be kept within 20 percent of each other or limited to a set maximum number of points (60 for example).

General Scenario 1: One-On-One Combat!

Background: Close-in combat maneuvering, both offensively and defensively, is a vital skill for fighter pilots. This scenario challenges both attacker and defender with various starting set-ups which they must capitalize upon to escape from or defeat their foes.

Maps:



Aircraft: Map Hex Fac. Alt. Speed

Neutral Set Ups:

"At the pass"

A/C #1	B1	3915	N	15	6.0
A/C #2	B2	3916	S	15	6.0

"Offset"

A/C #1	B1	3914	E	15	6.0
A/C #2	B2	3917	W	15	6.0

"Abeam"

A/C #1	B2	3817	N	15	6.0
A/C #2	B2	4217	N	15	6.0

One Aircraft Advantaged Set Ups:

"Guns Only"

A/C #1	B2	3916	W	10	5.0
A/C #2	B2	4116	W	12	6.0

"Guns and HS missiles"

A/C #1	B2	4019	S	15	5.0
A/C #2	B1	4013	S	15	6.0

"Guns, HS missiles and RH missiles"

A/C #1	B2	3716	NW	15	5.0
A/C #2	B2	4516	W	15	6.0

Game Length: 15 game-turns

Notes: See end of General Scenarios section.

General Scenario 2: Section Tactics!

Background: The basic fighting unit in air combat is a pair of fighters called a section. The section works as a team with either fighter attacking and the other covering. The "cover" must maneuver to be in position to help his team mate or to become the attacker if the team mate is forced out of position. Two fighters can usually defeat a single easily with good team-work; even a superior single, when the odds are even, it is a lot tougher. Against two foes the section must coordinate its actions, concentrating on one foe while keeping the other off balance. In this way, two inferior fighters can defeat two superior ones, one at a time.

Maps:



Two Against One Set Ups:

Aircraft: Map Hex Fac. Alt. speed

"Section Attacking"

Leader	C2	6017	N	20	6.0
Wingman	C2	6317	N	22	6.0
Defender	B1	4010	W	20	6.0

"Section Defending"

Leader	B1	3813	W	18	5.0
Wingman	B1	3910	W	18	5.0
Attacker	C2	6116	NNW	20	6.0

"Neutral Start"

Leader	B1	4013	NW	16	6.0
Wingman	B1	4213	NW	18	6.0
Enemy	B1	4115	S	16	6.0

Two Against Two Set Ups:

"Sandwich"

Lead 1	B1	3911	S	15	6.0
Wingman 1	B1	4110	S	15	6.0
Lead 2	C2	5217	NNE	15	6.0
Wingman 2	C2	6817	NNW	15	6.0

"Trail"

Lead 1	C2	5423	NNE	18	5.0
Wingman 1	C2	5724	NNE	20	5.0
Lead 2	C2	5919	SSW	18	6.0
Wingman 2	B1	4313	SSW	22	6.0

"Neutral Start"

Lead 1	B1	3912	S	20	6.0
Wingman 1	B1	4111	S	21	6.0
Lead 2	C2	6319	N	20	6.0
Wingman 2	C2	6620	N	20	6.0

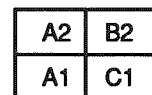
Game Length: 20 game-turns.

Notes: See end of General Scenarios section.

General Scenario 3: Division Tactics!

Background: A division is usually two sections working together although sometimes by plan or by attrition, the number is reduced to three aircraft. Division tactics are an extrapolation of section tactics and generally try to employ the same principles with one section attacking and the other covering. However, due to the larger number of aircraft, the ability of the pilots to maintain team-work in a multi-bogey environment is diminished and such engagements often degenerate into uncontrolled "furballs" (modern slang for dog-fights!).

Maps:



Aircraft Set Ups: Each side secretly selects between two and four aircraft.

Side A: This side must set its force up in the megahex centered about hex A2-0508. All aircraft face SSE, and start at altitude 20 and speed 5.0

Side B: This side sets up its force in the megahex centered about hex C1-1518. All aircraft face NNW and start at altitude 20 and speed 5.0

Game Length: 20 game-turns.

Notes: See end of General Scenarios section.

General Scenario 4: Air to Ground Strikes!

Background: Aircraft are a key form of military power projection. Their ability to conduct precision strikes with devastating firepower over long distances makes them quite feared. The speed of modern jets also makes them difficult to defend against. This scenario allows players to try conducting "surgical" strikes against a variety of defensive networks.

Maps: Select any four Map sections and arrange them as in General Scenario 3.

Set Up: One player is the defender and one is the raider.

Raiders: The raiding player selects a prominent terrain feature (i.e., bridge or airfield) near the center of any one of the four maps as his target. Alternately, he may place up to three game counter targets (POL markers, buildings, etc.) on the map as his targets. He then selects between two and six aircraft to carry out the raid loading them accordingly. After figuring the point value of his force he tells that to the defender.

Defenders: The Defender may now use that number of points to "buy" defense systems (Guns, radars, SAMs, or jets). Any defending aircraft are held off map but the ground defenses are set up as follows:

1) At least half, but up to all the point value of the ground unit defenses must be deployed on the "target" map.

2) The rest may be deployed on any other game maps.

Commencing Play: Once the ground defenses are in place, the raider may then examine the map announcing as his entry point, either of the two open map edges of the game map diagonally across from the target map. His aircraft then enter on turn 1 at any allowed altitude and speed.

After the raider aircraft enter play, any defending aircraft will enter play from either of the two open map edges of the target map, on the game-turn indicated by the roll of a die.

Game Length: Until all raiders have been destroyed or exited play from the map edges they originally entered from.

NOTES FOR ALL GENERAL SCENARIOS

1. Aircraft types and loads should be consistent with the historical era being played or represented. See tables below.

2. In all scenarios except number 4, additional maps may be added or existing maps shifted to increase the play area.

3. In scenario four, the maps are fixed in place. Any aircraft exiting the maps are removed from play. If they are raid aircraft exiting from other than the two allowed entry map edges, they immediately roll for damage as if they had taken a hit from a

weapon with an attack rating of "4". This represents the effects of other defending forces nearby.

4. **Victory:** Victory determination is as per the normal rules except for the scenario one set ups where one aircraft is defending and the scenario two one against two set ups. In these scenarios, bonus V.P.s are awarded at the rate of one per game turn to the single aircraft for as long as it survives.

5. **Advanced Rules:** Advanced rules may be used if mutually agreed to by the players.

6. **Bonus V.P.s:** If the opposing sides are not within 20 percent of each other, award the smaller force bonus V.P.s at the start of play as follows:

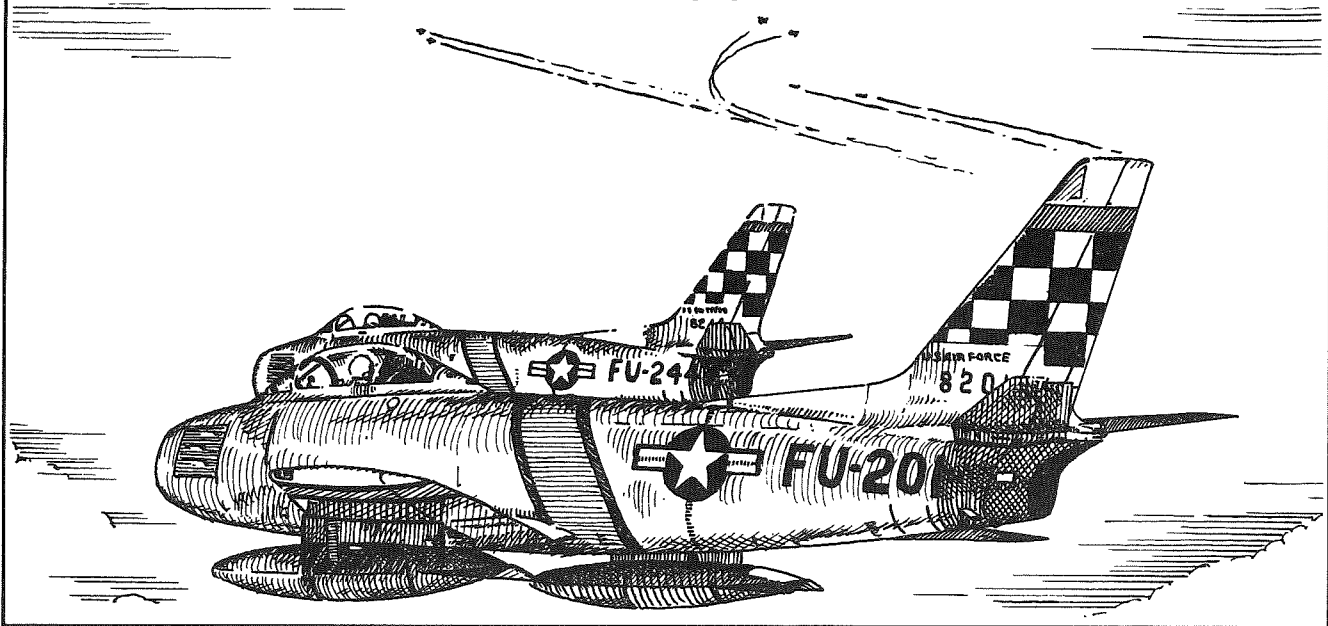
Bonus V.P.s = .05 x the larger force's value if it is 21 to 40 % higher, .10 x the larger force's value if it is 41 to 60 % higher, .15 x the larger force's value if it is 61 % or more higher.

AIRCRAFT AVAILABILITY BY TYPE AND YEAR

MiG-15bis	= 1949	F-80C	= 1945
MiG-15P	= 1948	F-84E/G	= 1950
MiG-15ISH	= 1951	F-8A/E	= 1947
MiG-17F/PF	= 1952	F-86F/F 6-3	= 1952/53
MiG-17PFU	= 1954	F-86D/L	= 1951
MiG-19SF	= 1954	F-89D	= 1953
MiG-19PF/PM	= 1955	F9F-2/5	= 1949/51
MiG-21F	= 1959	F2H-2	= 1949
MiG-21PF	= 1961	F-2H-3/4	= 1952/53
MiG-21PFMA	= 1967	F-100A/C	= 1954/55
MiG-21MF	= 1968	F-101B/C	= 1957
SU-9	= 1959	F-102A	= 1954
SU-11	= 1961	F-104A/C	= 1956
IL-28	= 1949	F9F-6/8	= 1953
TU-16A	= 1955	F7U-3/3M	= 1952
TU-16B/G	= 1961/68	F-100D	= 1956
		F-105B/D	= 1959/61
F-89H/J	= 1955	F-106A	= 1957
A-1H/J	= 1964	EF-105F	= 1966
A-3/B-66	= 1954	EF-105G	= 1968
EA-3/RB-66	= 1960	F-4B/C	= 1962
A-4C	= 1960	F-8C/D	= 1957
A-4E	= 1962	F-8E/J	= 1961
RA-5C	= 1962	F-4E/J	= 1967/66
A-6A	= 1963	F-111A	= 1965
A-6E	= 1971	F-111E	= 1969
A-7A/B	= 1966/68	B-52D	= 1956
A-7D/E	= 1967/68	B-52G	= 1958
A-37B	= 1968	B-57B	= 1954
F-5A/C	= 1964/65	B-57G	= 1969

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CHAPTER 2: KOREA! THE FIRST JET AIR WAR! 1950-1953



HISTORICAL BRIEFING

Jet Fighters were developed at the end of World War II. Two of them, the British Meteor and the German Me-262 reached operational status in the last months of the conflict but never fought against each other. History had to wait until 1950, for the first air battles involving opposing jets to occur. This happened in the small Asian country known as Korea.

A post W.W. II agreement between the Americans, British, Russians and Chinese had left Korea divided into halves, the North being communist controlled. In 1950, the North Koreans invaded the South in an effort to unify the country. The North Korean Air Force at the time consisted of almost two hundred piston engined Soviet built fighters and light bombers. Their army was also well equipped with tanks and artillery supplied by the Russians and Chinese. The South Koreans had a weak army and virtually no air force but were backed by Japanese based American airpower, a lot of which immediately deployed to Korea, and allied troops already stationed in Korea. Though the North Koreans initially pushed allied forces back to the Pusan perimeter, their air force did little as its planes were swiftly destroyed on the ground and in the air by veteran U.S. and allied pilots in P-51 Mustangs, F-80 Shooting Stars, Navy F4U Corsairs and F9F Panthers. The F-80 and Panther jets were especially effective against the slower propeller driven enemy planes.

General MacArthur's famous flanking invasion at Inchon caused the North Koreans to fall back in disarray. The North Korean Air Force was nearly extinct by then and allied planes roamed the skies freely, inflicting thousands of casualties on enemy troops. The North Korean army collapsed and allied troops soon overran most of the Korean peninsula. In response to these defeats, the Red Chinese intervened just as the allies approached the Yalu river by committing enormous masses of troops into the fray. This changed the balance of power yet again. The allies were caught off guard by this assault, almost overwhelmed, and roughly pushed back. The Chinese also committed hundreds of Soviet built MiG-15 jet

fighters into action with which they had just been equipped by the Soviet Union.

In November of 1950 USAF F-80 jets tangled with the MiGs. In this first historic jet to jet battle, the F-80s emerged the victors downing one MiG-15. On the following day, Navy Panther jets tangled with and also downed a MiG. Despite these early wins, U.S. pilots realized the MiG was clearly superior having a better rate of climb and a hundred mile an hour speed advantage. Against the older prop-driven Mustangs and Corsairs, the MiGs were even more dominant scoring several kills and temporarily curtailing allied fighter-bomber operations in the North.

The USAF response was to commit the newer F-84 Thunderjets and F-86 Sabrejets into the fray. The F-86, a swept-wing design like the MiG, was tasked with establishing air superiority. The MiG-15 and Sabre turned out to be closely matched aircraft. The MiG had a slight performance advantage, but inferior armament. MiG pilots however, were poorly trained and lacked initiative. The iron fist of communism insured that they spent more time learning political dogma than air combat tactics and they were often sent into battle after only a minimum of flight training. While there were some excellent MiG pilots, including Russian and East German "volunteers", the majority could not compare to Americans, most of whom were combat veterans from World War II.

MiG pilots did have the advantage of operating from Chinese bases near the Yalu river, across which allied pilots were forbidden to fly. They also monitored allied air operations through an excellent radar network often using it to guide them to positions of advantage in combat. The short range of the MiG, coupled with the desire to operate from the sanctuary of China did, however, manage to limit MiG operations to within a hundred miles of the Yalu. That area soon became known as "MiG Alley". Sabre pilots in turn, opted for an offensive strategy, preferring to take the fight right to the MiGs. This meant the F-86s got to operate at maximum range and were usually outnumbered, but it kept the MiGs away from fighter-

bombers supporting the troops further South which was the Sabres intent.

Effective and uninterrupted ground support from USAF, USN, USMC and other UN aircraft helped stem the tide of Chinese soldiers. The fluid battlelines soon stagnated into trench warfare which would last for several years. Operation "Strangle" was an all-out two year effort by fighter-bombers to cut off communist troops from their supplies. This interdiction campaign struck at all major rail lines, supply routes and bridges in North Korea. The communists countered by deploying masses of anti-aircraft guns and switching to night movement of supplies. Fighter-bomber losses were heavy but the F-80s, F-84s, Banshees and Panthers along with the older prop-driven planes never let up. One major group of bridges was hit repeatedly by the Navy in what came to be called the battle of Carlson's Canyon, so named as the leader of most of the strikes was "Swede" Carlson a Skyraider pilot. This battle inspired Jame's Michener's novel, "The bridges of Toko-Ri", written about Banshee pilots involved in the action.

Though the ground war was stalemated, the air war continued in vicious cycles. Newer models of the Sabres helped dominate the MiGs and though MiG losses were high, they scored some successes. Most notably, they devastated several B-29 raids into MiG alley. Of course, the MiG was designed for just that mission. The Chinese also deployed squadrons of IL-28 jet bombers which caused great concern among the Navy whose ships were thought to be vulnerable to fast jet raiders. Fortunately, the IL-28s were never used and exhaustion after four years of fighting drove both sides to the peace tables. The war was concluded with the lines drawn about where they had started from.

Korea earns its place in the annals of air combat history by being the first war to see jets extensively used in air and ground combat, and for the fact that the F-86 Sabre earned its glory by being the undisputed master of MiG Alley gaining a 10 to 1 kill ratio over the MiGs. 38 USAF pilots became jet aces in Korea. All of them flew the Sabre. Joseph McConnell led with 16 kills and James Jabara was second adding 15 kills to his 1.5 from World War II. Pete Fernandez came in third with 14.5 kills. Other notable MiG killers include Frances Gabreski (28 W.W.II kills against the Luftwaffe and 6.5 MiGs in Korea), John C. Meyer (24 W.W.II kills and 2 MiGs), Frederick Blesse (10 MiGs) who authored the book "No Guts, No Glory", a definitive treatise on jet fighter tactics in Korea. John Bolt was a Marine pilot who flew Sabres on exchange duty with the USAF and is the only non-USAF jet ace with six MiG kills. Another famous Marine MiG Killer is John Glenn, former astronaut, transcontinental speed record holder, and U.S. Senator, who scored 3 MiG Kills in nine days also while on exchange in F-86 Sabres. Dozens of other pilots, Navy and Marines included scored against the MiGs in a variety of aircraft.

No information exists on MiG pilots who may have become aces against allied pilots although Ivan Kozhedub, the Soviet ace of aces from W.W. II (62 kills) is thought to have been involved for a short time in Korea. In closing, it must be said that the superior skill and training of American pilots was the key to the Sabres' dominance over the MiG and the oft-stated theme that it is the man and not the machine that counts in air combat was born out once again.

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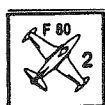
Flash back:

"Check Six" I called to the flight. Red 3 came back" lead, we've got six at 3 o'clock high and starting in!" As they came in firing, two of them overshot. I whipped back over on the tail of one of them at about one thousand feet range.

I laid the bright red circle of the gunsight on the tailpipe and gave him a good long burst. He lit up like a Christmas tree from the APIs. He had just started to make a right climbing turn when his engine evidently quit. I must have knocked it out, because he seemed to stop in mid-air. I chopped my throttle back to idle and threw my speed brakes out. I was doing everything I could to stay behind him. As he stalled he fell off on his left wing and started to go into a spin. My aircraft stalled too, and I kicked the left rudder unconsciously. It looked for a second as if my gunsight would fall right through him. I thought to myself, "This is my first MiG!" I held down the trigger and all six fifties started chugging away. I could smell the powder smoke. I was only three hundred feet from him when I cut his tail off just above the fuselage. The tail went one way and the fuselage spun in the other direction.

F-86 pilot Capt. Robin Risner describing the first of 8 MiG kills he would get in Korea.

KOREAN WAR AIRCRAFT BRIEFINGS



F-80 Shooting Star: America's first operational jet fighter, the F-80 entered service in 1945. None saw combat in W.W.II but they soon equipped dozens of USAF squadrons in Europe and the Far East. As aircraft go, the F-80 was essentially a W.W.II fighter design given greater speed due to its jet engine. Its armament consisted of six .50 calibre guns and a simple reflector type gunsight. Rushed into combat in Korea in 1950, it ran roughshod over the older NCAF prop-driven fighters downing 25 or so in air combat for no losses. Against the MiGs, the F-80 was outclassed. Only 6 MiG-15s were destroyed by F-80s, while 15 F-80s were downed by MiGs. When the Sabres arrived, the F-80 was relegated to ground support where it did well. After the war, F-80s were replaced by newer and faster designs as rapidly as possible.



F-84 Thunderjet: Conceived as a long range escort fighter, the Thunderjet was strong and heavily built. It first flew in 1946 and initial versions were underpowered, although by the Korean war this had been remedied. Its machine gun armament was identical to the F-80's but the F-84 was able to carry a bigger air to ground load much farther. Like the F-80, it was not able to compete with the swept winged MiGs but it reigned supreme

as a fighter-bomber and was available in quantity during the tough years of Korea. In air combat it fared slightly better than the F-80 being faster at most altitudes though less maneuverable due to its size and weight. Thunderjets shot down 9 MiGs and 3 other aircraft in air combat while losing 18 of their own to MiGs. The Thunderjet was the last straight winged jet fighter accepted by the USAF and served well into the 1950s being phased out of Air National Guard units in 1959.



F-86 Sabre: Like the P-51 before it, the Sabre was a classic design, embodying good range with speed and maneuverability. Its six .50 calibre guns gave it adequate firepower though many other fighters of the day carried 20mm cannon. The Sabre first flew in 1948 and was successively improved over the years being produced in Canada, and Australia under license. Though its thrust to weight ratio was only slightly better than its predecessors, it had the advantage of swept wings which gave it higher speeds and better transonic performance. The MiG-15, the Sabre's principal foe, enjoyed more thrust and was lighter being able to outperform the A and E models of the F-86, but later in the war the F-86F arrived having a redesigned wing, better engines, and a radar ranging gunsight which evened the odds. In air combat, 792 MiGs and other aircraft were claimed against the loss of 78 Sabres (110 by some accounts).



F9F Panther: The Panther was the U.S. Navy's first truly successful jet fighter and helped usher carrier aviation into the jet age. Conceived in 1946, the Panther, like the F-80, was basically designed to W.W.II specs. It entered operational service in 1948 as a simple day fighter, like other jets of its day, it was straight winged and slower than the Sabre or MiG. Being built to land on carriers, it was robust and unlike the USAF jets, carried a hard hitting battery of four 20mm cannon. Since Navy flyers were mainly committed to interdiction and ground support, contacts between the Panther and MiG were rare but when they did occur, the F9F came out on top gaining five confirmed kills for one loss despite the Panther's inferior performance. The Panther distinguished itself in ground attack missions and is best remembered for its appearance in the movie, "Bridges of Toko-Ri". After the war, the Panther was quickly replaced by newer swept winged fighters. The last Panthers retired in 1957 from Navy service.



F2H Banshee: The Banshee entered Naval service in 1948 and like the Panther, was a robust carrier fighter armed with four 20mm cannons. The Banshee however, was twin engined, bigger, and longer ranged. As a consequence, it was slower and less maneuverable than the Panthers but was destined to serve much longer due to its adaptability. Originally designed as a simple day fighter, the Banshee was first modified to carry bombs and rockets and served in Korea as a stable and accurate fighter-bomber. They never fought with MiGs but had they, Banshees would probably not have fared much better than other straight winged jets. Late in the war, a new model appeared with an air to air radar thus becoming the Navy's first all weather fighter. Aerial refueling capability was added a little later. Given its twin engined safety, radar, and good range, the Banshee was the natural choice to hold the line until the next generation of Navy fighters could be fielded. In the late 1950's

the Banshee was adapted to carry Sidewinder air to air missiles thus greatly improving its intercept capability. Banshees were still operationally flying as late as in 1962.



A-1 Skyraider: The Skyraider was not a jet, but has the distinction of being the Navy's last, best, and most powerful piston engined fighter-bomber.

The Skyraider evolved from World War Two experience and was designed to meet the Navy's need for a dedicated attack aircraft. Skyraiders entered service in 1946 and served alongside jets in both Korea and Vietnam. The Skyraider's load carrying ability is legendary; having no less than fifteen bomb racks. Compared to the underpowered jets of the day, it could carry three times their load, three times as far though, as the Jet jocks like to add, three times as slow. An excellent ground attack plane, the A-1 was a MiG killer as well. In Vietnam, Navy Skyraiders twice tangled with MiG-17s and shot down two. The Skyraider's large load and its ability to loiter for hours in support of ground troops made it indispensable. Only after proving vulnerable to SAMs in Vietnam, were the Skyraiders reluctantly retired from frontline combat duties.



MiG-15 Fagot: As mentioned before, the MiG-15 was a surprise to the U.S. although it had been in service since 1948 in Russia. Powered by copies of the British built Rolls Royce jet engine, the MiG was simple, capable and tough. It was designed to be easy to fly and its excellent performance was derived from its light weight compared to contemporary U.S. fighters. The MiG had a dismal combat record in Korea, due to the poor quality of its pilots. The MiG-15's armament was also inadequate for fighter combat. It carried one 37mm and two 23mm cannons, both having a low rate of fire, and a primitive gunsight. While adequate for attacking bombers, the MiG's original design goal, these weapons did not provide the firepower density to hit maneuvering fighter sized targets. The MiG carried only 80 rounds for its 23mm cannons and 40 for its 37mm. This gave it only a few seconds of firing time which the badly trained MiG pilots could seldom capitalize on (however, if they did hit, the results were devastating). Another vice it had was that at high speeds, the MiG tended to snake back and forth slightly throwing its aim off even more. These were items any competent pilot could compensate for but which hindered lesser trained ones. Nevertheless, the MiG was enough of a threat to prompt rapid advances in fighter designs following the war.



IL-28 Beagle: The Beagle was a fast twin jet Russian built bomber which was deployed by the Chinese near the end of the war but which never saw combat. In retrospect, it was nothing more than a basic medium bomber equipped with jet engines and possessing the attendant speed and altitude gains such powerplants allowed. However, it gave the communists something they had not had up to that time; an offensive strike aircraft. It could carry an effective bomb load and was even capable of using torpedoes for ship attacks. Its main threat was its speed. It was as fast as contemporary straight winged fighters and given the limited capabilities of shipboard early warning radars, the U.S. Navy realized that deck launched Panthers and Banshees did not have the performance to intercept them before they were overhead. It was always feared that the Russians may have given the Chinese the "bomb" so the Navy was justifiably concerned. The Beagle

threat helped define future Navy interceptor designs and prompted the U.S. Navy to sink money into air to air missile research, the result of which would forever alter the nature air combat. The missile age was on the horizon.

KOREAN WAR GUNS ONLY AIR COMBAT SCENARIOS

Scenario K-1: First Blood! 8 November 1950

Background: A few days earlier, P-51 Mustangs performing ground support missions had been attacked by Chinese MiG-15 jets. The Mustangs got away, but the stage was set for the first jet to jet battles as the USAF began using its F-80C Shooting Stars as top cover. On the 8th of November, F-80s of the 51st FIW were patrolling at 20,000 feet near the Yalu river. Six MiG-15s were spotted on the Chinese side climbing rapidly to 30,000 feet. The MiGs leveled off, crossed the Yalu and dove upon the American jets which turned to meet them. The MiGs made one firing pass then broke off, some diving for the safety of the Chinese border. Lt. Russell Brown, latched on to one of these diving MiGs and shot it down to score the first kill ever in all jet air combat.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-80C #1	C1	6006	N	20	5.0	CL	0
F-80C #2	C1	5906	N	20	5.0	CL	0
F-80C #3	C1	6106	N	20	5.0	CL	0
F-80C #4	C1	6207	N	20	5.0	CL	0
MiG-15 #1	C2	6028	S	25	6.0	CL	0
MiG-15 #2	C2	5927	S	25	6.0	CL	0
MiG-15 #3	C2	6026	S	26	6.0	CL	0
MiG-15 #4	C2	6125	S	26	6.0	CL	0
MiG-15 #5	C2	6023	S	28	5.0	CL	0
MiG-15 #6	C2	5922	S	28	5.0	CL	0

Game Length: 15 game-turns.

Notes:

1. For a smaller scenario just use the first two F-80s and the first three MiGs. All aircraft begin spotted, all are silver.

2. Victory; the MiGs must damage at least one USAF jet and have more points overall to win. The F-80s must destroy at least one MiG and have more points to win. Anything else is a draw.

3. Pilot training standards: USAF= good, Chinese= poor.

4. Aircraft Loads: F-80s = none, MiGs = none.

5. Advanced Rules:

- Pilot Quality: F-80s = all R.
MiGs = R, R, N, R, R, N.
Roll for attributes, no characteristics apply.
- Fuel: F-80C Start = 100, bingo = 70.
MiG Start = 100, bingo = 30.
- Weather: Clear, contrails begin at 35.

Scenario K-2: The Navy Scores! 9 November 1950

Background: The Navy's F9F Panthers got their chance at MiG-15s the day after Lt. Brown killed his. While covering AD2 Skyraiders and F4U Corsairs bombing the Yalu bridges, four Panthers of VF-111 were jumped by several MiGs. The Panthers quickly turned to face them but the MiGs broke off to zoom away. One kept turning to look behind himself allowing the Panthers to get in range. The F9Fs blasted away scoring hits which caused the MiG to pitch over into a dive. Lt. Cdr. Amen, the CO of VF-111, slid in behind it firing several more bursts until the MiG rolled over and crashed flaming to the ground. Later that day, two Panthers of VF-52 riddled another MiG which exploded in mid-air.

Maps:



Aircraft:	Map	Hex	Fac.	Spd.	Alt.	Conf.	Load
F9F-2 #1	C1	5905	SW	5.0	4	CL	0
F9F-2 #2	C1	5904	SW	5.0	4	CL	0
F9F-2 #3	C1	6204	SW	5.0	4	CL	0
F9F-2 #4	C1	6304	SW	5.0	4	CL	0
MiG-15 #1	C2	6428	SSW	6.0	6	CL	0
MiG-15 #2	C2	6627	SSW	6.0	8	CL	0
MiG-15 #3	C2	6524	S	5.0	12	CL	0
MiG-15 #4	C2	6624	S	5.0	12	CL	0

Game Length: 15 game-turns.

Notes:

1. All aircraft begin spotted. MiGs are silver, F9Fs are uncamoouflaged (dark blue over land).

2. Victory: to win, the MiGs must damage at least one F9F and have more points overall. The Panthers must score more points to win, anything else is a draw.

3. Pilot training standards: USN = good, Chinese = Poor

4. Aircraft Loads: Panthers = none, MiGs = none.

5. Advanced Rules:

- Pilot Quality: F9Fs= R, R, R, N. MiG = V, R, R, G.
All attributes = Average, no characteristics apply.
- Fuel: MiG start= 90, bingo= 35.
F9F start = 75, bingo = 50.
- Weather: Clear, contrails begin at 28.

Scenario K-3: Enter The Sabre! 17 December 1950

Background: The MiG pilots quickly learned from their errors in November, and on several subsequent occasions after they ran roughshod over the straight-winged USAF and Navy jets. The Air Force decided its F-80s and F-84s were outmatched so they rapidly deployed the swept-wing F-86 to Korea. The Sabres met the MiGs for the first time on 17 December when a flight of four F-86s ventured toward the Yalu. Four MiGs took off and climbed directly at the Sabres thinking they were the less capable F-80s. Given the gift of a soon to be rare altitude advantage, the Americans dove into the MiGs and scattered them. Col. Hinton, the Sabre leader, shot one MiG down after a short but hectic chase drawing first blood for the F-86.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-86A #1	C2	6316	N	25	4.0	CL	0
F-86A #2	C2	6217	N	25	4.0	CL	0
F-86A #3	C2	6417	N	26	4.0	CL	0
F-86A #4	C2	6517	N	26	4.0	CL	0
MiG-15 #1	C2	5617	NNE	20	3.5	CL	0
MiG-15 #2	C2	5618	NNE	20	3.5	CL	0
MiG-15 #3	C2	5517	NNE	20	3.5	CL	0
MiG-15 #4	C2	5418	NNE	20	3.5	CL	0

Game Length: 15 game-turns.

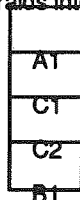
Notes:

1. All aircraft begin spotted. All aircraft are silver.
2. Victory: The F-86s must destroy at least one MiG and have more points to win. The MiGs must damage at least one F-86 and have more points to win. Anything else is a draw.
3. Pilot training standards: USAF= good, Chinese= Avg.
4. Aircraft loads: Sabres = none, MiGs = none.
5. Advanced Rules:
 - a) Pilot Quality: F-86s = V,R,R,R. MiGs = all R. Roll for attributes, no characteristics apply.
 - b) Fuel: Sabre start = 100, bingo = 60. MiG start = 100, bingo = 30.
 - c) Weather: Stratus layer at 28, 32, contrails at 35.

Scenario K-4: Bomber Escort! 1950-1951

Background: The advent of jet fighters raised doubts about the survivability of long range propeller driven bombers. Even the giant Convair B-36 "aluminum overcast" was considered obsolete by 1948 and the jet powered B-47 and B-52 bombers were still just prototypes in 1950. The B-36 was held in reserve for global nuclear warfare so the elderly B-29 was committed to Korea. The "Superfortress" did well until ordered to bomb targets in MiG Alley. The MiGs, designed precisely to intercept such bombers, cut them to pieces. Attempts to escort the B-29s with F-80s, F-84s, and F-86s proved futile as the MiGs attacked in such numbers that the escorts were overwhelmed. After 25 bombers were lost in two months, daylight heavy bomber raids into MiG Alley were permanently halted.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
B-29 #1	B1	4005	N	20	3.0	NA	NA
B-29 #2	B1	3906	N	20	3.0	NA	NA
B-29 #3	B1	4106	N	20	3.0	NA	NA

Bomber Escort: Four F-84E and two F-86A jets.

Interceptors: Eight MiG-15s.

Game Length: 20 game-turns.

Notes:

1. MiGs all set up in any hex of mega-hex C1-6006 at altitude level 30 speed 5.0, facing South. The MiGs begin spotted and are all camouflaged.
2. Escort fighters set up in any hex of mega-hex B1-4011 facing North at speed 4.0.
3. All escorts must set up so that each is adjacent to at least one other (in pairs). Each pair may be at one of the following altitude levels; 25, 28, 30, or 32. Any escorts starting at altitude level 25 begin unsighted, all others including the bombers begin sighted. All USAF aircraft are silver.

4. There is no data card for the B-29. The following paragraphs contain the B-29 flight rules.

B-29 Movement: B-29s always move first in the game turn before any fighters move. When they move they are only allowed to do the following;

- a) Use EZ turn rate.
- b) Do Slide maneuvers.
- c) Gain 0.20 Alt. levels per turn or lose 1 level per turn. This may be done at no cost in FPs.

A B-29 always moves at speed 3.0 unless H or C damaged, in which case it speed becomes 2.0.

Additional B-29 data is as follows:

VIS = 10, VLN = +2, Size = -2, Ceiling = 40.

B-29 Defenses: The B-29s have multiple gun turrets providing a 360 defense with an effective range of two hexes. Shots are unlimited. Any hits have an attack rating = 2.

Each B-29 is allowed to fire defensively twice per game turn in response to enemy gun attacks. Each bomber is also allowed one offensive gun attack if it has not used both its defensive shots in a game-turn. The offensive shot is taken after all aircraft have moved. If able, more than one bomber may team up for an offensive shot at a single enemy. In this case only one die roll is made figured from the bomber with the best odds of hitting; however a -1 modifier to the shot is allowed for each additional bomber firing at the target.

- The "to hit" rolls for offensive/defensive gunnery are:

Range 0 = 2, Range 1 = 1, Range 2 = 1.

- Gunnery Die Roll Modifiers = -1 if firing into bomber's 60 degree angle off arc or less. + or - Target aircraft size.

5. Victory: To win, the MiGs must destroy one B-29 and have more points overall. The USAF must have more points to win. Each bomber that exits the North edge of Map A1 by turn 20 is worth 8 VPs for the American player.

6. Pilot training standard: USAF= good, Chinese= limited.

7. For a smaller scenario, reduce the escort to either two F-84s or two F-86s and use only one B-29 and four MiGs.

8. Aircraft Loads: F-86s and F-84s = none, MiGs = none.

9. Advanced Rules:

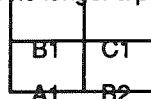
- Pilot quality: Roll for each pilot. Chinese are only eligible for CBT Hero characteristics. U.S. pilots eligible for all characteristics.
- Fuel: Escort start = 80% of internal, bingo = 60% of internal. MiG start = 110, bingo = 40 points.
- Weather: Contrails at 28, stratus layer at 35.

10. Recommended Variations: Try using F-80s in the escort role in place of the F-84s, or use all F-86s. Late in the war the Navy escorted B-29s with F2H-2 Banshees; try those.

Scenario K-5: MIG Alley Furballs! 1952-1953

Background: The F-86 Sabre was sent to Korea to establish air superiority at all costs. Sabre units therefore entered "MiG Alley" knowing that the MiGs, alerted by ground radar, would always meet their F-86 formations with position and altitude advantages. Despite this, and being outnumbered in nearly every fight, Sabre pilots, many of whom were veterans and aces of W.W.II, scored heavily against the inexperienced MiG pilots. Though the A and E models of the Sabre were slightly inferior in performance, the MiGs still suffered losses at a 5 to 1 rate. When the improved F models of the Sabre entered the war, MiG losses nearly doubled and "MiG Alley" was no longer a place of danger to allied aircraft.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-86 #1	B2	4017	W	35	5.0	1/2	5
F-86 #2	B2	4116	W	35	5.0	1/2	5
F-86 #3	B2	4117	W	35	5.0	1/2	5
F-86 #4	B2	4218	W	35	5.0	1/2	5

MiGs: Four MiGs enter play on game-turn 1 after the F-86s have moved. Four more MiGs enter on game-turn 3 after all aircraft have moved. Eight additional MiG-15s (use MiG-17 counters) may be brought into play, four each on game-turns 9 and 12.

F-86s: Four additional F-86s enter from East edge of play area on game-turn 6 after all other aircraft have moved.

Game Length: 20 game-turns.

Notes:

1. The American player must roll the die to see which model of F-86s each flight of four consists of.

- 1 to 2 = A models 5 to 8 = F models
3 to 4 = E models 9 to 10 = F models with 6-3 wing.

2. Play Area: The maps are fixed. USAF aircraft may only exit to the South or East and are removed from play when they do. MiGs may only exit to the North or West (into China). Any aircraft exiting an enemy edge is removed from play and 4 VP's are awarded to the enemy in addition to any points given for damage for that Aircraft.

3. MiGs always enter play at speed 6.0, at any altitude in the VH band from the North or West edges of play area. Entry side of play area is announced at start of game-turn of entry. MiGs must always enter initially from adjacent hexes, with identical altitudes and headings.

4. Reinforcing F-86s enter at speed 6.0, CL configured with 0 load. They enter in a group as the MiGs do but may begin at any altitude in the HI or VH band.

5. Victory: The side with the most points wins. If the MiG player opts to bring in additional MiGs on game-turns 9 and 12, two VP's must be given to the USAF player for each MiG brought. From two to four may be brought in each time.

6. Pilot training standard: USAF = good, MiGs = poor.

7. All aircraft enter play sighted, all are silver.

8. Aircraft Loads; F-86s: Stations 1, 4 = 250ft, load 2, conf=cl
MiG: All; stations 1, 2 = 250L FT, Conf. =cl, load = 2.

9. Advanced Rules:

- Pilot Quality: Both sides roll for on tables. U.S. use Good, Chinese use Poor and Chinese are only eligible for Combat Hero characteristics.
- Fuel: MiG start (on turn of entry) = 80, bingo = 40. F-86 start (on turn of entry) = 100, Bingo = 70.
- Weather: Clear skies, contrails at 30.
- Terrain: All contours represent mountains and each is a rise of 2 alt. levels vice one.

10. Smaller Scenario: For smaller game, keep the sides to just the first four aircraft plus one set of reinforcing MiGs.

Scenario K-6: Marines, Squids and MiGs! 1951-1952

Background: Navy and Marine air power was directed primarily against ground targets so Navy jets seldom tangled with enemy aircraft after 1950. One Marine outfit, VMF-311, did manage to get into three battles with MiGs in one year while performing ground attack missions. In each case, the MiGs attacked from above forcing the Marine Panthers to jettison bombs and defend themselves. Unfortunately, the end result was a total of one Panther lost to no MiGs with several damaged on both sides. In November of 1952 four Navy Panthers of VF-781 did better when they fought seven Russian MiGs in a little known incident downing two and damaging a third for one Panther Damaged. Banshees were used in 1951 as an occasional B-29 escort due to their range but no MiG contacts occurred. The only F2Hs to see MiGs were two unarmed photobirds which got badly shot up before escaping.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F9F-2 #1	C1	6103	NE	5	5.0	CL	0
F9F-2 #2	C1	6104	NE	5	5.0	CL	0
F9F-2 #3	C1	5904	NE	6	5.0	CL	0
F9F-2 #4	C1	5804	NE	6	5.0	CL	0
MiG-15 #1	A1	1713	SSE	8	7.0	CL	0
MiG-15 #2	A1	1712	SSE	8	7.0	CL	0
MiG-15 #3	A1	1613	SSE	8	7.0	CL	0
MiG-15 #4	A1	1610	S	10	6.0	CL	0
MiG-15 #5	A1	1509	S	10	6.0	CL	0
MiG-15 #6	A1	1709	S	10	6.0	CL	0

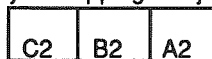
Game Length: 15 game-turns.

Notes:

1. All aircraft begin sighted. The MiGs are camouflaged, the Panthers are uncamlouflaged (dark blue over land).
2. Pilot training standards; USMC = avg., Chinese= poor.
3. Smaller Scenario: For a smaller game, use only the first half of each side. The side with the most points wins.
4. Aircraft loads: F9Fs = none. MiGs = none.
5. Advanced Rules:
 - b) Pilot Quality: Panthers = V, R, R, N.
MiGs = R, R, R, R, N, G. Roll for attributes, no characteristics apply to either side.
 - c) Fuel: Panther Start = 60, Bingo = 30.
MiG start= 85, Bingo= 45.
 - d) Weather: Clear skies. Contrails at 38.
5. Recommended Variation I: Delete the Panthers and set up two unarmed Photo-Banshees in hexes C1-5905 and 6105, facing N, altitude 8, speed 5.0. Both Banshees must escape off the N edge of Map A1 to win, no other conditions apply. If one escapes and one doesn't game is a draw.
6. Recommended Variation II: Play this scenario using F2H-2 or F2H-3 Banshees.

Scenario K-7: Fast Bomber Threat! 1953

Background: The deployment of modern IL-28 jet bombers to bases in southern China in the last year of the war caused the US Navy and Air Force some serious concern. Now the Chinese had an offensive weapon near the front which was nearly as fast as the Panthers and Sabres and which could reach most targets in South Korea. The IL-28 Beagle could fly above the range of AAA guns if desired and could be fitted with torpedoes for attacks against ships. Fortunately, peace came and it was never used. Its threat could have started World War III since the U.S. had made plans to attack the Chinese IL-28 bases. This scenario illustrates the difficulty of stopping fast jet bombers.

Maps:

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
IL-28 #1	C2	5323	E	32	5.0	DT	9
IL-28 #2	C2	5223	E	32	5.0	DT	9
IL-28 #3	C2	5224	E	32	5.0	DT	9

Interceptors: Set up four fighters, one each in hexes B2-3519, 3619, 3520 and 3621. All facing W at speed 5.0 and in any allowed altitude in the HI to VH band.

Use either F-86Fs, F-84Gs, F9F-5 Panthers or F2H-3 Banshee Fighters.

Optional Escort: The Chinese player may opt to use two MiG-15s as an escort. They set up in hexes C2-5524 and 5525, facing W, at Altitude 40, speed 5.0. If the escort is taken, award the US player 10 V.P.s at start of game.

Game Length: Until all IL-28s are destroyed or exit the East edge of the play area.

Notes:

1. All aircraft begin sighted due to contrails. All Chinese and USAF aircraft are Silver. Navy aircraft are uncamlouflaged.
2. Pilot training standard: U.S. = good, Chinese= limited.
3. Victory: The side with the most points wins. Award the Chinese 1 V.P. for each bomb carried by each Beagle that exits the East edge of Map A1.
4. Play Area: The Maps are fixed. Any aircraft exiting the play area is removed from play except IL-28s exiting to the East which are assumed to successfully bomb their targets.
5. Aircraft Loads: All fighters and escort = none. IL-28s: 10 bombs worth 1 V.P. apiece if carried to target (8 in the bomb bay and one each on pylons 1 and 3).
6. Advanced Rules:
 - a) Crew Quality: Generate each from the tables.
The Chinese are not eligible for characteristics.
U.S. use Good table, Chinese use Average.
 - b) Fuel: All have sufficient fuel to finish the scenario.
 - c) Weather: Contrail altitude is 30, clear skies.

KOREAN WAR
AIR TO GROUND COMBAT SCENARIOS
 (AAA ONLY)

Scenario K-8: Pork Chop Hill! 1950. *

Background: The Chinese became famous for their "human wave" style of infantry attacks. A number of U.S. units were overrun and destroyed by them early in the war. However, US troops soon learned to employ mass firepower and close air support became a primary means of delivering that firepower. It was in this role that the AD-1 Skyraider became famous as the "Flying Dump Truck" and where the F-80s, F-84s, panthers and Banshees earned their keep while the Sabres plugged MiG Alley. This scenario illustrates a typical Close Air Support Mission in the rough terrain of Korea.

Maps:

Ground Unit Set Up: US Troops; two green infantry and one tan CCU counter; one each in hexes 4321, 4322, 4422.

Chinese Troops: Two Tan Medium Armor units and six tan infantry units. Place the tanks in hex 4221, and two infantry each in hexes 4222, 4223, and 4323.

Chinese AAA: One M-38 37mm MED. AAA unit in hex 4024, One ZPU-1 14.5mm LT. AAA in hex 4319. One ZPU-4 14.5mm Lt. AAA in hex 4120.

Air Support: Four aircraft, one each in hexes 3328, 3229, 3430, 3530; all facing N, at Altitude 10 and at any allowed speed for their configuration. Choose either A-1s, Panthers, Banshees, F-80s, or F-84s loaded as desired with HE bombs, Napalm, or Rockets.

Game Length: 15 game-turns.

Notes:

1. The AAA fires as per random AAA fire rules.

2. Human Wave Attacks: At the end of game-turn 8, the Chinese can attack any adjacent Americans as described in training scenario 5. Each tank unit equals two infantry units. If an American unit is wiped out, up to three Chinese units which participated in the attack on it, can advance into the hex. At the end of game-turn 15, a final human wave attack is allowed.

3. Victory: The US player wins if at least two of his units are still alive at the end of turn 15 or if one unit is alive and half or more of the Chinese units have been destroyed. The Chinese win otherwise.

4. Aircraft loads: As set up by the player.

5. Advanced Rules:

- a) Terrain: The contour lines represent a rise in terrain of 1 level. The hilltop is at level 2.
- b) AAA rules: All Chinese infantry are capable of barrage fire but not the tanks.
- c) Fuel: All have sufficient fuel to finish the scenario.
- d) Weather: Roll for weather on Far North Table.
- e) Pilot Quality: Roll for pilots on Good table.

Scenario K-9: Carlson's Canyon! Spring 1951 *

Background: Air Group 19 aboard the USS Princeton, discovered and destroyed a pair of important railroad bridges spanning a small canyon in a series of devastating raids that would inspire the epic novel; "Bridges Of Toko-Ri". The canyon was named after the leader of the raids "Swede" Carlson, a Skyraider pilot. The actual aircraft involved were prop driven Skyraiders while Panthers flew top-cover. In the novel, James Michener created a hypothetical carrier group equipped with Banshee jets and made the bridges more formidable and heavily defended. In the movie, F9F-2 Panthers were used. In this scenario, you may try all three versions.

Maps:



Ground Unit Set Up: Place a bridge marker in hex 6010. It is a hard target, defense strength = 6.

North Korean AAA: Place two M-38 37mm AAA units one each in hexes 5812 and 6510. Place a ZPU-4 quad. 14.5mm AAA unit in hexes 5908 and 6108.

Hollywood AAA: If you wish to try the more exciting Hollywood version of the defenses add;

- a) Two KS-12 85m, one each in 5506 and 6611.
- b) Another ZPU-4 in hex 6014.
- c) Another M-38 in hex 6105.

Attackers: Choose any two sets of the following;

- a) Four AD-4 Skyraiders; each with two 2,000lb. HE bombs.
- b) Four F2H-2s each with two 500lb. HE bombs.
- c) Four F9F-2s each with two 500lb. HE bombs.
- d) Any of the above, but design your own load.

Game Length: 15 game-turns.

Notes:

- 1. This is designed as a solitaire scenario. Use the Random AAA fire rules if played as such.
- 2. All aircraft enter play on game-turn one from either the

East or West map edges. They may enter at any allowed speed and altitude for their configuration.

3. Aircraft may exit any map edge, once they do, they are out of play. All aircraft are uncamoouflaged.

4. Victory: To win, the Navy pilots must damage the bridge and take no losses, or destroy the bridge while losing no more than two aircraft.

5. Aircraft Configurations: AD-4 = 1/2 F9F and F2H = 1/2.

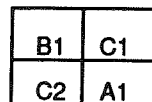
6. Advanced Rules:

- a) Fuel: All have sufficient fuel to finish the scenario.
- b) Weather: Clear skies.
- c) Pilot Quality: all R, roll for attributes, no Characteristics apply.
- d) Terrain: Each ridgeline is a one Alt. level rise.

Scenario K-10: Operation Strangle! 1951-1952

Background: When the War stagnated in 1951, Operation "Strangle" was commenced to cut off Communist troops from their supplies. All available aircraft were used to attack enemy supply lines. Trains, trucks, bridges and railroads were favored targets. The two year effort was not entirely successful however. Enough supplies trickled through for the enemy to hold out until peace resumed so no territorial gains on the ground were made. The enemy suffered enormous losses in men and material but hundreds of fighter bombers were also lost. Most fell to AAA and some to MiGs which occasionally sortied well south of MiG Alley.

Maps:



Ground Unit Set Up: Locomotive B1-4510; Train x 2, B1-4511, 4512; POL marker B1-4714 and C1-5315; Tan infantry x 6 plus Trucks x 6, one truck and one infantry each in hexes A1-1404, 1504, 1605, 1505, 1507, 1904. The infantry is considered dismounted and separate targets. Two Tan Med. Armor units, both in C1-5314. Two junks, one each in A1-2103, 2304. One tan CCU in B1-4708.

AAA Unit Set Up: M-38 37mm AAA x 3, ZPU-4 quad. 14.5mm x 3, S-60 57mm x 2, ZPU-1 14.5mm X3. One per hex anywhere within 12 hexes of B1-4915.

Attackers: Choose any one of the following;

- a) Four F-80s
- b) Four F-84E/Gs
- c) Four F9F-2/5
- d) Four F2H-2/3
- e) Four AD-4 Skyraiders + two F9Fs.

Attacker Set Up: Anywhere in Megahex C1-6508 at altitude 15, facing W, at any allowed speed for their configuration.

Attacker Loads: Any allowed combination of HE bombs, Rockets, and Napalm.

MiG-15 Threat: The Chinese Player secretly rolls one die and records the result. The result is the game-turn in which two MiGs are allowed to enter play from the West edge of maps B1 or C2. The MiGs enter CL configured at altitude 20, speed 6.0.

Game Length: 20 game-turns.

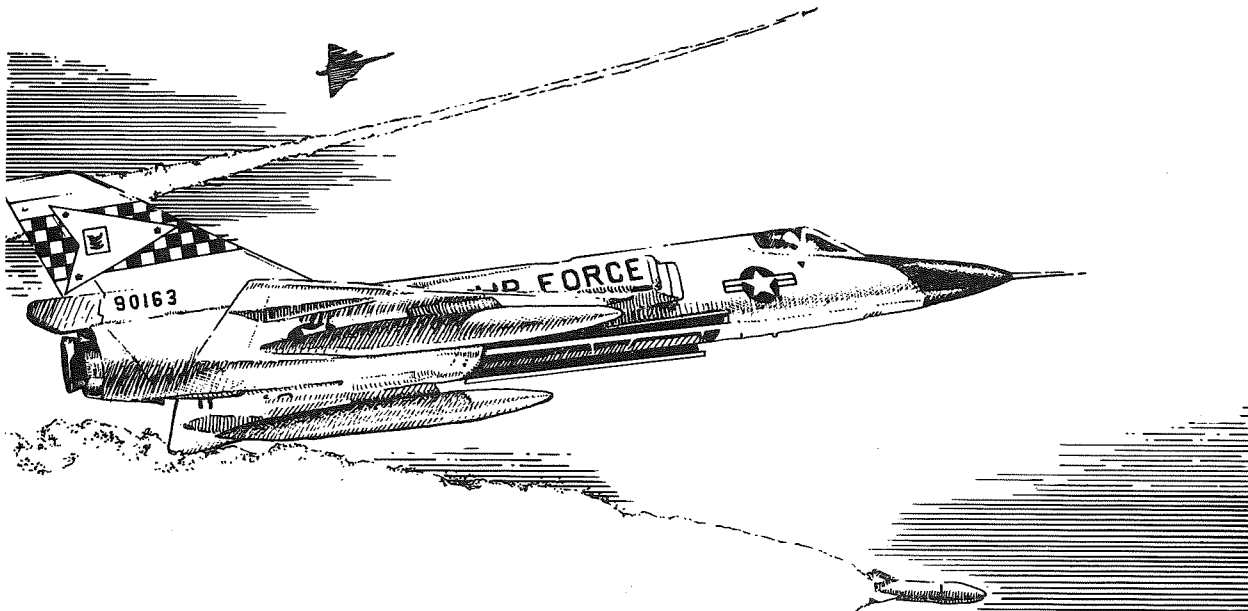
Notes:

1. Play Area: The Maps are not fixed, additional maps may be added as needed to expand the play area.
2. The MiGs enter unsighted with the nearest two US aircraft sighted. Ground targets are not sighted at the start of play. Navy aircraft are uncamoouflaged, all others are silver.
3. Victory: The U.S. player must inflict at least 15 points of damage to ground units and have more points overall to win.
4. Pilot training standards: US= Avg., Chinese= limited.
5. Aircraft Loads: U.S.= As set up by player. MiGs= none.
6. Advanced Rules:

- a) Fuel: Fighter bomber start = 70% of internal, bingo = 45% of internal. Chinese start = 60 % of internal, bingo = 35 % of internal.
- b) Weather: Generated from the Far North tables.
- c) Pilot Quality: Generated from the tables; Chinese are not eligible for characteristics. U.S. use Good table, Chinese use Poor.

7. Recommended Variation: Turn the Tables! Let the attackers be three IL-28s, escorted by two MiGs. They can be intercepted by any two U.S. fighters of the period. In this case, consider all ground units to be allied troops. Use the same AAA but delete the M-38s and add an S-60 (the 14.5s simulate quad. 50cal units and the S-60s simulate allied 40mm guns).

CHAPTER 3: THE COLD WAR, DAWN OF THE MISSILE AGE! 1954-1964



HISTORICAL BRIEFING

Not long after World War II, the Soviet Union achieved nuclear capability. Initially, the threat to America was minimal as the Soviets did not have the capability to deliver atom bombs on U.S. soil. However, just after the Korean war, this changed. In 1954, two aircraft entered service which gave the Soviets their first intercontinental bombers; the TU-95 Bear, and the TU-16 Badger. The Bear was immense, roughly the equivalent of a B-36 but faster with large turboprop engines and swept wings. The Badger was a medium sized jet bomber similar to but slightly larger than a B-47. The Bears had the range to fly almost anywhere and the Badgers could hit the outer edges of the U.S. on one way trips. This caused USAF defense planners many headaches as both bombers were nearly as fast as most fighter jets of the day.

To cope with these threats, America created the US Air Defense Command which soon became the Continental Air Defense Command called CONAD. This eventually grew and integrated the Canadian Air Force with the USAF to create the North American Air Defense Command better known as NORAD. An extensive net of early warning radar stations was built and new aircraft were designed to tackle the problems of long range air defense. Since Soviet bombers could strike at

any time and in any weather, radar equipped interceptors were needed to replace the masses of traditional day-only fighters forming the bulk of the USAF after Korea.

Creating an all weather defense force presented many difficulties. First, airborne radar technology was still not very advanced in 1954. Early radars were large, bulky and prone to breakdown. Weaponry was also a major concern. In the Korean War, the six fifty calibre guns of the Sabre had barely proven adequate to shoot down MiGs therefore it was reasoned that they certainly wouldn't work against the tough Soviet bombers. Cannons were considered inadequate as well since the bombers were heavily defended by gun turrets and the typical pursuit curves flown by attacking fighters left them vulnerable to defensive fire. What was needed was a weapon that could be fired from beyond the range of the defensive guns. Guided missile technology was being developed at the time but the need to field interceptors couldn't wait.

An immediate if temporary solution came in the form of unguided rockets fired in large salvos. Fighters would launch the rockets from a point determined by a fire control computer linked to the fighter's radar. One of the first jets to have air to air rockets was a radar equipped version of the Sabre, the F-86D. The Sabre-Dog, as it was called, carried a clip of 24

rockets instead of guns. In practice, the accuracy of this single-shot warload was found to be very poor and the Sabre's range too short for intercontinental defense. Other rocket armed fighters quickly appeared but the aircraft that epitomized the rocket era was the F-89D Scorpion, a large two-seat straight winged jet loaded with a total of 104 rockets. The Scorpion had tremendous range but was so slow it could not catch bombers from behind, it relied on forward quarter intercepts and its large firepower to make a single pass kill. This of course was far from desirable. The accuracy limitations of rockets led to another unusual weapon, the AIR-2 Genie. This was a large unguided rocket carrying a nuclear warhead. The idea being that it could miss by the proverbial mile and still obliterate a target with its nuclear blast. Of course, it was almost as dangerous to the launching aircraft as to the target... not to mention any adverse effects involved in detonating nukes over home territory.

By 1955, rapid gains in radar technology had made airborne missile guidance feasible and the sound barrier had been explored. Thus the next generation of interceptors was designed to employ radar guided missiles and to possess supersonic speeds. The Air Force developed the Falcon series of radar missiles while the Navy concentrated on the Sparrow. The first Air Force missile armed interceptors to be fielded were the F-101 Voodoo and the F-102 Delta Dagger. Neither carried guns but both possessed the range and performance to make NORAD a workable defense system. Earlier interceptors like the subsonic Scorpion were even retrofitted to carry guided missiles. Still, firing radar missiles proved to be a difficult and complex task requiring specialized aircraft and in many cases, two man crews. Fortunately, a simpler weapon was under development; the heat-seeking missile which became operational in 1956 thanks to the Navy.

In the early 1950s the U.S. Navy was considered extremely vulnerable to nuclear bombers. It did not at the time possess supersonic fighters, having only the aging Banshee and newer but underpowered transonic fighters like the F9F Cougar and the radically shaped F7U Cutlass for defense. These Navy fighters relied primarily on guns and lacked the speed to make a quick intercept. As for the Air Force, guided missiles were seen as the Navy's salvation to its defense problems but big two man radar equipped jets were not an option. The Supercarriers that could handle such big jets were yet to be built. The Navy, working diligently in its weapons labs, succeeded in developing the simple yet very functional Sidewinder heat-seeking missile. The heat-seeker revolutionized air combat and is still in use today. The beauty of the concept was that it was so simple it could be hung on just about any aircraft and was not reliant upon radars; a pilot could simply point it at an opponent's tailpipe and shoot. Sidewinders proliferated and soon armed even subsonic fighters like the Banshee and Cougar and were quickly adopted for use on Air Force fighters like the F-100 and even the F-86. The heat seeker's only weakness was that it could not see through clouds so for all-weather defense, the Navy eventually employed the radar guided Sparrow on F7U-3M Cutlasses in special missile armed and trained squadrons.

As the 1960's approached, advances in aircraft and radar technology occurred quite rapidly. Double-sonic speeds were achieved in new interceptors like the F-104 and F-106 and missiles were being placed on all fighters that could handle them. With the arrival of big deck carriers, the Navy began

fielding its first true supersonic fighters and was working closely with McDonnell Douglas to create the big and superbly capable F-4 Phantom, a mach-two capable interceptor armed with a total of eight Sparrow and Sidewinder missiles. The post Korean era of transonic aircraft quickly faded from the scene as the new jets entered service. Guns rapidly lost importance and the Navy's F-8 Crusader was the last U.S. fighter designed before Vietnam to have internal guns.

On the other side of the fence, the Soviets had developed a large interceptor force but the lack of good radar technology left them no choice but to produce improved models of their point defense MiGs. The twin engined MiG-19 was the first to be capable of sustained supersonic speeds. However, it was the light and agile delta winged MiG-21 which became the Soviets main air defense fighter. Limited in capability when compared to the big radar equipped aircraft in the U.S., all the MiGs were still potent jets possessed of good maneuverability and armed with heavy cannons and in the case of the MiG-21, with copies of the Sidewinder missile. To tackle the lack of range in the MiGs, other interceptors like the SU-9/11 were built. These had larger radars and relied on missiles alone for interception duties. The Soviets also developed a functional and reliable line of surface to air missiles.

Ironically, both sides would soon find their Cold War designs meeting in combat over Vietnam in situations they were not designed for. The simple, lightly armed and fast climbing MiGs, designed to be employed in mass against lumbering bombers would instead be pitted against superior numbers of missile armed American fighters. Likewise, the big heavy U.S. interceptors would find themselves knee deep in agile little MiGs instead of bombers. It would be in Vietnam that the limitations of the all-missile armament theory would be discovered and the call for a return of guns in fighters initiated.

Flash Backs:

A favorite F-101B trick was to give 'em (the SAC guys) the probe... an aerial substitute for the universally recognized display of the middle digit. This practice died when the seldom used refueling probes were removed and IR detection and tracking was installed on the nose of the 101s.

An early problem with the Deuce (F-102) was a failure of the starter clutch to engage. When this happened, the starter, which was a small jet engine, would overspeed and explode. I once had an aircraft in which the starter refused to operate. The crew chief eventually got it started and, after the mission, I asked him how he did it. "Oh I just climbed on top of it and hit it with a hammer until it started." Now there was a brave man indeed!

"The missile with a man in it" may not seem like a futuristic or very unusual nickname to hang onto a fighter today...but in the early fifties, the only missiles we had were strictly experimental and a bad way of blowing up in spectacular and unplanned fashion. So the F-104's nickname should be appreciated for what it implied back then.

Reflections of USAF Interceptor Pilots

COLD WAR AIRCRAFT BRIEFINGS



F-86D Sabre: The F-86D "Sabre-Dog", entered production in 1951 and was an all-weather interceptor variant of the basic Sabre. While it retained the original Sabre's wings; canopy; and tail assembly,

the fuselage was completely redesigned to accept a newly developed afterburning engine; an APG-36 radar with collision course guidance capability; an auto-pilot; and a retractable tray housing 24 air to air rockets. The rockets were the F-86D's sole weaponry until it was adapted to carry AIM-9B sidewinder missiles in 1956. The "D" was a finely tuned machine and well liked by its pilots. Its all weather capability was limited as was its range for Air Defense missions but it was still produced in greater numbers than the fighter Sabres. A simplified version carrying four 20mm cannons instead of rockets and deleting the collision course technology was built for NATO air forces as the "K" model. The "L" model was simply a "D" model with improved avionics and a larger wing.



F-89 Scorpion: The Scorpion was designed in response to an Air Force request for a jet aircraft to replace the P-61 Blackwidow nightfighter.

What resulted was a large, straight-winged, twin-engined jet fighter with a two man crew; APG-33 radar; and six 20mm cannons. The Scorpion's range and endurance was twice that of contemporary fighters and though it was too big and underpowered for fighter combat, it sufficed for home defense. The first variants, F-89A's and B's, appeared in 1950. A year later the F-89C version with strengthened wings and better engines took flight. In 1952 the F-89D entered production. This model incorporated collision course guidance and deleted its guns for a load of 104 rockets! Beginning in 1955 the Scorpions were adapted to carry Falcon Missiles and the final variants, F-89J's, served in Air Guard units until 1969.



F-100 Super Sabre: The "Hun", as the F-100 came to be called, was the result of design work initiated in 1949 to develop a jet fighter that could exceed the speed of sound in level flight. In 1953,

the first prototype was ready and broke Mach 1 on its maiden flight! The key to this feat lay in its powerful J-57 turbojet which incorporated the new "afterburner" technology providing three times the thrust of an F-86's engine. By 1954, the F-100 was entering squadron service and became the Air Force's main fighter until replaced by F-105s and F-4s in the 1960's. The Hun was a simple day fighter, capable of carrying bombs and AIM-9 missiles and having four 20mm cannons as its "teeth". Though considered obsolete by 1965, four wings of Super Sabres were deployed to Vietnam and served well in the close air support role. They even flew missions into North Vietnam and two inconclusive skirmishes with MiG-17s were recorded. F-100s served with the Air Guard until retired in 1980. The Hun was also extensively exported serving with dozens of Nations.



F9F-6 Cougar: In 1950, a swept-winged variant of the F9F Panther was proposed to the Navy. The offer was accepted and the result was the Grumman Cougar which first flew in 1951 and

entered Squadron service in late 1952; just a hair too late to fight in the Korean War. The Cougar was an immediate success though. Its swept wings and more powerful engine gave it a speed increase of 120mph over the Panther and it

was a solid and safe machine to fly. Like the panther, it was tough, had four 20mm cannons and could carry a variety of bombs and rockets. The Cougar was developed even further in 1953 with the F9F-8 model which had a larger and revised wing, new engine, and could top 700mph in level flight. A later variant, the F9F-8B was capable of carrying up to four Sidewinder missiles. The last fighter Cougars were withdrawn from service around 1960 although a two-seat version was used until 1974 by training units.



F7U Cutlass: This tailless, futuristic, swept-wing, twin engined Navy fighter first flew in 1948. The design was radical but advanced; certainly pushing the leading edge of technology then. Unfortunately,

projected engine developments failed to materialize and the first Cutlasses were underpowered and had numerous teething problems. Only 14 F7U-1s were built, all for testing, and over a third crashed while the bugs were worked out over the next few years. The first production model, the F7U-3, with J-46 afterburning engines and a radar only entered service in 1952 eventually equipping 13 squadrons. It could have been a great machine had it been produced in 1950 but by 1954 its performance had been matched or exceeded by other designs far less demanding to fly. The Cutlass was a capable jet but its accident rate was so high it earned the nickname "Ensign-Eliminator"! The most heavily armed version, the F7U-3M appearing in 1955, could carry 4,000 lbs of bombs or four Sparrow or Sidewinder missiles in addition to its 20mm guns. By 1957, the Cutlasses were all gone; replaced by newer supersonic fighters like the F-8 Crusader.



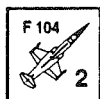
F-101 Voodoo: Entering service in 1957, the Voodoo proved to be a versatile machine. Originally conceived as a single seat, long ranged supersonic escort fighter for SAC, it was picked

up by Tactical Air Command as the F-101C strike-fighter armed with "nukes" instead. Its only conventional ordnance was its cannons as it was not wired for bombs or rockets. These fighter bomber versions had a short life, being rapidly replaced by F-105s in the same mission. The Fighter Voodoos gave way to the photo-recon versions which excelled in low altitude high speed reconnaissance and earned high marks in that role during the Vietnam War. The RF-101s were so popular that they were not retired until 1975 although RF-4C photo-Phantoms were available. In 1959, a two seat, all weather interceptor model, the F-101B was fielded. It was armed with three Falcon missiles and two Genie rockets. By virtue of its long range and superior speed, Voodoo units quickly augmented the F-102 in NORAD and the F-101B was selected by the Canadian Air Force to be its main interceptor. The Voodoos were excellent interceptors and only retired from U.S. service in 1983.

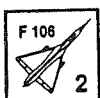


F-102 Delta Dagger: The F-102 was the first Air Force jet designed from the beginning purely as a supersonic interceptor. It was to have the most advanced systems then available and be armed with Falcon missiles and rockets. The F-102 sported a Delta shaped wing with no tail. With a powerful J-57 engine, the Dagger looked promising and was ordered into production even before it first flew. Unfortunately, on its maiden flight in late 1953, serious buffeting was encountered and it failed to reach supersonic speeds. The problem lay in its fuselage

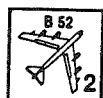
design which caused too much transonic drag. The solution was found after a year of extensive redesign and testing. With a new "area ruled" and stretched fuselage, redesigned wings, and a reshaped canopy, the Dagger hit Mach 1.2 in level flight. The new version entered production in 1955 and served long well, being retired from the ANG in 1978. The Dagger was exported to Greece and Turkey and was also used in Vietnam.



F-104 Starfighter: Nicknamed "the missile with a man in it", the Starfighter's design was a direct result of Korean war experience. American pilots were demanding more speed and climb performance in order to intercept and defeat high flying MiGs. At high altitudes, maneuvering combat was not envisioned so a high energy, fast climbing, cannon and missile armed design was deemed adequate. The F-104 was little more than an advanced afterburning J-79 engine with tiny wings and a pilot attached and its performance was staggering. The Starfighter could hit mach 2.0 and outzoom or outdash every other fighter of its day. Unfortunately its rudimentary radar, limited range, and small weapons load made it undesirable to the USAF which preferred long ranged heavily armed interceptors. The Starfighter would serve with only two USAF wings starting in 1958. One squadron of Air Force F-104's saw limited action in Vietnam and all were retired from USAF service by 1968. Extensively exported, F-104s equipped many foreign Air Forces and some still fly with Italy and Turkey today.



F-106 Delta Dart: Convair's F-106 design was started shortly after it's F-102 and benefitted from the Dagger's aerodynamic mistakes. The Dart was bigger, used a similar delta layout and was powered by the large J-75 engine which made it the second American fighter design capable of Mach two speeds. The Dart also featured an improved fire control system and was armed with four late model Falcon missiles and a Genie nuclear rocket. The Dart entered service in 1959 and was immediately liked by its pilots. Its avionics suffered some teething problems initially but these were soon fixed and it became NORAD's most capable interceptor serving with 11 different squadrons. Over the years it has been given improved electronics, a new canopy, and most significantly, in the 1970's all active Dart's were retrofitted with the vulcan 20mm cannon as a result of lessons learned in Vietnam. The Dart was finally retired in the late 1980's.



B-52 Stratofortress: For an airplane that was conceived in 1946, first flown in 1955 and continues to fly in a third of Strategic Air Command's squadrons today, the "Buff" has had a rather remarkable life. Continuously upgraded, this swept winged eight engined behemoth jet bomber has guarded "peace" for over 35 years as the "manned" portion of the Strategic triad. Designed for global nuclear warfare, the Buff's first combat experience was as a conventional bomber in Vietnam where it proved devastating in "Arc Light" raids on enemy troop concentrations and in raids over heavily defended North Vietnam where fifteen B-52s were lost to enemy defenses. Their employment helped in bringing a speedy end to US involvement. Until the advent of advanced SAM missiles and supersonic interceptors, these fast jet bombers were virtually an unstoppable force which kept the "Cold War" cold. The tireless Buff's were used yet again during the Gulf War in 1991.



SU-9/11 Fishpot: The Soviets also faced the threat of nuclear destruction from American bombers and did their best to counter them. They developed half a dozen surface to air missile types, a multi-layered radar network and deployed over 2,000 interceptors in their equivalent of NORAD called PVO-Strany. The SU-9 Fishpot entered service in 1958 as an uncomplicated all weather interceptor equipped with radar and four AA-1 Alkali missiles and soon equipped many PVO squadrons. Its importance lay in its supersonic speed and improved range over other Soviet fighters. In 1961, a new version with a more powerful radar and carrying two large AA-3 Anab missiles appeared called the SU-11. Neither compared with U.S. interceptors but at one time, Fishpots represented half the total interceptor force available and the last were not retired until the early 1980's.



TU-16 Badger: First flown in 1952, the Badger remains operational today in the Soviet Union and in China in numerous versions. A versatile aircraft, its original mission was as a medium-range nuclear bomber similar in size and capability to the U.S. B-47 Stratojet. It has since been adapted to a number of roles including reconnaissance and aerial refuelling. When it first entered service in 1954, its high subsonic speed made it a difficult target for contemporary fighters to intercept. It was the threat that this and several other jet bombers posed which drove the massive development of American interceptors and missile technology in the 1950's. It remains a credible threat to this day being armed with large stand off anti-ship cruise missiles.

COLD WAR

GUNS & ROCKETS AIR COMBAT SCENARIOS

Scenario CW-1: MIG Alley Revisited! 1954-1955.

Background: One lesson of Korea was that American fighters needed to be faster and fly higher. American pilots realized that they wouldn't always face poorly trained enemies. In Korea the MiG's superior ceiling and speed often allowed it the luxury of initiating or breaking off combat at will. As the Cold War began shaping up, several new U.S. fighters appeared which could meet the MiG-15 on even or better terms. Among them were the Navy's F9F-6 Cougars and F7U-3 Cutlasses which gave that service its first swept winged jets. Also appearing was the Air Force's F-100 Super Sabre. The F-100 was extremely advanced for its day. Its afterburning engine gave it supersonic speed in level flight; the first U.S. fighter so capable. This scenario assumes the Korean war lasted another year or two and the new jets saw action!

Maps:

B1	C1
A1	B2



U.S. Aircraft: Take four of any of the following types;

- a) F-100A Super Sabres b) F-86L Sabres
- c) F9F-6 Cougars d) F7U-3 Cutlasses.

Aircraft Set Ups: As in scenario K-5 for the U.S. aircraft.

Scenario Play: As in scenario K-5 with MiGs and additional U.S. aircraft entering play accordingly.

Game Length: 20 game-turns.

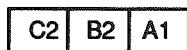
Notes:

1. The General scenarios may also be used to create different set ups.
2. Pilot training standards: U.S.= good, Chinese= limited.
3. All scenario K-5 notes apply except change aircraft loads to "none" for all jets and change fuel to 60% of internal for start and 40% of internal for bingo for U.S. jets.
4. Recommended Variation: Use MiG-17s, described in the Vietnam chapters in place MiG-15s. The MiG-17 entered service in 1953, but wasn't exported until 1955.

Scenario CW-2: Bomber Bashing! 1950-1955. *

Background: America's answer to the TU-4 Bull (a Russian copy of the B-29) in 1950 was the long ranged, all weather, radar equipped F-89 Scorpion carrying six 20mm cannon initially and later, 104 air to air rockets. The Scorpion was large, underpowered and would have been slaughtered by contemporary fighters in air combat. However, as an interceptor designed to attack unescorted prop-driven bombers, it was more than adequate. Scorpions were supplemented by additional air defense fighters like the F-86D which also deleted guns for a radar and rocket armament but lacked the Scorpion's range. They could cope with the Bulls but when the TU-16 Badger flew in 1955, the F-86D and F-89 found themselves a much more difficult foe.

Maps:



Bombers: Map Hex Fac. Alt. Spd. Conf. load

"The Early Days"

TU-4 #1	C2	5523	E	30	3.0	NA	NA
TU-4 #2	C2	5423	E	30	3.0	NA	NA
TU-4 #3	C2	5424	E	30	3.0	NA	NA

"The latter Days"

TU-16 #1	C2	5522	E	40	5.5	NA	NA
TU-16 #2	C2	5324	E	40	5.5	NA	NA

Interceptors: Choose any one of the following forces:

- | | |
|----------------|----------------|
| a) Four F-100C | b) six F-86D/L |
| c) Four F9F-6 | d) Four F-89D |

All set up one per hex in any hex of megahex B2-3523 facing West at any allowed speed and altitude.

Game Length: Until the bombers are destroyed or exit the East edge of map A1.

Notes:

1. This scenario is designed for solitaire play. The TU-4 Bulls fly and defend themselves using the B-29 rules of scenario K-4. Bulls are silver.
2. The TU-16s have data cards and may be flown by a second player if desired. The TU-16s are silver.

3. Victory: The interceptors must destroy all bombers or they lose. All aircraft above altitude 28 begin and remain sighted due to contrails. All interceptor aircraft are silver.

4. Rockets: You will have to read advanced rule 9.3 to play the rocket armed fighters.

5. Aircraft loads: all interceptors= none.

6. Advanced Rules:

- a) Fuel: Interceptors start with 70% of internal, bingo is 30% of internal, although they are not required to bingo home; this is big one after all.
- b) Weather: Generate from far north table (Alaska).
- c) CrewQuality: Generate from the Average tables.

6. Recommended Variation: Try intercepting the bombers with both night and weather rules in effect.

7. Recommended Variation: Switch the situation and let the Soviets do the intercepting as follows:

For Bombers: use the B-36 counters which fly as the B-29 but with the following additions;

- a) B-36 speed is 4.0, and start altitude is 40.
- b) Its defensive guns have an attack rating of 3.
- c) Vis.= 12, Size= -3, Vuln.= +2.

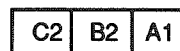
Interceptors: use 8 of any variant of the MiG-15 or MiG-17.

**COLD WAR
GUNS AND MISSILES AIR COMBAT SCENARIOS**

Scenario CW-3: Bomber Bashing—III! 1956-1964 *

Background: The air-to-air guided missile, the Genie nuclear rocket, and the new interceptors designed to use them helped NORAD overcome its initial defensive difficulties. Upgraded F-89's fitted to carry Falcon missiles appeared first, followed by supersonic F-102 Daggers. Shortly after, came the F-101 Voodoo which was faster and longer ranged than the Daggers. Voodoos were followed by the F-106 which could hit Mach 2.0 in a dash, and by the F-104 Starfighter, the famed "missile with a man in it", which could also hit Mach 2.0 speeds but which was simpler and limited to heat seeking missiles.

Maps:



Bombers: Choose either three Badgers or three Bears. Place one each in hexes C2-5523, 5121 and 5227. All are facing E. Bears have a speed of 5.0 and the TU-16s; 5.5. The altitudes are 35, 41, 30 respectively.

Interceptors: Choose one of the following forces;

- | | |
|------------------------|-----------------------------|
| a) Two F-89H Scorpions | b) Two F-102A Delta Daggers |
| c) one F-101B Voodoo | d) one F-106A Delta Dart |
| e) Four F-100C | f) Four F-104A Starfighters |
| g) Four F-86D Sabres | h) one F-89J Scorpion |
| i) Four F9F-8 Cougars | j) Four F7U-3M Cutlasses |

The interceptors set up in any hex of Megahex B2-4523. Facing W at any allowed altitude and speed.

Game Length: Until the bombers are destroyed or exit the East edge of Map A1.

Notes:

1. All aircraft above the contrail Altitude of 30 begin and remain sighted. Navy and USAF interceptor jets are uncamoouflaged, USAF fighters and all bombers are silver.

2. The Bear flies exactly as the B-29 in Scenario K-4 with the following exceptions.

- a) Its speed is 5.0.
- b) Its tail guns are radar directed, so allow a -1 die roll modifier to hit when firing into the 60 or less angle off arcs.
- c) Its Vis.= 12, Size= -3, Vuln.= +1.

3. Interceptor Loads:

- a) F-89H= 3 x AIM-4C, 3 x AIM-4E, and 4 factors of rockets in tip pods. Load= 3, Conf.= CL.
- b) F-102A= 3 x AIM-4C, 3 x AIM-4E, and 2 factors of rockets in weapons bay. Load= 3, Conf.= CL.
- c) F-101B= 1 x AIM-4C and 1 x AIM-4E plus 2 x AIR Genie rockets in wpns. bay. Load= 3, Conf.= CL.
- d) F-106A= 2 x AIM-4C, 2 x AIM-4E, plus 1 x AIR Genie rocket in wpns. bay. Load= 3, Conf.= CL.
- e) F-100C= 2 x AIM-9B, one each on stations 3 and 5. Load= 2, Conf.= CL.
- f) F-104A= 2 x AIM-9B, one each on stations 1 and 5. Load= 2, Conf.= CL.
- g) F-86D = 2 x AIM-9B, one each on stations 2 and 3 plus two factors of rockets. Load= 2, Conf.= CL.
- h) F-89J = 2 x AIM-4C and 2 x AIM-4E, one each on stations 3 to 6, plus 2 x AIR Genie rockets on stations 1 and 2. Load= 8, Conf.= 1/2.
- i) F9F-8= 4 x AIM-9B, one each on stations 3 to 6. Load= 4, Conf.= CL.
- j) F7U-3M= 4 x AIM-9B or 4 x Sparrow-I, one each on stations 1,2,4,5, and 3 factors of rockets in the belly pod. Load= 4, Conf.= CL.

4. Both the Badger and the Bear are equipped with AJM-A3s and each carries 40 chaff decoys.

5. Advanced Rules:

- a) Fuel: Start fuel for all interceptors is 70% of internal and bingo is 30% of internal.
- b) Weather: Generate from the Far North table.
- c) Crew Quality: Generate from the Good tables.

Scenario CW-4: Stratofortress Attack! 1960.

Background: If the U.S. was concerned about Soviet bombers, the Soviets were doubly concerned about U.S. bombers. The Strategic Air Command had at its beck and call a number of extremely capable jet bombers. The largest and most famous of these is the B-52 Stratofortress which still serves in SAC today, though in reduced numbers. The B-52s could go anywhere thanks to inflight refueling techniques and hundreds of them stood airborne alert in the 1950s ready to reduce the Soviet Union to radioactive dust should the President hit the big red button. The "Buff", meaning Big Ugly Fat Fucker, as the giant B-52 is called, brought with it the strategy of single bombers penetrating Soviet defenses with the aid of electronic countermeasures, nuclear missiles and flying decoys. This scenario illustrates a Buff defending itself from a large fighter force attack.

Maps:

A2
B1
B2
C1



Bombers:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load.
B-52D*	C1	5512	N	50	6.0	DT	(lots)
B-52D*	C1	6010	N	30	6.0	DT	(lots)
B-52D*	C1	6511	N	40	6.0	DT	(lots)

*The B-52 player secretly designates one of the Buffs as the actual aircraft. The other two are "Quail" decoys which fly exactly as the buff and mimic it on radar.

Interceptors: Four SU-11 which set up in megahex B2-3523 facing South speed 6.0, altitude 50, plus four more in megahex B1-4508 facing South, speed 6.0, altitude 20.

Game Length: Until the B-52 is destroyed or exits off the North Edge of the play area.

Notes:

1. The SU-11s will be able to identify the Quails or the Buff for what they are as soon as they start any sighting phase within six hexes of one. The Buff is uncamoouflaged, the SU-11s are silver.

2. Aircraft Loads: SU-11; station 1= AA-3a ANAB, station 4= AA-3b ANAB. Conf.= 1/2, load= 3.0. The Quails do have AJM jammers but no decoys.

3. Advanced Rules:

- a) Fuel: B-52= unlimited.
SU-11 start=250, bingo=100.
- b) ECM: All B-52 and quail jammers have an effectiveness rating of 3. B-52 has full DDS at start.
- c) Weather: Generate from Far North column.
- d) Pilot Quality: All = R, roll for attributes only.

4. Victory: The Soviets can only win if the Buff is destroyed before exiting the play area.

5. Recommended Variations: Make the scenario a night or low level attack. For low level attack let the buffs start at altitudes 5, 7, and 3 respectively; and the interceptors at 10. Use the terrain rules. Add these AAA units which may set up anywhere on map B-2; KS-12 85mm x 3, M-38 37mm x 3.

6. Recommended Variation: Substitute SU-9s, MiG-19s or MiG-21Fs for the SU-11s. The MiGs are described in the Vietnam sections.

7. Recommended Variations: Try penetrating with one of the following forces instead;

- a) B-66 Destroyer x 2 (Short range from Japan)
- b) A-5 Vigilante x 2 (Carrier launched; Sea of Japan)
- c) B-57 x 3 (short range from Turkey).

8. Recommended Variation: SAMs; add an EWR and one SA-2B fire unit to defenses; place both in hex A2-2425.

9. Recommended Variation: Conventional attack; use two or three Buffs set up in adjacent hexes at same altitude and speed (a "cell") without the Quail decoys.

COLD WAR AIR TO GROUND COMBAT SCENARIO (AAA / SAM)

Scenario CW-5: Cuban Missile Crisis! Oct. 1962.

Background: In 1962, it was discovered that the Soviets were basing medium ranged ballistic missiles in Cuba. President Kennedy asked for proof, and the Air Force sent in U-2 spyplanes and RF-101 Voodoos to get pictures. The Cubans defended themselves shooting down a U-2 with a newly installed SA-2 surface to air missile system. The Voodoos got plenty of attention from AAA though none were hit. With proof in hand, the president ordered a blockade of Cuba and threatened to invade Cuba or surgically remove the missiles if they were not withdrawn. The Cubans and Soviets "blinked" and removed the ballistic missiles. This scenario explores the recon and strike options.

Maps:



Ground Unit Set Up: Three tan infantry counters representing one real and two fake ballistic missile launchers in C1-5410, C1-6305 and A1-1909.

AAA/SAM Defenses: SA-2bx 1, A1-2210; ZPU-4 14.5mm LT AAA x 3, one at each potential ballistic missile site. M-38 37mm med. AAA x 2, A1-1705, and 2615. S-60 57mm Med. AAA x 1, C1-5805.

MiGs: Two MiG-17Fs, one each in hexes C1-6507 and 6608, facing S at altitude 15, speed 4.0.

USAF Recon Mission:

RF-101 Voodoos: One each in hexes B2-3428 and 3528 facing NNE at altitude level 3, speed 6.0.

Game length: 20 game-turns.

Notes:

1. The Voodoos, to get clear low altitude pictures, must pass within three hexes of each missile site in level flight at exactly 3 levels over their terrain.

2. No aircraft or ground units begin sighted. It is recommended the terrain rules and T-level flight rules be used. The Voodoos are camouflaged, the MiGs are silver.

3. Pilot training standards: USAF= Average, Cubans = Average.

4. Aircraft loads: Voodoos and MiGs = none.

5. Victory: The U.S. player must exit at least one RF-101 having pictures of all 3 sites off the North edge of Map A-1.

6. Advanced Rules:

- a) Fuel: Voodoo start= 200, bingo= 100, MiG start= 80, bingo= 20.
- b) Weather: Generate from the Tropics table.
- c) Pilot quality: USAF= R, R; MiGs= R, N. Roll for Attributes only. No special characteristics apply.

7. Recommended Variation: Substitute RF-8A Crusaders for the RF-101As.

USAF Strike Mission:

Strike Force: Set up either Two B-66, two B-57B, or two F-105B in place of Voodoos.

Game Length: 20 game-turns.

Notes:

1. Target is site A1-1909. The bombers are all described in chapter 4 below. All bombers are silver.

2. Bomber loads as follows:

- a) B-66 load= 12 x M65 1000lb. HE in bomb bay. Conf. = DT, load= 18.
- b) B-57 load= 6 x M65 1000lb. HE in bomb bay. Conf. = 1/2, load= 9.
- c) F-105B load= One MER with six M117 750lb. HE on station 3. Two x M117, one each on stations 1 and 5. Conf. = DT, load= 17.

3. Advanced rules:

- a) All as for Recon mission game.
- b) Aerial Tanker availability = 8.

4. Victory: To win, USAF player must kill the missile site and then exit at least one aircraft from play area.

US NAVY Strike Mission:

Strike Force: Use four A-4C Skyhawks or four A-1 Skyraiders set up two apiece in each of the F-101 start hexes.

Game Length: 20 game-turns.

Notes:

1. The target is as above for USAF strike mission. The A-4s would be uncamouflaged.

2. A-4 loads: Stations 2, 4= one TER with three Mk-82 500 lb. HE each. Conf.= 1/2, load= 11.

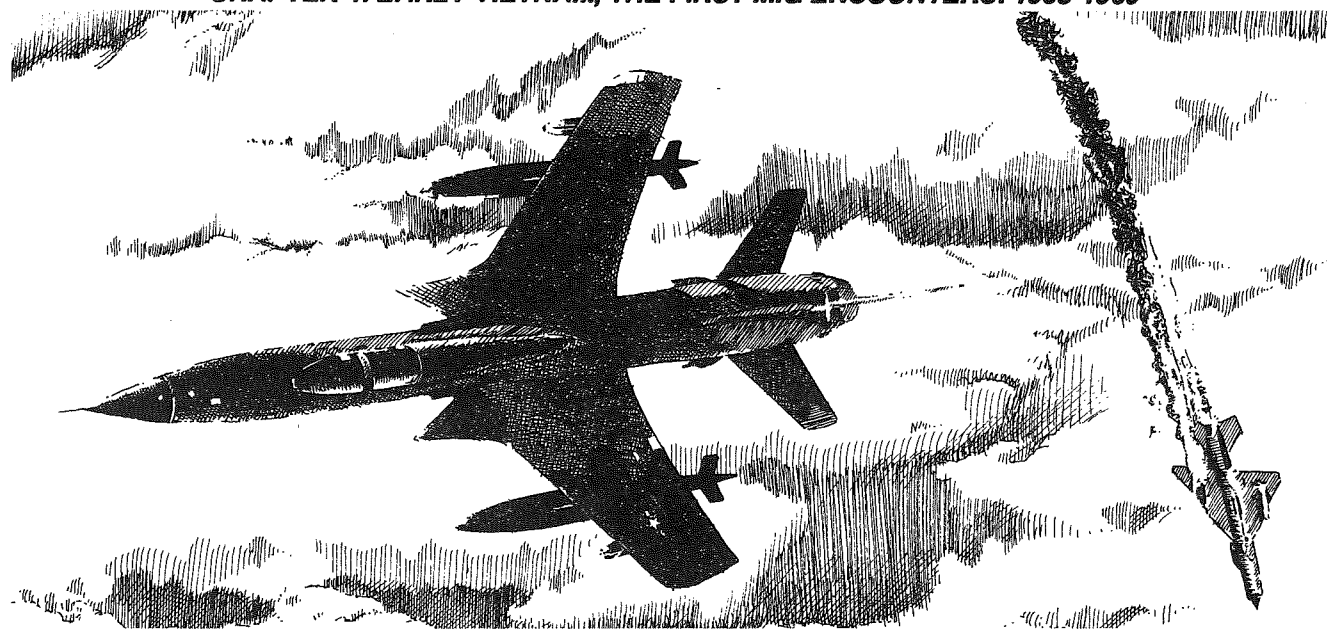
3. A-1 loads: Stations 1, 3, 5 and 11, 13, 15 = one Mk-82 500 lb. HE each. Stations 7, 8, 9= one M117 750 lb. HE each. Conf. = DT, load = 15.

4. Advanced rules:

- a) As for recon game.
- b) Aerial Tanker Availability = 6.

5. Victory: As for USAF strike mission except that at least two aircraft must exit play area after site is destroyed.

* * * * *

CHAPTER 4: EARLY VIETNAM, THE FIRST MIG ENCOUNTERS! 1965-1969**HISTORICAL BRIEFING**

While America was engaged in the Korean war, France was fighting to hold on to its colonies in Indochina. Exhausted and having suffered a military defeat at Dien Bien Phu in 1954, the French agreed to a partition of Vietnam pending democratic elections which would unify the country under a single government. Shortly thereafter, the French withdrew leaving a provisional government in the noncommunist South. The agreed upon elections never occurred and South Vietnam soon found itself embroiled in fighting Viet Cong insurgents supplied and supported by North Vietnam.

The South Vietnamese turned to the U.S. for help and the Americans responded by sending military advisors (Green Berets) and a detachment of specially trained aircrew and aircraft to South Vietnam. The detachment's mission was to train the Vietnamese Air Force but they also flew covert combat missions starting in 1961. The aircraft they used were obsolete prop-driven trainers and light bombers. Operations "Farm-Gate" and "Jungle-Jim" were code names synonymous with these missions.

Jets first entered the scene in 1962 when USAF RF-101s and Navy RF-8s started being used to photograph and monitor Viet Cong troop movements. A squadron of F-102s was even deployed to protect Saigon when it was noted that the fledgling North Vietnamese Air Force had received a half dozen obsolete IL-28 bombers from China. However, it was the Tonkin Gulf incident in 1964 that really sparked U.S. involvement. In retaliation for attacks on US destroyers, Navy F-8 and A-4 jets struck at North Vietnamese torpedo boat bases destroying several boats. The Air Force deployed several squadrons of jets to bases in Laos and South Vietnam as a show of force. Events quickly escalated from there.

In early 1965, President Johnson elected to use both USAF and Navy aircraft to send "messages" to North Vietnam by bombing army barracks and other facilities. At the same time he authorized U.S. jets to conduct strikes in South

Vietnam in support of Vietnamese troops. This was soon followed by the full scale commitment of American soldiers and Marines into ground combat and the commencement of an aerial bombing campaign against North Vietnam known as "Rolling Thunder". The original Rolling Thunder plan called for a devastating three week bombing assault but President Johnson feared that such an aggressive move would spark Soviet or Chinese intervention and start World War three. Instead, he dictated that a gradual escalation of bombing would be used. Furthermore, all targets would have to be approved by him or his civilian staff on a daily basis and numerous restrictive "Rules of Engagement" were imposed on U.S. pilots since this was not a declared war. As a result, Rolling Thunder never achieved its intended shock value. It would become a drawnout interdiction campaign instead and, as with Operation Strangle in Korea, it would fail.

In an ironic reversal of roles, American fighters were committed to the strategic bombing of the North while B-52s and B-57s were used tactically to support troops in the South. The reasoning was that the fighters could perform "surgical" strikes and not cause collateral damage thus limiting civilian casualties. The jets most associated with Rolling Thunder are the F-105s and F-4s of the Air Force and the F-8s and A-4s of the Navy. Other American jets that participated included F-100s and F-104s as well as EB-66 jammers and EF-105F/G Wild Weasels. The F-111A also made a brief showing but was withdrawn after a number of unexplained losses occurred.

Rail lines, supply depots and bridges were favoured targets of the campaign. Two bridges became famous, the Paul Doumer and Than Hoa bridges. Both were crucial for the movement of supplies in the North and both were heavily constructed and well defended. They were repeatedly struck by Air Force and Navy jets. Everything from 3,000 lb. bombs to command guided Bullpup rockets were used to no avail. The bridges were often damaged, but never completely destroyed and the cost of the repeated attacks was quite high. Both bridges finally fell in the latter part of the war; victims of new "smart bomb" technology.

Stretched out over several years, the gradual escalation of Rolling Thunder only sufficed to give the North Vietnamese time to build up their defenses and dig in. The Soviets and Chinese supplied massive aid in the form of AAA guns, ammunition, early warning radars, SAMs and MiG-17 jets. By 1966, the Soviets were also providing missile armed supersonic MiG-21s. China even allowed the use of its air bases as sanctuaries and throughout the war immediately replaced any aircraft losses the North Vietnamese Air Force suffered.

The air combat phase of the war began in April of 1965 when NVAF MiG-17s ambushed and shot down two F-105s. These were the first air to air kills of the war. Other skirmishes soon followed with both sides scoring. A number of major air battles would also occur in the next few years. As the F-105 was primarily used as a bomber, it often found itself hindered in combat, being laden with bombs and unable to use its great speed and energy advantage over the MiGs. It survived a lot of fights only by virtue of its toughness and its 20mm vulcan cannon. Though the lightweight MiG-17s could fly circles around an F-105 in a dogfight, the score between the MiGs and Thuds was about even with most of the MiG kills coming from the F-105's cannon. Later, as MiG activity increased even more, F-4s had to be brought in to escort the Thuds.

The Phantom was a great machine, but was also hindered in combat by lack of a gun and the need to visually I.D. foes which negated long range Sparrow missile shots. The early Sidewinders it carried were meant for downing bombers and turned out to be unreliable against rapidly maneuvering fighters. Despite these problems, Phantoms still managed a kill ratio of 2 to 1, but it was a far cry from the high kill ratios achieved over MiGs in Korea. One of the Phantom's most successful fights occurred in 1967 during operation "Bolo", in which a force led by the legendary Col. Robin Olds, a W.W.II ace with 12 kills, baited a squadron of NVAF MiG-21s into an ambush and shot down seven for no loss. Col. Olds would score a total of four MiG kills during his tour in Vietnam and would probably have gotten several more had a gun been available to him. Navy Phantoms, operating from carriers in "Yankee Station", would fair about the same as Air Force ones but F-8 Crusaders would shine. The Crusader had cannons and her pilots were practiced in air combat maneuvering as a result. In Vietnam, F-8s would destroy 19 MiGs for 3 losses in dogfights; the best kill ratio of any fighter in the war.

Overall, Rolling Thunder would last three years and nine months interspersed with numerous political bombing halts. The bombing halts were President Johnson's way of encouraging the North Vietnamese to attend peace talks. Instead, the Vietnamese would use the halts to rebuild, resupply, and further the effectiveness of their defenses. Each time the talks would amount to nothing and Rolling Thunder would be resumed. The campaign would accomplish little at a high cost in men and machines. Numerous pilots would be shot down and captured to finish the war as POWs in the "Hanoi Hilton". To be sure, the enemy was hurt often, but never decisively. The campaign ended in 1968 and U.S. jets did not officially return to North Vietnam until 1972.

Flash Back:

I'd never seen a MiG before, and I had always felt it would be hard to identify one quickly. Not so; the high swept-back tail and blunt nose left no doubt. They were as MiG as MiGs could be, zipping along, trying for a shot at the fleeing Thuds ahead of me. It wasn't a memorable aerial battle. They didn't see me. I whispered "Jesus" and filled the sky with 20mm bullets. The leading MiG flew into the barrage. When he felt the hits, he did the swiftest reversal I've ever seen. I tried to keep the gun pointed at him but it was impossible. I flashed past close by, my eyes wide with the nearness of this alien creature, beautiful in green battle dress, standing on its wing in a hard left break; flaming and mortally wounded.

Capt. G.I. Basel, F-105 pilot describing a MiG kill

EARLY VIETNAM AIRCRAFT BRIEFINGS



F-105D Thunderchief: Republic's legendary Thunderchief was a large, robust, Mach-two, all weather capable fighter-bomber. Air combat was not in its original design criteria; just speed, range and the ability to carry a nuclear bomb. It was amply powered by the big afterburning J-75 engine and able to carry 14,000 pounds of ordnance. The first "Thuds" entered USAF service in 1958. The "D" model was the definitive version of which 610 were built. By virtue of its high speed and long range, the F-105 was chosen to carry out the "Rolling Thunder" campaign against North Vietnam which started in 1965. Here, the F-105 earned its glory. Thud pilots faced an increasingly sophisticated array of AAA guns, MiGs and SAMs that took a heavy toll of them. Nevertheless, F-105 pilots never turned away from their targets and shot down 27 MiGs for 23 losses in air combat. Withdrawn from combat in 1972, the surviving aircraft were given to the Air Guard and the last retired in 1984.



EF-105F/G Wild Weasel: As the war in Vietnam heated up, two dozen trainer versions of the Thunderchief were converted into EF-105F "Wild Weasel" SAM suppression aircraft. They were given radar warning receivers and the second crewman was especially trained in using them to detect and locate active SAM sites. The Weasels carried ECM pods for jamming and used ARM missiles and cluster bombs to attack the sites. It was a tough job and Weasel losses were high but shootdowns of regular strike aircraft by SAM missiles dropped accordingly. In 1968, the improved F-105G Weasel entered production. The "G" had all the normal EF-105F equipment plus new jamming systems which were installed internally to free the wing stations for more ordnance. Over half the EF-105Fs and F-105Gs ever built were lost in combat during the war. The surviving aircraft continued to serve with the USAF until 1978 when they were given to the Guard which retired them in 1983.



F-4B/C Phantom II: This record setting Navy interceptor proved so capable that the Air Force decided to acquire it in 1962 after comparison tests with an F-106 were flown. The F-4 had a

two man crew, mach two speed, and its radar was the best around. With four Sparrow and four sidewinder missiles, it was a potent fighter and could carry 14,000 lbs of bombs as well making it a true multi-mission aircraft. Its two afterburning J-79 engines gave it the brute strength to power through maneuvers normally reserved for smaller and more agile fighters. The F-4B was the Navy version while F-4Cs equipped Air Force squadrons. When properly flown, Phantoms easily held their own against enemy MiGs, but the lack of guns, which hindered its in-close fighting ability, was not corrected until gun pods were adopted by the Air Force in 1967. The Navy never remedied this. All told, Phantoms would score 146 MiG kills to 39 known losses in air combat during the war.



B-57 Canberra: In 1950 the USAF needed a modern jet to replace the B-26 Invader a W.W.II light bomber. The English designed Canberra was one of 5 contenders in a fly-off held in 1951.

It won and was accepted when the British agreed to an American company building the jet using American engines. Martin, was the company and after producing a few stock copies (B-57As), it created a new version (B-57Bs) with a two seat fighter style cockpit, dive brakes, and revised weaponry including guns in the wings plus a rotating bomb bay door adopted from Martin's failed XB-51 jet bomber design. The B-57B was the most widely built variant though others, including night interdiction G models appeared later. B-57s had a mixed if ultimately successful bombing career in Vietnam. They were good machines but F-4 Phantoms could carry more bombs faster and rapidly replaced the few B-57s left in the 1970s.



F-8 Crusader: The "last of the gunfighters" - Vought's F-8 Crusader was the first Navy fighter to be capable of sustained supersonic speeds, and the last to have internal cannons for dog-

fighting until the F-14 appeared twenty years later. The Crusader benefited from the lessons learned with other supersonic fighters and was so well designed that it easily exceeded mach one on its first test flight in 1955 and soon set several world speed records. It was ordered into immediate production reaching operational status in 1957 and quickly replaced Cutlasses and other less capable fighters then in service. The first Crusaders could carry 32 aerial rockets but these were rapidly deleted in favor of carrying fuselage mounted Sidewinder missiles. The Crusader demanded skill to fly and was difficult to land on Carriers but it was an excellent fighter and equipped dozens of squadrons. In Vietnam, it had a distinguished record, downing 19 MiGs in air combat for only 3 losses. Crusaders were slowly replaced by F-4 Phantoms during the war though the recon variant served until the end then moved to the reserves with the last ones only being retired in 1986.



A-3 Skywarrior (B-66 Destroyer): This beefy twin engine jet bomber was originally designed to give the Navy a carrier aircraft capable of striking targets deep in the Soviet Union with

nuclear weapons. Never very popular, the A-3D, which entered service in 1954, once had the nickname "All-3 Dead" as it lacked ejection seats and had a high fatality rate in carrier accidents. Nevertheless, the "Whale" (its other nickname) was a sound aircraft and though its bomber mission was obsolete by the time the Vietnam war started, it was successfully used in other roles such as electronic warfare, reconnaissance, and

aerial refueling. A highly modified version, having ejection seats, was procured by the USAF as the B-66 Destroyer. Like the A-3, it was soon relegated to support roles as the B-57 was a better light bomber. and other jet bombers had the strategic mission. The B-66 faded quickly after Vietnam but EW variants of the A-3 served the Navy until being retired in 1990.



A-4 Skyhawk: The Douglas A-4 Skyhawk was a small versatile attack jet designed for U.S. Navy carrier operations. Entering service in 1954, the A-4 was able to carry the same bomb load as a

Skyraider but at three times its speed. The Skyhawk was armed with two 20mm cannons and was as maneuverable as most jet fighters of the day. Though tricky to land, the Skyhawk was robust, easy to fly and well liked by its pilots. It would be the Navy's most important tactical jet bomber during the first half of the Vietnam war. There, Skyhawks faced the same tough masses of AAA, SAMs and MiGs that were taking a toll of USAF aircraft and 37% of all Navy losses would be Skyhawks. As the war progressed, the Navy would pioneer the use of internal ECM and decoy dispensers on strike aircraft with Skyhawks receiving the first systems. Modified to carry Shrike missiles, A-4s would also be used on "Iron Hand" missions to attack SAM sites. Eventually replaced in the Navy by A-7s, the A-4 would still serve for many years with the Marines, the Israeli Air Force and in other Countries.



MiG-17 Fresco: The MiG-17 first appeared in 1952 and was a logical and progressive development of the MiG-15. While similar in appearance, the Fresco was virtually a new aircraft. A more

powerful engine along with a redesigned wing and tail structure allowed the MiG-17 superior transonic speed and climb performance. Like the MiG-15, the Fresco would be mass produced and heavily exported. It was liked for its simplicity but it still carried the same inferior cannon armament of the MiG-15 and was restricted in maneuverability at high speeds due to lack of hydraulic boosted controls. Later models of the Fresco would get a better cannon layout and some would even be wired to carry Atoll missiles. Interceptor versions having a primitive radar and beam riding AA-1 missiles were used in the mid-1950s but rapidly replaced by more capable jets. By Vietnam the MiG-17 was considered obsolete, however with its light weight and superb maneuverability, it still proved to be a significant threat to the bomb laden American jets it fought.



MiG-21F/PF Fishbed: The MiG-21 was well designed as a simple supersonic point-defense day fighter, much like the American F-104. The MiG-21 however, was more maneuverable utilizing

a delta shaped wing with a conventional tail and being lighter in construction. The earliest "F" models, which entered service in 1958, carried only two heat seeking missiles and a single 30mm cannon with 80 rounds. They relied on a simple gunsight and ranging radar for determining shot parameters. They were not well equipped for instrument flight limiting their effectiveness as interceptors. The later MiG-21PF model, which entered production in 1961, featured a more capable radar and all weather instruments but deleted the cannon in the process which eliminated its close in dogfighting capability. Widely exported, examples of both types reached North Vietnam in 1966. The NVA most often employed them as ambushers, making single high speed passes in attempts to

fire both missiles at the rear of a target before breaking off. Despite their light armament, the MiG-21s were the most capable fighter used by the NVAF and they accounted for well over half the kills achieved against U.S. aircraft during the war.

EARLY VIETNAM GUNS ONLY AIR COMBAT SCENARIOS

Scenario V-1: Skyraiders Against MiGs! June 1965 and October 1966

Background: At the start of the Vietnam war, Prop-driven Skyraiders still served in a number of Navy squadrons. They were used actively in North Vietnam until the increasing SAM and MiG threat relegated them South. On two occasions, Skyraiders would encounter and stand off MiG-17 jets downing two for no losses. The first occurred in June of 1965 when four Skyraiders of VA-25 were attacked by two MiGs. The A-1s dove for the deck and started a low altitude weave for defense. One MiG broke off but the other persisted and was nailed in a head-on pass with two Skyraiders. In October of 1966, two of VA-176's A-1s were jumped at low altitude by four MiG-17s. They fended them off until two more Skyraiders arrived. One of the reinforcing A-1s got behind a MiG and shot it down, the rest then broke off.

Maps (both set ups):



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
VA-25's Encounter:							
A-1J #1	C2	5417	N	10	2.0	DT	16
A-1J #2	C2	5617	N	10	2.0	DT	16
A-1J #3	C2	5619	N	10	2.0	DT	16
A-1J #4	C2	5819	N	10	2.0	DT	16
MiG-17F #1	C2	6317	N	10	4.5	1/2	4
MiG-17F #2	C2	6418	N	10	4.5	1/2	4
VA-176's Encounter)							
A-1J #1	B1	3612	S	9	2.0	DT	16
A-1J #2	B1	3411	S	9	2.0	DT	16
MiG-17F #1	B1	4407	SW	10	4.0	1/2	4
MiG-17F #2	B1	4406	SW	10	4.0	1/2	4
MiG-17F #3	B1	4506	SW	10	4.0	1/2	4
MiG-17F #4	B1	4607	SW	10	4.0	1/2	4
A-1J #3	C2	6618	NW	9	2.0	DT	16
A-1J #4	C2	6818	NW	9	2.0	DT	16

Game Length: Both set ups= 20 game-turns.

Notes:

1. All aircraft begin sighted in set up #1. The MiGs and first two Skyraiders begin sighted in set up #2. MiGs are silver, A-1s are uncamoouflaged.
2. Pilot training standards: USN= good, NVAF= limited.
3. Victory: To win, the MiGs must shoot down at least one Skyraider and score more points overall. The A-1s must score more to win. Anything else is a draw.

4. Aircraft Loads: MiGs; stations 1,2 = 400L FT each. A-1s; stations 7,9 = 2 600L FT each, stations 4,6,10,12 = one LAU-3ARP each. Load =16, Conf= dt

5. Advanced Rules:

- a) Fuel: The Skyraiders can fly at mil power indefinitely (2+ hour endurance).
MiG start= 110, bingo= 40.
- b) Weather: There is a solid overcast (dense layer) in both scenarios starting at level 12 up to level 22.
- c) Pilot Quality: A-1s= all R. MiGs= R, R, R, N.
Roll for attributes only.

Scenario V-2: Thunder-Hog Gunfight! 29 June 1966

Background: A flight of four F-105Ds of the 388th TFW on a flak suppression mission spotted four MiG-17s attacking from the left rear. The "Thuds" jettisoned their ordnance and broke into the attack. The lead pair of MiGs overshot the rear element of F-105s but continued on to attack the lead element damaging both "Thuds" with cannon fire before overshooting them also. A free-for-all developed and one of the damaged F-105s reversed and shot down his attacker. The second element of F-105s also fired several shots before the surviving miGs disengaged. This was the first recorded F-105 MiG kill of the war.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-105D #1	B1	4612	NNW	15	4.0	1/2	7
F-105D #2	B1	4712	NNW	15	4.0	1/2	7
F-105D #3	B1	4713	NNW	15	4.0	1/2	7
F-105D #4	B1	4714	NNW	15	4.0	1/2	7
MiG-17F #1	B1	4415	NNE	15	6.5	1/2	4
MiG-17F #2	B1	4315	NNE	15	6.5	1/2	4
MiG-17F #3	B2	4417	NE	18	5.0	1/2	4
MiG-17F #4	B2	4418	NE	18	5.0	1/2	4

Game length: 15 game-turns.

Notes:

1. All aircraft begin spotted. The MiGs are silver, the F-105s are camouflaged.
2. Pilot training standards: USAF= good, VNAF= poor.
3. Victory: Neither side can win unless it shoots down an aircraft of the opposing side and has more points overall.
4. Aircraft Loads: MiGs; stations 1,2= 400L FT. F-105s; stations 2,4= 1700L FT.
5. Advanced Rules:
 - a) Fuel: F-105 start= 400, bingo= 320,
MiG start= 100, bingo= 60.
USAF Tanker Availability = 5.
 - b) Weather: Generate using the S.E. Asia table.
 - c) Pilot quality: F-105s= R, R, R, R.
MiGs= R, N, R, N.
Roll for attributes and characteristics.
NVAF pilots not eligible for tactics master.

EARLY VIETNAM GUNS AND MISSILE AIR COMBAT SCENARIOS (Guns And Heat Seeking Missiles Only)

Scenario V-3: Opening Rounds! 4 April 1965

Background: A major effort to bomb the Than-Hoa bridge was in progress but bad weather forced several divisions of attackers to enter holding patterns to await their turns to go in. Suddenly, four MiG-17s broke out of the overcast behind four F-105s of the 388th TFW which were orbiting at slow speed. Despite a desperate call to break, the MiGs closed in on the lead pair of "Thuds" and shot both down before breaking off to face a pair of F-100 Super Sabres that intervened. The MiGs out-maneuvered the "Huns" and dove away to safety. This was the first successful MiG attack of the war.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-105D #1	C1	5713	NE	10	3.5	DT	21
F-105D #2	C1	5613	NE	10	3.5	DT	21
F-105D #3	C1	5715	NE	10	3.5	DT	21
F-105D #4	C1	5816	NE	10	3.5	DT	21
F-100D #1	C2	5321	NE	15	4.0	1/2	7
F-100D #2	C2	5322	NE	15	4.0	1/2	7
MiG-17F #1	C1	5215	NE	12	6.0	CL	2
MiG-17F #2	C1	5114	NE12	6,0	CL	2	
MiG-17F #3	C1	5115	NE	12	6.0	CL	2
MiG-17F #4	C1	5216	NE	12	6.0	CL	2

Game Length: 15 game-turns.

Notes:

1. All aircraft begin spotted. All aircraft are silver. This is early in the war before all Thuds were camouflaged.

2. Pilot training standards: USAF and MiGs= Average.

3. Aircraft Loads: MiGs; stations 1,2= 400L FT. F-100s; stations 2,6= 850L FT, stations 3,5= AIM-9B IRM. F-105s; stations 2,4= 1700L FT, station 3= MR plus six M117 750 lb. HE bombs.

4. Victory: MiGs must down at least one U.S. jet and have more points to win. U.S. player must have more points to win. The MiG player gets 8 points each bomb load destroyed with or jettisoned from an F-105.

5. Advanced Rules:

- a) Fuel: MiG start= 120, bingo= 80.
F-100 start= 300, bingo= 200,
F-105 start= 350, bingo= 225.
USAF Aerial Tanker Availability = 7.
- b) Weather: There is a dense layer of clouds starting at level 18 and extending to 24.
- c) Pilot Quality: All R. Roll for attributes and characteristics. The MiG pilots are not eligible for tactics masters or combat heroes.

Scenario V-4: Fresco Valley Dogfight! 12 June 1966.

Background: The sleek looking Navy Crusader fighters were first blooded in action in the summer of 1966 when four VF-211 F-8s were attacked from astern by MiG-17s. The battle scene favored the MiGs as there was a low overcast which took away the superior vertical capability of the F-8s. However, experience was on the Navy side and they broke into the Frescos firing cannons. A scissoring fight ensued in which the Crusader jocks gained the upper hand. Forcing an overshoot on one MiG, the Crusader leader, Cmdr. Harold L. Marr, fired an AIM-9 Sidewinder which missed. The MiG broke for home and Marr fired a second missile which blew the MiG in two. He then pursued a second MiG which he damaged with cannon fire. No F-8's were hit.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-8E #1	B1	4213	N	3	4.5	CL	2
F-8E #2	B1	4313	N	3	4.5	CL	2
F-8E #3	B1	4613	N	3	4.5	CL	2
F-8E #4	B1	4713	N	3	4.5	CL	2
MiG-17F #1	B2	3916	NNE	2	6.0	CL	0
MiG-17F #2	B2	3817	NNE	2	6.0	CL	0
MiG-17F #3	B2	4018	NNE	2	6.0	CL	0
MiG-17F #4	B2	4019	NNE	2	6.0	CL	0

Game Length: 15 game-turns.

Notes:

1. All aircraft begin spotted. The F-8s are uncamouflaged, the MiGs are silver.

2. Pilot training standard: USN= Good, MiGs= poor.

3. Weather: There is a solid overcast beginning at level 5. Any aircraft climbing up to or above level 5 is removed from play.

4. Aircraft loads: MiGs= none. F-8s; stations 2,3= one AIM-9B IRM each.

5. Victory: The MiGs must score more points overall to win. The F-8s must damage at least one MiG and score more points to win, anything else is a draw.

6. Advanced Rules:

- a) Fuel: F-8E start= 250, bingo= 180.
USN Aerial Tanker Availability = 6.
MiG start= 80, bingo= 50.
- b) Weather: See note 3, delete special condition and use regular adverse weather flight rules if desired. The dense layer extends from 5 to 18.
- c) Pilot quality: F-8s= V, R, R, R.
MiGs= R, R, R, N.
Roll for attributes and characteristics. MiGs are not eligible for tactics masters or combat heroes.

Scenario V-5: Crusaders Against Fishbeds! 1968

Background: On every occasion in which the F-8 Crusader met the faster, more maneuverable MiG-21s, the MiGs came out losing. The reason being that the Crusader pilots were better trained and far more aggressive. During the war, F-8s would bag four MiG-21s; the first was shot down by Cdr. Dick Bellinger, a VF-162 pilot who ambushed a low flying pair from behind on 19 October 1967. Not until 1968, did MiG-21s encounter F-8s again. The three set ups given illustrate the situations in which the other three MiG-21s were shot down.

Maps:



Set Up One: 26 June 1968. Three F-8Ds of VF-51 were vectored against two MiGs near the coast. The MiGs attacked from a height advantage but overshot and the F-8s reversed the situation and Cdr. L. Myers downed one with a Sidewinder.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-8D #1	C2	5917	N	15	6.0	1/2	2
F-8D #2	C2	5818	N	15	6.0	1/2	2
F-8D #3	C2	6018	N	15	6.0	1/2	2
MiG-21F #1	B1	6512	S	18	6.0	DT	5
MiG-21F #2	B1	6611	S	18	6.0	DT	5

Set Up Two: 1 August 1968. An F-8D from VF-51 and an F-8E from VF-53 on patrol together were jumped by two MiG-21s. The lead MiG fired one Atoll which missed then turned to flee. His wingman never engaged. The MiG was faster than the F-8s but not faster than the AIM-9D fired by Lt. Norman McCoy which killed it.

F-8D	B1	3510	E	15	4.5	1/2	2
F-8E	B1	3512	E	15	4.5	CL	2
MiG-21PF #1	C2	5117	NNE	16	7.0	CL	2
MiG-21PF #2	C2	5524	N	20	6.0	CL	2

Set Up Three: 19 September 1968. Two F-8Cs vectored for an intercept spotted and pursued a MiG-21 which attempted to evade by looping. One F-8C, flown by Lt. Anthony Nargi, followed and destroyed the MiG with a Sidewinder while the other covered. The MiG's wingman was also spotted and attacked by both F-8s but escaped.

F-8C #1	B1	4314	SW	20	6.0	DT	4
F-8C #2	B1	4514	SW	20	6.0	DT	4
MiG-21PF #1	C2	5917	S	20	5.0	DT	5
MiG-21PF #2	C2	5905	S	15	5.0	DT	5

Game Lengths: All set ups; 15 game-turns.

Notes:

1. All aircraft begin spotted except for the #2 MiGs in set ups 2 and 3 which begin unspotted. Crusaders are uncamoouflaged, MiGs are silver except for MiG #2 in set up three which is camouflaged.

2. Pilot training standards: USN= good, NVA= average.

3. Aircraft loads: F-8s (all set ups), stations 1,2= one AIM-9D IRM. MiGs (all set ups), stations 1,3= one AA-2A Atoll IRM. Also, in set ups 1 and 3, station 2= 600L FT.

4. Victory: The win goes to the side with the most points. however, F-8s are worth double points to MiG side.

5. Advanced Rules:

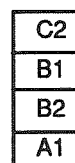
- Fuel: set up 1; F-8 start= 300, bingo= 150, MiG start= 200, bingo= 120. Set up 2; F-8 start= 220, bingo= 160, MiG start= 140, bingo= 100. Set up 3; F-8 start= 250, bingo= 150, MiG start= 200, bingo= 100. No USN Tankers available.
- Weather: Generate weather from S.E. Asia table.
- Pilot Quality (in order of set ups): F-8s= all R, no characteristics, roll for attributes. MiGs= R,N,R, R,R,V, average attributes. no characteristics.
- Terrain: Ignore all contours and ridgelines. The ground is flat and ground level= 0.

EARLY VIETNAM GUNS AND MISSILES AIR COMBAT SCENARIOS (Guns, IR and RH Missiles)

Scenario V-6: The First U.S. Kills! 17 June 1965.

Background: On April 4, 1965, NVAF MiG-17s had shot down two USAF F-105s. Two months later, Navy Phantoms would even the score by downing two MiG-17s. These were the first MiG kills of the war and occurred when a flight of MiG-17s attempted to attack two F-4B Phantoms of VF-21. Warned by radar, the F-4s turned into the MiGs and locked them up with radar several miles out. As the MiGs approached head on, the Phantoms launched Sparrow missiles which destroyed two and scattered the rest ending the battle almost before it began. It need not have been so simple.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
MiG-17F #1	C2	5926	S	20	6.0	1/2	4
MiG-17F #2	C2	5826	S	20	6.0	1/2	4
MiG-17F #3	C2	6126	S	20	6.0	1/2	4
MiG-17F #4	C2	6226	S	20	6.0	1/2	4
F-4B #1	A1	1910	N	20	6.0	1/2	13
F-4B #2	A1	2110	N	20	6.0	1/2	13

Game Length: 15 game-turns.

Notes:

1. All aircraft begin unspotted and undetected by radar. The F-4s may not fire missiles until their targets are visually sighted. Sighting: MiGs are silver, F-4s are uncamoouflaged.

2. Pilot training standards: USN= average, MiGs = poor.

3. Aircraft loads: MiGs; stations 1,4= 400L FT. Phantoms; stations 2,4= two AIM-9B IRM each, station 3= 2200L FT, stations 6,7,8,9= AIM-7D RHMs.

4. Victory: The F-4s must destroy one MiG and have more points overall. MiGs must destroy one F-4 or score more points to win. If both sides meet victory conditions, game is a draw.

5. Advanced Rules:

- a) Fuel: F-4 start= 480, bingo= 250.
USN Tanker Availability = 8.
MiG start= 140, bingo= 70.
- b) Weather: Clear, contrails begin at 33.
- c) Pilot/Crew quality: F-4s= V,R,R,R. MiGs= R,R,R,N.
Roll for attributes, no characteristics apply.
- e) Terrain: Ignore contours and ridgelines, the terrain is flat with ground level=0.

Scenario V-7: The First Fishbed Kill! 26 April 1966

Background: In early 1966, the NVAF MiG-21 force became operational. North Vietnam received MiG-21Fs from China and MiG-21PFs from the Soviet Union. On the 26th of April, three Fishbeds attacked a pair of 555th TFS F-4Cs which were escorting an RB-66 electronic warfare jet. Two MiGs came in high while another came in low from behind. The two Phantoms negated the high MiG attack by diving underneath them. The RB-66 dove to safety while the lead Phantom zoomed back up and shot one of the high MiGs down. Moments later, the unseen low MiG made a pass at the pair but was spotted and evaded in time.

Maps:

C1	B1
A1	B2



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
MiG-21F #1	C1	5404	SSE	25	6.0	DT	5
MiG-21F #2	C1	5304	SSE	25	6.0	DT	5
MiG-21F #3	B1	4504	SW	10	6.0	DT	5
F-4C #1	A1	2802	W	20	4.5	1/2	13
F-4C #2	A1	2903	W	20	4.5	1/2	13
RB-66	A1	2603	W	15	4.5	CL	0

Game Length: 15 game-turns.

Notes:

1. MiG #3 starts unspotted, all other aircraft are sighted. The MiGs are silver, the USAF aircraft are camouflaged.
2. Pilot training standards: USAF= average, MiGs= poor.
3. Aircraft loads: MiGs; stations 1,3= AA-2A IRM, station 3= 600L FT. F-4Cs; stations 1,5= 1200L FT, stations 2,4= two AIM-9B IRM, stations 6,7,8,9= AIM-7D RHM. The RB-66 carries 8 flare decoys.
4. Victory: The NVAF can win by destroying the RB-66 while losing no more than one MiG regardless of points. Otherwise, the side with the most points wins.

5. Advanced Rules:

- a) Fuel: MiG start= 235, bingo= 125.
F-4 start= 380, bingo= 300.
RB-66 has unlimited fuel.
USAF Tanker Availability = 6.
- b) Weather: Generate from S.E. Asia table.
- c) Pilot/Crew quality: F-4s= R/R, R/N.
MiGs= R,G,R.
Roll for attributes, no characteristics apply.
- d) Terrain: Mountainous Terrain; ground level is altitude level 3; each contour is a rise of 2 levels.

Scenario V-8: Operation "Bolo"! 2 January 1967

Background: Col. Robin Olds, the legendary leader of the "Wolfpack" (8th TFW), planned and led an elaborate deception in which a large force of F-4C Phantoms pretended to be a vulnerable F-105 strike force. Bad weather hindered the mission but numerous MiG-21s responded to the bait. Under GCI control they began to pop up out of the clouds on all sides of the Phantoms. To their dismay they did not find bomb laden F-105s but MiG hungry F-4s. A large melee ensued involving 12 of the F-4s and as many MiGs. The better trained USAF pilots prevailed and seven of the MiGs were confirmed destroyed for no loss. This scenario shows the initial set up of Col. Olds' flight in the action.

Maps:

A2
A1
C1



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-4C #1**	A1	2502	NW	12	5.0	1/2	13
F-4C #2	A1	2503	NW	12	5.0	1/2	13
F-4C #3	A1	2802	NW	12	5.0	1/2	13
F-4C #4	A1	2901	NW	13	4.5	1/2	13
MiG-21F #1	A1	2907	NNW	10	6.0	DT	5
MiG-21F #2	A1	1207	N	10	6.0	DT	5
MiG-21F #3	A1	1512	NE	9	6.0	DT	5
MiG-21PF #1	C1	6301	N	20	6.0	DT	5

Game length: 20 game-turns.

Notes:

1. All aircraft begin spotted. The MiGs are silver, the F-4s are camouflaged.
2. Pilot training standard: USAF= excellent for #1, good for the rest. NVAF= limited.
3. Weather: There is a solid layer of clouds from altitude level 8 to the ground. Any aircraft entering the layer is removed from play except that missiles in pursuit of jets entering clouds may still have their attacks resolved. Exception, IR missiles which cannot reach their target in the same proportional move in which the target entered the clouds automatically miss.
4. Aircraft loads: MiGs; stations 1,3= AA-2A IRM, station 2= 600L FT. F-4Cs; stations 1,5= 1200L FT, stations 2,4= two AIM-9B IRMs each, stations 5,6,7,8= AIM-7E RHM.
5. Victory: Neither side may win unless they shot down at least one enemy jet and have more points over all. 10 bonus points are awarded to the NVAF if they shoot down Col. Olds in F-4 #1.

6. Advanced Rules:

- a) Fuel: F-4 start= 360, bingo= 240.
MiG start= 240, bingo= 60.
USAF Tanker Availability = 8.
- c) Weather: There are stratus layers at levels 21 and 24, contrails start at 28.
- d) Pilot/Crew Quality: F-4s= V/R, R/R, R/N, R/R.
F-4 #1's pilot is a combat hero, no other characteristics apply, roll for attributes.
MiG pilots are all R and average in all respects.

8. Recommended Variation: Try the same scenario with F-104C's in place of the Phantoms. Four flights of Starfighters actually participated in the operation but encountered no MiGs. Their loads would be 600L FTs on stations 1 and 5 plus an MDR with two AIM-9B IRMs on station 3.

9. Recommended Variation: Try different weather. Generate weather from the S.E. Asia table.

Scenario V-9: Enter The Gunpod! 14 May 1967

Background: As soon as the first MiG engagements occurred, Phantom pilots began to lament the lack of cannons on their fighters. The Air Force finally rectified this in 1967 when the newly developed SUU-16 20mm gun pods reached Phantom squadrons. The 20mm pod was an instant success. On 14 May it claimed its first victims when F-4Cs of the 366th TFW, escorting F-105Ds, engaged a superior force of MiG-17s in a spectacular low altitude fight. Numerous missiles were fired to no avail but two of the Frescos were shredded by cannon fire and went down in flames.

Maps:

C1	B1
B2	A2



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
MiG-17F #1	B2	4219	NNW	4	6.0	CL	2
MiG-17F #2	B2	4319	NNW	4	6.0	CL	2
MiG-17F #3	B2	4818	NW	4	6.0	CL	2
MiG-17F #4	B2	4917	NW	4	6.0	CL	2
MiG-17F #5	B2	4522	NNW	8	5.0	CL	2
MiG-17F #6	B2	4523	NNW	8	5.0	CL	2
MiG-17F #7	B2	4623	NNW	8	5.0	CL	2
F-105D #1	B2	4017	N	2	5.0	1/2	7
F-105D #2	B2	3918	N	3	5.0	1/2	7
F-4C #1	B1	3213	SW	10	5.0	DT	17
F-4C #2	B1	3212	SW	11	5.0	DT	17
F-4C #3	B1	3613	SSW	10	5.0	DT	17
F-4C #4	B1	3712	SSW	11	5.0	DT	17

Game Length: 30 game-turns.

Notes:

1. Only MiGs 1 to 4 begin spotted, all others are unspotted. All aircraft are camouflaged.

2. Pilot training standards: USAF= good. MiGs= limited.

3. Aircraft loads: MiGs; stations 1,2= 400L FT. F-4s; stations 1,5= 1200L FT, stations 2,4= Two AIM-9B IRM each, station 3= SUU-16 GP, stations 6,7,8,9= AIM-7D RHM. F-105s; stations 1,5= 1700L FT.

4. Smaller Scenario: For a smaller game, delete MiGs 5,6,7; delete the F-105s and F-4s 3 and 4.

5. Victory: The side with the most points wins. Double points are scored for damage to the F-105s.

6. Advanced Rules:

- a) Fuel: F-4/F-105 start= 500, bingo= 300.
USAF Tanker Availability = 7.
MiG-17 start= 150, bingo= 80.
- b) Weather: Clear skies, no clouds.

c) Pilot/Crew quality: MiGs= R, R, R, R, R, N, N.
F-105s= V, N. F-4s= R/R, R/N, R/R, N/N.
Characteristics and attributes are rolled for.

EARLY VIETNAM AIR TO GROUND COMBAT SCENARIOS (AAA ONLY)

Scenario V-10: The In-Country War! 1965-1969

Background: A primary mission of the "in-country" war was to interdict enemy troop and supply movements along the Ho-Chi-Minh trail. Air Force and Navy jets could not fly low and slow enough to spot the well camouflaged enemy in the dense jungles of South Vietnam, Laos and Cambodia where most of the missions took place. Instead, they relied on airborne FACs in their tiny O-1E and O-2A light observation planes to find and pinpoint targets. The FACs would then mark them with smoke and call the jets in. The enemy countered by lining the trail with thousands of AAA guns making interdiction a dangerous and difficult task. This scenario represents a typical situation.

Maps:

A1
C1
B2



Ground Unit Set Up: The North Vietnamese player secretly notes on paper the hex location of the following targets, which may be placed one per hex, on or adjacent to any road or trail hex located in megahexes A1-2011, A1-1513, C1-5503, C1-6006, C1-6011, C1-6513, B2-4518, and B2-4021.

- a) POL Markers x 2, b) Tan and green infantry x 8,
- c) Trucks x 6, d) Trains x 2 (a.k.a more trucks).

AAA unit Set Up: As above, secretly note on paper the hex location of the following AAA units which may be placed one per hex in any hex of a megahex containing a target.

- a) S-60 57mm Med AAA x 1,
- b) M-38 37mm Med AAA x 3,
- c) ZPU-4 14.5mm Lt AAA x 2,
- d) ZPU-1 14.5mm Lt AAA x 3,
- e) ZU-23 23mm Lt AAA x 1.

American Forces: 1965-1967 = One O-1E Bird-dog plus one of the following;

- a) B-57B Canberra x 3. (silver)
- b) F-100D Super Sabre x 4. (silver)
- c) A-4C/E Skyhawk x 4. (uncamouflaged)
- d) F-105D Thunderchief x 4. (camouflaged)

American Forces: 1968-1969 = as above but Substitute an O-2A Skymaster for the O-1E; and the following additional forces may be chosen from.

- e) A-37 Dragonfly x 4. (camouflaged)
- f) F-5A/C Freedom Fighter x 4. (silver)
- g) A-6A Intruder x 2. (uncamouflaged)

American Set Up: After the NVA player has noted his unit positions; declare any partial megahex on the edge of the playing area as the point of entry for the strike aircraft. Place the FAC aircraft at altitude 5, anywhere on the game maps with

any facing and allowed speed. The strike jets enter play after being called in by the FAC (see below).

Game-Length: 30 game-turns beginning on the first turn a strike aircraft enters play.

Notes:

1. Carefully read rules 11.2 and 11.6. The terrain is considered all jungle so all ground units are camouflaged.

2. The FAC aircraft is used to find camouflaged units. When sighted by the FAC, the units are placed on the map in their listed hex. Strike aircraft may then search for and attack the units though, for sighting purposes, they are still considered camouflaged to the jets. Any AAA unit that fires is placed on the map as well.

3. At the end of any turn in which the FAC does not fire rockets or other weapons, he may "call in" one or more strike aircraft. All strike aircraft do not have to be in play at one time.

4. Strike aircraft enter play on the game turn after the one they are called in on. They enter at any allowed speed and any altitude between 5 and 15. They must always enter through one of the half-hexes on the edge of their starting megahex.

5. Strike aircraft may exit any edge of the play area at any time and those that do return to the holding area and cannot be called back in until the 10th turn after they leave.

6. FAC Aircraft Flight Rules: Log sheets are not required for FAC aircraft, they must use one of the following movement options each turn;

0-1E Bird-dog: (silver)

- Move one hex and change facing 30 or 60 degrees.
- Change facing 30 or 60 degrees then move one hex.
- Stay in same hex and change facing 60 to 120 degrees.
- Do any of the above while climbing 0.25 levels or diving 1 level.

0-2A Skymaster: (uncamouflaged)

As 0-1E but change climb ability to 0.5 per turn and add option "e" below.

- Move two hexes without changing facing.

7. FAC Aircraft Data:

0-1E Bird-dog: Vis= 4, size= +2,
Vuln= -3, Ceiling= 18.
0-2A Skymaster: Vis= 4, size= +2,
Vuln= -2, Ceiling= 18.

8. Aircraft Loads:

FACs: 0-1E = Four smoke rockets.
0-2A = 2 x SUU-11B minigun pods plus
2x RP with 7 smoke rockets each.

Strikers: Any permissible combination of BB class weapons, RPs, and GPs.

9. Backup FAC: If the first FAC is shot down or exits play area, a back up FAC enters from same megahex as strikers five game-turns later.

10. Victory: AAA units and aircraft are worth normal point value. Target units are worth double value.

11. Advanced Rules:

- Weather: Generate from S.E. Asia table. Modify start altitudes as necessary to be below layers.
- Terrain: Altitude contours are normal 1 level rises.
- Fuel: All aircraft must exit play by end of turn 30 or Vietnamese player is awarded 10 points.
- Crew quality: Generate pilots from Average tables.

12. Variation? ARC LIGHT Raid. Add three B-52Ds to strike force. The B-52s must remain at or above alt. level 40. See Scenario V-25 for area bombing rules. Give NVA player 20 bonus V.P.s.

Scenario V-11: Combat SAR Task Force! 1965-1969

Background: The venerable Douglas Skyraiders were found to be ideal escort aircraft for the HH-53C "Jolly Green" rescue helos. The Skyraiders could act as FAC aircraft if need be and were themselves formidable attack planes. Usually, two to four Skyraiders would escort a pair of Jolly greens on missions deep into enemy territory to recover shot down pilots. Often times these rescues were hotly contested by AAA guns and harrasing MiGs which were not always fended off by nearby jets. This scenario recreates a typical "hot" rescue.

Maps:

A1
B2
B1



Shot Down Aircrew: Two green infantry, one each in hexes B2-3927 and B2-4124. Each marker represents a single shutdown American crewman.

NVA Forces: Tan infantry x 6, M-38 37mm med. AAA x 2, ZPU-1 14.5mm lt. AAA x 3, ZPU-4 14.5mm lt. AAA x 2.

The NVAF player secretly notes the hexes his infantry units and AAA units start in as for scenario V-10. They may start, one per hex in any hex of the six megahexes surrounding the one the Americans are in.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
A-1H #1	B1	3910	N	5	2.0	DT	21
A-1H #2	B1	4110	N	5	2.0	DT	21
HH-53C	B1	4011	N	1	1.0	NA	NA
F-105D #1	B1	3310	N	15	4.0	1/2	8
F-105D #2	B1	3211	N	17	4.0	1/2	8
MiG-17F #1	A1	1903	S	7	5.0	CL	2
MiG-17F #2	A1	2002	S	7	5.0	CL	2

Game length: 45 game-turns.

Notes:

1. The MiGs begin unsighted. The American aircraft are all sighted due to a nearby North Vietnamese radar site guiding the MiGs. The terrain is considered all jungle/forest and all NVA ground units and AAA are camouflaged and must be sighted as in scenario V-10. All aircraft are camouflaged.

2. Pilot training standards: USAF= good. MiGs= poor.

3. The A-1H's and HH-53 sight ground units as if they were FAC aircraft. AAA which fires reveals itself as in scenario V-10.

4. Aircraft loads: A-1s; stations 7,9= 1200L FT, stations 4,6,10,12= CBU-58, stations 1,2,14,15= LAU-68 RP. MiGs; stations 1,2= 400L FT. F-105s; stations 2,4= 1700L FT, station 5= AIM-9B.

5. **HH-53 Flight Rules:** No aircraft log is required for the HH-53 helo, it must use one of the movement options given below each game-turn. Its game data is:

HH-53: Vis= 6, size= 0, Vuln.= +2, Ceiling= 17.

- Move one hex and change facing up to 60 degrees.
- Change facing up to 60 degrees, then move one hex.
- Stay in same hex and change facing by any amount.
- Not move at all (HOVER).
- Move forward without changing facing at a speed of 1.5.
- Do any of the above while climbing 0.25 or diving 1 level.

6. **Helo Weapons:** The HH-53C is armed with three flexible SUU-11B gunpods. One covering the right 150 to 90 arcs, one covering the left 150 to 90 arcs and one covering the Helo's rear (left through right 60 or less arcs). The guns may each fire at any one ground target within two hexes of range in their area of coverage. Aiming is not required and there are no modifiers.

The Helo may only return fire against air to air cannon attacks from covered arcs and needs a 1 to hit at any range; no modifiers apply.

7. **Aircrew Rescue:** To pick up a crewman, the helo must hover in the same hex for a number of game turns equal to half the roll of a die (rounded up).

8. **Ground Unit Movement:** At the start of the game, and at the end of turns 15 and 30, the NVA player is allowed to secretly, or if sighted, openly shift his infantry units one hex. The two American crewman may then shift one hex if desired. If a crewman ends up in the same hex as NVA infantry he is captured. If in an adjacent hex, the NVA can reveal his adjacent units (place them on the map) and roll one die for each; on a "1" the crewman is captured.

9. **Victory:** Each crewman captured, or rescued and flown off the map is worth 20 V.P.s to the appropriate side. Other points are scored normally.

10. Advanced Rules:

- Fuel:** The Helos and A-1s are not fuel limited.
MiG start= 80, bingo= 40.
F-105D start= 300, bingo= 150.
USAF Aerial Tanker Availability = 8.
- Weather:** Generate using the S.E. Asia Table.
- Crew Quality:** MiGs = V, R.
F-105s = R, R. A-1s = V, R.
Roll for attributes; no characteristics apply.

11. **Recommended Variation:** Use a single 0-2A FAC (described in scenario V-10) and two F-105Ds loaded with two 1700L FTs on stations 2,4 and an MR with six 750lb. HE bombs on station 3, in place of the two A-1s as helo escort. place the FAC within 5 hexes of the helo at start.

12. **Recommended Variation:** Late War Rescue (1972); Use two A-7Ds in place of A-1s. Loads as desired. Allow two of the NVA infantry squads to have SA-7 infantry SAMs (two each, for a total of 4 missiles). Note on paper which squads have them before play begins.

Scenario V-12: Alpha-Strike On Kep! 1 May 1967

Background: When Air Wing 21 of the USS Bon Homme Richard attacked Kep airfield, it was the first of only a few occasions during the war when U.S. pilots were allowed to attack enemy airfields and enemy aircraft on the ground. Diving through intense flak, the Air Wing's Crusaders and Skyhawks blasted Runways, hangars and several MiGs on the ground with bombs and rockets. When a flight of MiG-17s intervened, one was shot down by an F-8E of VF-211 while another was downed by a Flak-suppression A-4C Skyhawk piloted by Lcdr. Ted Swartz of VA-76. His Skyhawk was in a rocket run when the MiG cut in behind him. Executing a tight climbing barrel roll, the A-4 ended up behind the MiG and Swartz fired some air to ground rockets at it scoring what he terms; "a lucky hit".

Maps:

C1	C2
B1	A1



North Vietnamese Ground Units: M-38 37mm med. AAA x 3; one each in A1-1603, A1-1209, C1-6915. S-60 57mm med. AAA x 3; one each in B1-3613, C2-5325, A1-2009. ZPU-4 14.5mm lt. AAA x 2; one each in A1-1205, A1-1606. MiG-17F x 2 (parked on ground); both A1-1304. POL marker x 1; A1-1307. Large Building x 1; A1-1206. Hangar & tower x 1, both in A1-1405.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
A-4C #1 & 2	C1	5707	SE	15	5.0	DT	16.5
A-4C #3 & 4	C1	5905	SE	15	5.0	DT	16.5
A-4E #5 & 6	C1	5604	SE	15	5.0	DT	13.5
A-4E #7 & 8	C1	5504	SE	15	5.0	DT	13.5
F-8E #1	C1	5703	SE	16	5.0	1/2	4
F-8E #2	C1	5702	SE	16	5.0	1/2	4
F-8C #3	C1	5405	SE	16	5.0	1/2	4
F-8C #4	C1	5306	SE	16	5.0	1/2	4
MiG-17F #1,2	C2	5521	W	10	5.0	CL	2
MiG-17F #3,4	C2	5924	W	5	5.0	CL	2

Game Length: 20 game-turns.

Notes:

1. Some aircraft are set up in pairs. All U.S. aircraft begin sighted, the MiGs are unsighted. The maps are fixed, any aircraft exiting the play area are out of play. Missiles which pursue an aircraft out of play are considered to score a direct hit. MiGs are camouflaged, USN jets are uncamouflaged.

2. Pilot training standards: USN= good, MiGs= poor.

3. **Smaller Game:** For a smaller scenario delete A-4Cs #2 and #4, both F-8Cs, A-4Es #3 and #4, MiGs #1 and #2, and one of each type of AAA gun (players choice).

4. **Aircraft loads:** A-4Cs; stations 2, 4 = DR plus two LAU-10 RPs each, station 3= 1200L FT. A-4Es; stations 2, 4 = TR plus three 500lb. HE bombs each, station 3= 1200L FT. All F-8s; stations 1, 2 = two AIM-9D IRM each. MiGs; stations 1,2 = 400L FT.

5. MiGs on ground are soft targets with a visibility rating of 12 and a defense strength of 3. All AAA guns are considered

entrenched (double defense strength). Runway hexes are allowed targets.

6. Victory: To the side with the most points.

7. Advanced Rules:

- Fuel: A-4 Start= 150, bingo= 60; F-8 Start= 250, bingo= 100; MiG start= 100, bingo= 40 or 85 if any runway hex is destroyed.
USN Aerial Tanker Availability = 6.
- Weather: Clear skies, contrails at 28.
- Pilot Quality: (in order listed above) USN A-4s; all = R. F-8s= V,R,R,N. MiGs= V,N,R,N. Attributes are average and no characteristics apply.
- Terrain: Ignore all contours and ridgelines, the area is flat and ground level is 0.

EARLY VIETNAM AIR TO GROUND COMBAT SCENARIOS (AAA and SAM)

Scenario V-13: Going Downtown! Aug. to Dec. 1967.

Background: The F-105 Thunderchief became famous for the courage its pilots displayed on their missions into the heavily defended air space near Hanoi. Facing SAMs, MiGs and radar guided AAA all at once greatly increased the heart-rate, and greatly reduced the survival rate. In the latter half of 1967, the Thuds would go "downtown" repeatedly to knock out and keep knocked out the extremely important Paul Doumer and Canale des Rapides railroad bridges. In these raids, the F-105s would often take heavy losses but would also tangle with and shoot down a fair number of MiGs. This scenario is typical of those raids.

Maps:

C1	
B1	C2
A2	B2
A1	



North Vietnamese AAA: KS-12 85mm Hvy. AAA with FCR-A x 3; one each in A2-2119, A2-1117, A2-2826. S-60 57mm med. AAA x 3; one each in A2-1923, B1-3813, B1-4809. M-38 37mm Med. AAA x 3; one each in B1-4412, B2-3221, A2-1620. ZPU-4 14.5mm Lt. AAA x 3; one each in A2-2423, B1-4813, A2-1920.

NVA SAM Network: EWR Type A plus CCU; both in A2-2621. SA-2B SAM Fire Units x 3; one each in A2-1818, A2-2927, B2-3222.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
EF-105F #1	C1	5406	SSE	10	5.0	DT	13
EF-105F #2	C1	5206	SSE	10	5.0	DT	13
EF-105F #3	C1	6104	SSE	10	5.0	DT	13
EF-105F #4	C1	6103	SSE	10	5.0	DT	13
F-105D#1 & 2	C1	5505	SSE	5	5.0	DT	21
F-105D#3 & 4	C1	5303	SSE	5	5.0	DT	18
F-105D#5 & 6	C1	5302	SSE	5	5.0	DT	18
F-105D#7 & 8	C1	5301	SSE	5	5.0	DT	20
MiG-21PF #1	C2	5927	SW	20	6.0	1/2	4
MiG-21PF #2	C2	6026	SW	20	6.0	1/2	4

MiG-17F#1, 2	B2	3925	NW	10	5.0	CL	2
MiG-17F#3, 4	B1	4025	NW	10	5.0	CL	2

Game Length: 30 game-turns.

Notes:

1. No aircraft begin sighted, the MiG-21s are silver, all other aircraft are camouflaged.

2. The USAF player must roll the die; on a 1-4, the target is the Paul Doumer (hexes A2-1822 to 2021); on a 5-10 the target is the two Canale bridges (B1-4513, 4713). All are hard targets and their defense strengths are 18, and 12 respectively.

3. Smaller Game: For a smaller game, delete one of each type of Gun (NVAF player's choice), EF-105s #2 and #4, F-105Ds #1 and #2, both MiG-21s and the SA-2 in A2-2927.

4. Pilot training standards: USAF= average, MiGs= poor.

5. Victory: To win, the USAF player must have more points overall and damage at least two bridge hexes of each target.

6. Aircraft loads:

Weasels #1 and #3; station 1= ALQ-101 AJM pod, station 5= ALQ-81 DJM pod, stations 2, 4= AGM-45 ARM, station 3= 2200L FT. Weasels #2 and #4; station 1= ALQ-101 AJM pod, station 5= AGM-45 ARM, stations 2, 4= one 800lb. AP cluster each, station 3= 2200L FT.

Thud #1 and #2 (Flak Suppressors); station 1= ALQ-101 AJM pod, station 5= AIM-9B IRM, stations 2,4= 1700L FT, station 3= MR plus six 500lb. HE bombs. Thuds #3 to #6 (Bombers); Station 1= ALQ-101 AJM pod, station 5= AIM-9B IRM, stations 2, 4= one 3,000lb. HE bomb each, station 3= 2200L FT.

MiG-21s; stations 1, 3= AA-2A IRM, station 2= 600L FT.

MiG-17s; stations 1, 2= 400L FT.

7. Game Maps: The play area is fixed, aircraft exiting the maps are removed from play. Any USAF aircraft exiting from West edges of MAP A-2 (Hanoi) are automatically shot down. USAF aircraft may safely exit all other edges. Missiles which exit play area in pursuit of aircraft score direct hits.

8. Advanced Rules:

a) Fuel: MiG-21 start= 180, bingo= 40.

MiG-17 start= 80, bingo=40.

All F-105s start= 350, bingo= 200.

USAF Tanker Availability = 8.

b) ECM: No aircraft have decoys.

c) Missiles: AGM-45 Shrikes have LF seeker heads.

d) Integrated Air Defense: Pass downs to SAM units can only occur as long as the CCU is undamaged.

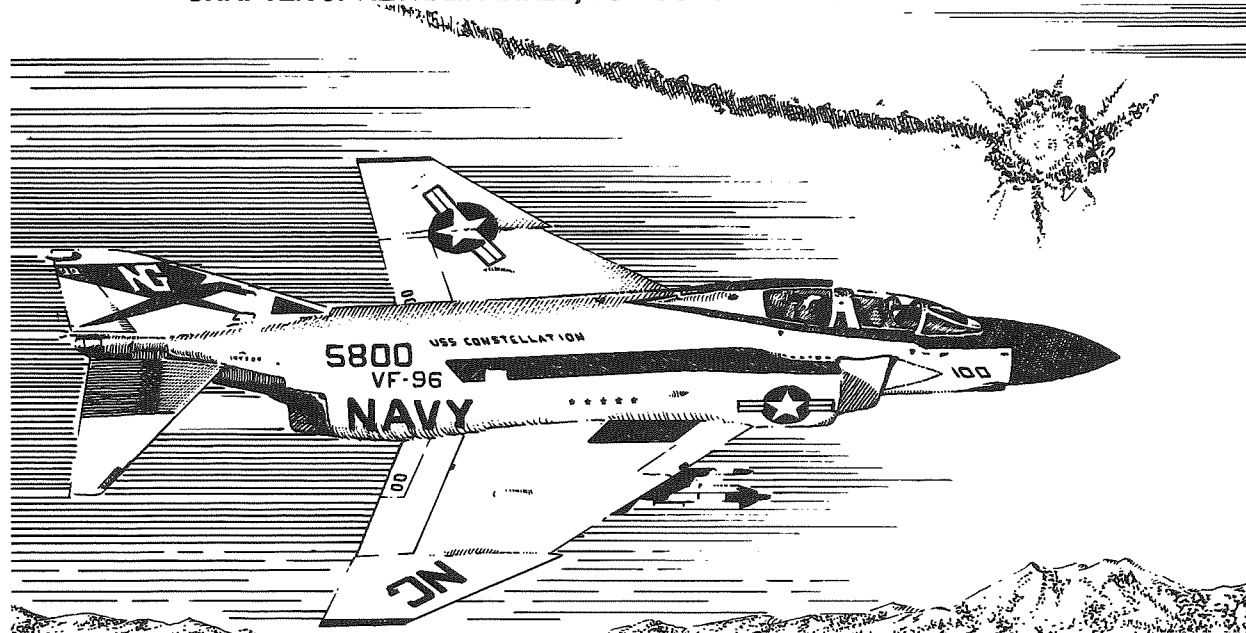
e) Weather: Generate from S.E. Asia table.

f) Crew Quality: F-105s; all R, roll for attributes and characteristics. MiG-21s= R,N; MiG-17s= V,N,R,R; roll only for attributes.

h) Terrain: Ignore all contours and ridgelines, the terrain near Hanoi is flat. Ground level= 0.

10. Recommended Variation: The attack occurs in 1966, before Wild Weasels and ECM pods appeared; replace the EF-105Fs with F-4Cs loaded as follows; Stations 1,5= two 1200L FTs. Stations 2,4= two AIM-9B each. Stations 6,7,8,9= one AIM-7E each. Delete the ALQ-101 pod and AIM-9B missile from all F-105Ds.

CHAPTER 5: VIETNAM FINALE, TOP GUNS AND MIG ACES! 1970-1975



HISTORICAL BRIEFING

American pilots did not sit idle once the bombing of North Vietnam was halted in 1969. They were continuously engaged in ground support operations in South Vietnam and in covert interdiction strikes in Laos and Cambodia along the Ho-Chi-Minh Trail. This fighting, while less dangerous than that of Rolling Thunder, was never taken lightly as the threat from AAA guns and small arms fire remained quite high. Weapons designers in the U.S. were feverishly working on so called "smart" weapons; TV and Laser guided bombs. These were introduced into action in 1969 and 1970.

New aircraft types were being introduced into combat as well. Among these were the Navy's A-6 Intruders and A-7 Corsairs. The Intruders were highly sophisticated two seat attack jets; able to carry large bomb loads in any weather and in terrain following flight. The Corsairs rapidly replaced the A-4 Skyhawk in the daylight attack mission and featured a computerized and highly accurate visual bomb delivery system. They could carry twice the load of an A-4 twice as far. The Air Force also adopted the A-7 Corsair to replace F-100s in the ground support role. The South Vietnamese Air Force received F-5A Freedom Fighters and the extremely useful counter-insurgency A-37 Dragonflies to supplement their elderly Skyraiders. New versions of the Phantom appeared with improved radars, engines, avionics, and in the case of the Air Force's F-4E, with an internal 20mm cannon as well. By 1972, the F-111's would be redeployed and would be highly successful in the night all weather attack role.

From 1969 to 1972, continuous peace talks were being held in Paris between the U.S. and North Vietnam. The North Vietnamese refused to budge on critical issues but used the three year respite to strengthen and rebuild their defenses while doubling their support of insurgents in the South. Support which included sending North Vietnamese army units into combat there. By 1972, President Nixon was in power in the U.S. and he was determined to end the war. To do so, he ordered Air Force and Navy pilots back into North Vietnam to

carry out new bombing campaigns. "Linebacker I" and "Linebacker II" were the results.

Both of these bombing offensives were intense and the enemy resisted with all their might. NVAF MiGs were committed in large quantities and a number of major air battles resulted. This time American fighter pilots were better prepared. During the four years between Rolling Thunder and Linebacker, the Air Force and Navy had assimilated the results of its air combat experience. Two separate studies reached the same conclusion. The Navy's "Ault" report and the Air Force's "Red Baron" report concluded that U.S. pilots were inadequately trained for air combat, that air to air missiles needed improvements in dogfight capability, and that fighters needed guns! In response to these reports, improved models of the Sidewinder and Sparrow missiles appeared. As for pilot training, the Navy founded its famous Top Gun school to teach fighter pilots sound air combat tactics. The Air Force, in contrast, did nothing until after the war when it initiated its Aggressor training programs and fighter weapons schools.

The Linebacker campaigns produced five American Aces; two pilots and three radar officers, all Phantom Crew members. Radar officers in the two seat Phantoms shared full credit for kills with their Pilots. Navy Pilot Lt. Randall "Duke" Cunningham and his RIO, Lt. Willy Driscoll became aces together. They shot down a MiG-21 and four MiG-17s, all with Sidewinders becoming the world's first all missile Aces. Cunningham and Driscoll were products of Top Gun and on their most successful day, they shot down three MiG-17s in a single mission, the last in an epic duel against one of the NVAF's leading aces, Col. Tomb. Unfortunately, they were shot down by a SAM immediately after but rescued. The Air Force, pressured by the Navy's success, soon produced one pilot and two weapons system officers as Aces. The Pilot was Lt. Steve Ritchie, who has the distinction of destroying five MiG-21s, all with Sparrows; a remarkable feat considering the poor reliability of that missile. His backseater, Charles DeBellevue, shared four of those kills and went on to score two more with other pilots to become the top U.S. MiG killer of the war. Another Backseater,

Jeffery Feinstein, scored five kills with four different pilots to complete the roster of American Aces.

By the end of the Linebacker campaigns, the Navy was vindicated with its Top Gun training program. Navy Phantom crews would produce a kill ratio of 10 to 1 compared to the Rolling Thunder average of 2 to 1. The Air Force's kill ratio actually fell to 1.5 to 1 in the same period. After the war, the Air Force would initiate numerous improvements in its fighter training programs. In Linebacker, American pilots faced newer models of the MiGs. The MiG-19 Farmer, a superb air combat machine armed with three 30mm cannon and occasionally with missiles, had been supplied by China. The Soviets provided MiG-17Ds with rudimentary radar, improved cannon armament and better engines. They also introduced the MiG-21MF which rectified most of the shortcomings in performance and weaponry of the earlier Fishbeds. It carried four missiles and either mounted internal guns or a centerline gunpod depending on the exact type as well as an effective radar.

The North Vietnamese also produced their share of Aces. According to post-war claims, as many as 15 individual MiG pilots were credited with five or more kills against U.S. aircraft. Some of their information does not correlate with U.S. loss records but certainly they operated in a target rich environment and had ample opportunity to score. Their officially acknowledged top Air Pirate killer was Col. Nguyen Van Coc, with 9 confirmed kills (some over recon drones). Many authors in the West have written about the infamous Col. Tomb who was reported to have at least 13 kills and who was supposedly shot down by Cunningham and Driscoll when they became aces. Oddly, this name does not appear in NVAF post war records and there are many arguments against his existence. Nevertheless, the pilot Cunningham fought against for his final kill was certainly a skilled adversary and most likely an ace. Perhaps the fact that their best ace was shot down at all explains why North Vietnam keeps curiously quiet about him, or perhaps he was a Soviet or Chinese pilot flying as an advisor. One author believes that it was Van Coc who was in that MiG and many, myself included, believe there never was a Col. Tomb (sometimes spelled Toon).

It was the Linebacker II offensive that finally brought the North Vietnamese to their knees. Their MiG losses were high and their air defense system had been broken down. Linebacker had none of the previous restrictions that had hindered pilots in Rolling Thunder missions. MiGs, SAMs, and radars were relentlessly sought out and destroyed. American B-52s were committed in mass to bomb industrial areas around Hanoi and needless to say, with each Buff carrying eightyfive 750 lb. bombs, these raids were devastating. Haiphong harbor was mined and every major railroad was cut. After two weeks, the North Vietnamese were on the verge of collapse. They agreed to Peace talks and a cease fire was effected. A peace accord was signed which garnered the return of American POWs. American forces were fully withdrawn from Vietnam in 1973. They had stopped the North from conquering the South but it was only a temporary reprieve. Two years after the American pull out, the South Vietnamese army would collapse under the weight of a major North Vietnamese army invasion which completely overran the South in a matter of weeks. American air power briefly reappeared in 1975 to cover the evacuation of American citizens and embassy personnel from the doomed country but no air fighting resulted. That appearance repre-

sented the end of a dark and bitter period of American military involvement in Southeast Asia. Lessons learned there would be applied to the next generation of American combat aircraft.

* * * * *

Flash Backs:

I no more than got my nose pointed down, and one Phantom came out of the circle, and I didn't see him. I almost hit him! I bet we didn't miss him a hair! I said; "Willie, who's in 112?" It was Cdr. Dwight Timm, with Jim Fox in his back seat. I said; "Jeez look at that!" He was in a port turn. He had a MiG-17 about 2,000 feet behind him. He had a MiG-21 about a thousand feet behind the 17, and what he didn't see...was a MiG-17 flying wing on him! We were back at his seven o'clock, behind the trailing MiGs. But the threat was the MiG on his wing, who was about to pull in and start shooting. I had a tone on the Sidewinder, but when I relaxed it, it didn't change, so if I had fired it, (he was in burner) it probably would have hit the F-4. I called for him to reverse starboard, to kick the MiG across his tail, so that my Sidewinder would home on the MiG's tailpipe. He thought I was talking about the trailing MiGs (he still hadn't spotted the real threat) and he kept on going. I called again; "Showtime, reverse starboard, if you don't, you're going to die!" Just then Willie said; "Duke look at two o'clock high!" I looked up and saw two flashes, not airplanes, they were too high, just flashes. I thought; "There can't be anymore 17s in the world!" Because behind us were four 17s trying to catch up, plus the two out in front of us. And, by the way, Timm was in this arcing turn, and the 17s behind were catching up! Well the two above us weren't 17s, they were MiG-19s! They rolled in on us, I reversed, and they went out to my six o'clock...

USN Lt. Randy "Duke" Cunningham
describing part of the air battle in which he shot
down three MiG-17s.

Whoosh!...that big AIM-7 smoked out in front of us. We were going down in a right turn, accelerating through 500 knots and closing on the MiG as the missile came off. At first I thought it would miss him anyway... it appeared to be going too far out in front of him ...but it was just pulling lead and they came together about 4,000 feet out in front of me. The Sparrow impacted at the right wing root of the MiG, blowing the right wing completely off!

USAF Major Dan Cherry
describing his April 72 MiG kill.

VIETNAM FINALE AIRCRAFT BRIEFINGS



F-4E/J Phantom II: After a year in combat with gunless models of the Phantom, the USAF decided to rectify the situation and approached McDonnell Douglas for a solution. Their answer was the F-4E model, incorporating a longer nose containing the smaller, more compact, but equally capable APQ-120 radar plus a 20mm Vulcan cannon. The cannon had already been proven in combat in F-105s and represented a major increase in the Phantom's dogfighting ability. Other improvements included upgraded avionics and slightly uprated engines. The Navy likewise sought an improved F-4 but for some reason still resisted the incorporation of an internal gun. They got the F-4J instead which had a more powerful AWG-10 radar, the same uprated avionics and engines as the F-4E and more importantly, internal ECM equipment. These models would be successively improved and while Navy F-4s were finally replaced by Tomcats in the 1980s, the USAF still has many Phantoms in service as do many other countries.



RA-5C Vigilante: The Navy's quest to become a viable nuclear deterrent force in the late 1950s, led it to procure the A-5A Vigilante, a high performance supersonic attack jet. The A-5's original armament was to be a single nuclear bomb contained in a linear tube centered in the middle of the aircraft and ejected rearward from an exit point between its two engine exhausts. Conventional weapons capability was tested only as an afterthought. A prototype flew in 1956 and production started in 1959 but only 18 were built when Congress rescinded Naval Aviation's nuclear deterrence role. The Navy suddenly found itself with a superb mach two capable aircraft, having advanced avionics for pinpoint navigation, but with no mission. Conventional attack was for cheaper, expendable jets like the A-4. Fortunately, the A-5's potential as a high speed reconnaissance platform was recognized giving birth to the RA-5C. This became the main production Variant and entered fleet service in 1962. Only 140 RA-5C's were built and many served in Vietnam where 18 were lost to enemy defenses. The Vigilante was retired in 1979; replaced by F-14s with TARP capability.



A-6 Intruder: Grumman's big, stubby looking twin engined A-6 attack jet came about from the Navy's need for an aircraft that could attack targets in day or night and in any weather. In 1956 the A-6 was conceived and its maiden flight occurred in 1960. The first squadrons were equipped with it in 1963. The heart of the A-6's all weather capability lay in its digitalized and computerized NAV/ATTACK system which utilized two separate radars in its bulbous nose; one for navigation and one for terrain avoidance. It required a side by side seated two man crew which made it wide and kept it firmly subsonic. The A-6A could carry 15,000 lbs. of bombs but had no weapons for self defense. In Vietnam A-6s were employed initially in daylight attacks and suffered high losses. When used at night and in weather as intended by their designers, they proved very capable and survivable. The A-6E featured improved Avionics, ECM and more powerful engines plus provisions for a Sidewinder if needed. Upgraded E models with advanced night vision and laser designation capability still serve as the Navy's main all weather attack jet to this day.



A-7 Corsair II: Vought's subsonic A-7 attack jet was derived from the supersonic F-8 Crusader. While the basic layout was similar, the A-7 was shorter, featured an economic non-afterburning turbofan engine, and six wing pylons for air to ground stores. Resulting from a 1963 Navy request for a replacement for the A-4, the Corsair more than fit the bill having twice the load capacity and twice the range of the Skyhawk. Additionally, the A-7 had a useful NAV/ATTACK radar and autopilot allowing it limited all weather strike capability against area targets. The early Corsairs had two 20mm cannons but the A-7D/E models which followed had 20mm Vulcan gatlings. Both could carry AIM-9 missiles. The D/E models also featured a fully computerized weapons delivery system tied in with a Heads Up Display unit which made them the most accurate day bombers in the world in 1968. A-7s entered into combat in Vietnam in 1967 and served with distinction proving to be capable of sustaining heavy battle damage. The Air Force acquired A-7s to replace F-100s and A-1s in the ground support role. Upgraded A-7Ds.



F-111A Ardvaark: First flying in 1964, the F-111 embodied the thinking of that era in how to create a supersonic aircraft with good take-off, landing and cruise performance as well. The solution was in using swing wings. The F-111 was not the first aircraft to utilize the concept, but it was the first swing-wing airplane to enter production. Its mission was all-weather attack, though it could carry a gun and missiles for air combat if desired. Compared to the subsonic A-6, it was much larger, faster, greater ranged and had the first automatic terrain following system ever installed in a combat jet. The Air Force was more than pleased with it but there were a number of teething problems and after a number of crashes, the plane received a lot of bad publicity. Six were deployed to Vietnam in 1968 and withdrawn after three were mysteriously lost. A defect was discovered, corrected and in 1972, F-111s were again deployed performing quite well on solitary night raider missions. Improved versions of the F-111 continue to serve with the USAF today.



F-5A Freedom Fighter: Derived from the USAF T-38 advanced trainer, the F-5 was a small lightweight supersonic fighter intended for export to third world nations. In essence, it is an American MiG-21. The F-5 is a very basic aircraft, easy to fly and maintain and much more versatile with regard to air to ground weapons than the MiGs. The Freedom Fighter would usher many small national air forces into the supersonic jet age and was highly successful as an instrument of foreign aid. Entering production in 1960, the F-5A was armed with two 20mm cannon and could carry two AIM-9 missiles plus numerous bomb and rocket types. A squadron of F-5s manned by American pilots was sent to Vietnam in 1965 to evaluate its combat potential. These were F-5Cs which were modified to allow inflight refueling and had some minor changes to their avionics. After the evaluation, they were turned over to the South Vietnamese who also recieved additional F-5As beginning in 1968. When South Vietnam fell, many captured F-5s were incorporated into the NVAF and used until lack of spares shut them down. It is possible that the NVAF F-5s were even involved in dogfights with Chinese MiGs during the short border skirmishes which took place in the late 1970's.



A-37 Dragonfly: The A-37 is an attack derivative of the USAF T-37 basic jet trainer. It was created as a low cost counterinsurgency aircraft for use in low anti-aircraft threat environments. The

Dragonfly has beefed up wings with multiple weapons pylons, more powerful engines, a refueling probe and an internal gatling machine gun. Despite its tiny size, it is able to lift a 5,500 lb. weapons load which is superior to that of some regular jet fighters produced in Europe during the same era. The Dragonfly was extensively used in Vietnam by the USAF and the South Vietnamese air force. Like the F-5, many were captured by the North Vietnamese at the end of the war. It has been widely exported to Latin America and several other countries as well. A very effective aircraft, the Dragonfly has been updated with ECM and numerous radios for FAC duties as the OA-37. In this guise it still serves with several U.S. Air National Guard squadrons.



MiG-19 Farmer: The MiG-19 first flew in 1954 and was immediately liked by its pilots. It was a contemporary of the F-100 and in many respects it was far superior, having a better rate of climb,

a higher thrust to weight ratio and a superb armament of three hard hitting 30mm cannons. The MiG-19 departed from earlier MiG designs by having sharply swept wings and two engines instead of the usual one. It was considered an excellent dogfighter and was supplied to dozens of countries friendly to the Soviet Union. While others would later replace it with the newer MiG-21s, the Chinese opted to reverse engineer some samples they received from the Soviets and put it back into production starting in 1962. These new airplanes, designated F.6s, were soon supplied to Egypt, Pakistan and other countries including North Vietnam in 1968. Night fighter and interceptor variants were also made. The interceptor version had no cannon and was armed with four AA-1 Alkali missiles instead. In Vietnam, the MiG-19s were often employed at low altitude like MiG-17s and were not utilized to their full advantage. As such they suffered about a 1 to 1 kill to loss ratio.



MiG-21MF Fishbed-J: The MiG-21's original weaknesses were its limited armament and lack of staying power. Two new models appeared in the late 1960's to correct this. They were the

PFMA and the MF. Both received the designation of Fishbed-J and both featured increased engine power, extra fuel, a new radar and two additional wing pylons doubling their missile load capacity. The main differences between the two marks were that the early PFMA's still lacked an internal gun while a good gun, and a slightly more powerful afterburner, were standard features on the MF models. North Vietnam started receiving MiG-21MFs around 1970 and these were often camouflaged. Unlike the earlier PF models in NVAF service, the Fishbed-Js displayed an increased willingness to enter into traditional dogfights with U.S. fighters. The MiG-21 has been built in the thousands and widely exported. More than any other MiG, it came to symbolize Soviet air power in the 1960's and 1970's and still equips over two dozen air forces in the world today. In fact the Pakistani Air Force was taking delivery of new Chinese built MiG-21s as late as in 1990 to serve alongside their U.S. supplied F-16s.

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VIETNAM FINALE! GUNS ONLY AIR COMBAT SCENARIO

Scenario V-14: MIG Threat Neutralized! 2 June 1972

Background: A pair of F-4E Phantoms of the 58th TFS were egressing a target area low on fuel when they spotted two MiG-19 Farmers approaching fast from their six o'clock low position. At this point in the war, the NVAF had become quite adept at tracking U.S. aircraft which were low on fuel or damaged and vectoring MiGs after them. In this case, the effort to gain a cheap advantage failed as the F-4Es broke back down into the MiGs initiating a dogfight in which one farmer was lacerated by gunfire and went down in flames.

Maps:

B1
B2



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-4E #1	B2	4018	S	15	4.5	DT	15
F-4E #2	B2	4217	SSW	16	4.5	DT	15
MiG-19 #1	B1	4109	S	12	7.0	1/2	4,6
MiG-19 #2	B1	4009	S	12	7.0	1/2	4,6
(see note 4)							
MiG-19 #3	B1	4206	S	10	7.0	1/2	6

Game Length: 15 game-turns.

Notes:

1. All aircraft begin spotted. MiG #3 is not part of the regular scenario, see note 4. The MiGs are silver, the F-4s are camouflaged.

2. Pilot training standards: USAF= good. NVAF= limited.

3. In addition to their cannon, the F-4s had air to air missiles which they were unable to use in the historical fight due to the close in nature of the fighting, see note 4.

4. Optional Air to Air Missile Combat Game: Allow the F-4s use of their missiles and for play balance either;

- a) Add MiG #3, or
- b) Allow MiGs #1 and #2 two AA-2A missiles each.

5. Aircraft loads: MiGs; stations 1,4= two 600L FTs. Or stations 1,4= two 600L and stations 2,3= two AA-2A IRMs (Conf.=DT, load=8). F-4Es; stations 1,5= two 1200L FTs, stations 2,4= two AIM-9E each plus an ALQ-101 ECM pod on 4, stations 6,7,8,9= one AIM-7E RHM each.

6. Victory: The side with the most points wins.

7. Advanced Rules:

- a) Weather: Clear.
- b) Crew Quality: F-4s= R/R, R/N. MiGs= R,R,N. Roll for attributes no characteristics apply.
- c) Terrain: Ignore contour lines, the area is flat with ground level= 0.
- d) Fuel: MiG start= 160, bingo= 90.
F-4 start= 300, bingo= 230.
USAF Aerial Tanker Availability= 7.

8. Recommended Variation: Replace the MiG-19s with MiG-21 PFs equipped with GP-9 gun pods on station 2 and AA-2A IRMs on stations 1,3 (conf.=1/2, load=4).

VIETNAM FINALE

GUNS AND MISSILE AIR COMBAT SCENARIOS

(Guns and Heat Seeking Missiles Only)

Scenario V-15: The Death Of Col. Tomb! 10 May 1972

Background: North Vietnam's mystery leading Ace, Col. Tomb, supposedly had 13 air to air victories when he encountered Showtime 100, an F-4J of VF-96 during an air battle on 10 May 1972. In the F-4 were LT "Duke" Cunningham and LTJG "Irish" Driscoll. Showtime 100 had already scored two kills and was attempting to egress the battle area when Col. Tomb's green and brown camouflaged MiG-17 met them head on with cannons blazing. What followed was a classic one against one dogfight in which the nimble MiG consistently held the advantage until the expertly flown F-4 did the unexpected as both aircraft spiraled upward in a rolling scissors maneuver. The Phantom crew selected idle power and used speedbrakes to force the MiG out front. The trick worked, Cunningham and Driscoll became Aces and Col. Tomb became history.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
F-4J	A1	1508	E	10	5.0	CL	6
MiG-17F	A1	2508	W	10	5.0	CL	2

Game length: 30 game-turns.

Notes:

- Both aircraft begin spotted. The MiG is camouflaged, the F-4 is uncamouflaged.
- Pilot training standards: USN= excellent, VNAF= good.
- Aircraft Loads: F-4J; stations 1,5= empty TR (triple bomb rack), stations 2,4= one AIM-9G IRM each, stations 8,9= one AIM-7E RHM each. MiG: stations 1,4= 400L FT.
- Victory: The side with the most points wins.
- Advanced Rules:
 - Weather: Clear.
 - Crew Quality: F-4J= R/R, pilot is tactics master (Top Gun graduate) with excellent confidence. MiG-17= V; pilot is a combat hero. No other attributes or characteristics apply.
 - Terrain: Ignore any contours, the terrain is flat with ground level= 0.
 - Fuel: F-4 start= 330, bingo= 200. USN Tanker Availability = 7. MiG start= 90, bingo= 60.
- Recommended Variations:
 - Let Col. Tomb fly a MiG-19 (guns only) or MiG-21F with two AA-2B missiles.
 - Allow Col. Tomb's MiG-17 to carry two AA-2A missiles.

Scenario V-16: Phantoms And Farmers! 18 May 1972

Background: Two USS Midway F-4B Phantoms of VF-161 were on a MIGCAP mission when they were vectored against two MiG-19 Farmers that had just taken off from Kep Airfield North of Hanoi. The Phantoms crossed the coast of Vietnam at about 11,000 descending and picking up speed. About five miles from the Airfield they spotted two silver MiG-19s and turned to get on their tails. The MiGs saw the threat and turned into the Phantoms initiating a turning dogfight which spit the F-4s out. The Phantoms separated and came back in splitting the MiGs up. In the melee that ensued, one MiG lost sight of the second F-4 and got shot down by an AIM-9. The second MiG turned to flee and was shot down by the second F-4.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	conf.	load
F-4B #1	C2	6317	W	5	6.0	1/2	13
F-4B #2	C2	6517	NNW	5	6.0	1/2	13
MiG-19S #1	C2	5919	S	1	4.0	1/2	4
MiG-19S #2	C2	5918	S	1	4.0	1/2	4

Game Length: 20 game-turns.

Notes:

- All aircraft begin sighted. The MiGs are silver, the F-4s are uncamouflaged.
- Pilot training standards: USN= good, NVAF= poor.
- Aircraft loads: MiGs; stations 1,4= 600L FT. F-4s; stations 1,5= 1200L FT, stations 2,4= two AIM-9G IRM missiles each, stations 6,7,8,9= one AIM-7E RHM each.
- Victory: The side with the most points wins.
- The Sparrow missiles were not used historically due to ground clutter during the low altitude fight.
- Advanced Rules:
 - Weather: Overcast skies; there is a stratus layer at 12, and a dense layer from 15 to 21.
 - Crew Quality: Phantoms = R/R, R/R, MiGs= R, N. Roll for attributes, no characteristics apply.
 - Terrain: Ignore the contours on map C2, the terrain is flat with ground level= 0.
 - Fuel: MiG start= 200, bingo= 80. F-4 start= 450, bingo= 250. USN Tanker Availability = 7.
- Recommended Variations: Substitute MiG-21s or MiG-17s for the two MiG-19s.
- Recommended Additions: Add NVAF AAA. Allow one ZU-23 23mm Lt. AAA, one M-38 37mm Med. AAA, and one ZPU-4 14.5mm Lt. AAA to be set up, one per hex in any hex within one of the airfield.

Scenario V-17: Phantoms And Fishbeds! 6 May 1972

Background: Two F-4J Phantoms launched on a MIGCAP from the USS Kittyhawk were vectored against a pair of radar contacts. The contacts turned out to be two flights of two MiG-21PFs. Each MiG wingman was flying so close to his leader that they appeared as one on radar. The Phantoms saw the MiGs first and turned in after the second pair successfully shooting one down with a sidewinder as the MiGs started a defensive break. A second MiG was dispatched moments later by the third of three AIM-9s fired at it; the first two missed. The other two MiGs started back into the fight but after seeing their compatriots fireballed, they split the scene.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
MiG-21PF #1	C2	5917	S	4	4.0	1/2	4
MiG-21PF #2	C2	5917	S	4	4.0	1/2	4
MiG-21PF #3	C1	5910	S	4	4.0	1/2	4
MiG-21PF #4	C1	5910	S	4	4.0	1/2	5
F-4J #1	C1	6511	NW	6	6.0	1/2	13
F-4J #2	C1	6711	NW	6	6.0	1/2	11

Game Length: 20 game-turns.

Notes:

1. The Two F-4s begin unsighted, all the MiGs are sighted. The MiGs may not use any turn rate over HT until they sight any F-4s. The MiGs are silver, the F-4s are uncloaked.

2. Pilot training standards: USN= good. NVA= limited.

3. Aircraft loads: MiGs; stations 1,3= one AA-2A IRM each, station 2= 600L FT. F-4s; stations 2,4= two AIM-9E IRMs each, station 3= 2200L FT. F-4 #1; stations 6,7,8,9= AIM-7E RHM. F-4 #2; stations 8,9= AIM-7E RHM.

4. As in V-16, the Phantoms in this scenario had Sparrows but these were unused due to ground clutter.

5. Victory: The side with the most points wins.

6. Advanced Rules:

- a) Weather: Stratus layer at 8.
- b) Crew Quality: F-4s= All R, MiGs= R,N,R,N. Roll for attributes, no characteristics apply.
- c) Fuel: MiG start= 250, bingo= 100. F-4 Start= 450, bingo= 275. USN Tanker Availability = 6.

VIETNAM FINALE**GUNS AND MISSILE AIR COMBAT SCENARIOS**
(Guns, IR and RH Missile Scenarios)**Scenario V-18: MIG Trap Falls! 16 April 1972**

Background: A flight of F-4Ds from the 13th TFS were on a MIGCAP mission during Linebacker when they met a pair of silver MiG-21s head on. The flight was about to engage when a third camouflaged MiG, further back and lower down was sighted. The flight split with one pair of F-4s going after the

Silver MiGs and the other pair taking on the "ambusher". After a short maneuvering battle, one of the silver MiGs and the camouflaged MiG were shot down; both by sparrows. The radar officer of the F-4 which downed the camouflaged MiG was Capt. Jeff Feinstein. This was the first of five MiGs he would get during his tour to become the Air Force's third and final ace of the war.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
F-4D #1	A1	1802	NE	20	6.0	CL	5
F-4D #2	A1	1803	N	20	6.0	CL	5
F-4D #3	A1	1502	N	21	6.0	CL	5
F-4D #4	A1	1403	N	21	6.0	CL	5
MiG-21PF #1	B2	4230	S	24	6.0	1/2	4
MiG-21PF #2	B2	4329	S	24	6.0	1/2	4
MiG-21MF	B2	4123	S	16	6.0	1/2	6

Game Length: 20 game-turns.

Notes:

1. All aircraft except the MiG-21MF begin sighted. The F-4s and the MiG-21MF are camouflaged, the other MiGs are silver. Use F-4C data card to simulate F-4Ds. The main difference between the two is in ground attack equipment.

2. Pilot training standards: USAF= avg., MiGs= average.

3. Aircraft loads: MiG-21PFs; stations 1,3= one AA-2A IRM each, station 2= 600L FT. MiG-21MF; stations 1,2,4,5= one AA-2B each, station 3= 600L FT. F-4s; stations 2,4= one AIM-9J IRM each, stations 7,8,9= one AIM-7E2 RHM each.

4. Victory: The side with the most points wins.

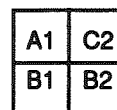
5. Advanced Rules:

- a) Weather: Stratus layers at 15 and 12.
- b) Crew Quality: F-4s= all R, MiGs= R, N, V. Roll for attributes, no characteristics apply.
- c) Fuel: MiG start = 230, bingo= 90. F-4 start = 500, bingo= 300. USAF Tanker Availability = 7.

Scenario V-19: It's Showtime! 10 May 1972

Background: During a major strike near Hanoi, seven F-4J Phantoms of VF-96 (call sign "Showtime") found themselves embroiled in the midst of almost twenty MiGs of all types. A dangerous and fast paced dogfight developed with MiGs so thick they were getting in each others way. Though shot at repeatedly, three of the Phantoms accounted for six MiG-17s in the battle and all but one managed to return safely to their carrier. A SAM missile shot down Showtime 100 as they left the battle. In it were LTs Cunningham and Driscoll. They had just downed three of the MiG-17s to become the first and only Navy Aces of the war. They were rescued by helicopter after safely ejecting.

Maps:



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
MiG-17F #1	A1	2507	SW	3	4.0	CL	2
MiG-17F #2	A1	2607	SW	3	4.0	CL	2
MiG-17F #3	A1	2707	W	3	4.0	CL	2
MiG-17F #4	A1	2807	W	3	4.0	CL	2
MiG-17F #5	B1	4603	SSE	3	4.0	CL	2
MiG-17F #6	B1	4602	SSE	3	4.0	CL	2
MiG-17F #7	B2	3821	NNE	8	6.5	CL	2
MiG-17F #8	B2	3824	NNE	8	6.5	CL	2
MiG-19SF #1	C2	0305	E	12	5.0	1/2	4
MiG-19SF #2	C2	0204	E	12	5.0	1/2	4
F-4J #1	A1	2414	SSW	5	5.0	1/2	13
F-4J #2	A1	2811	NW	3	6.0	1/2	13
F-4J #3	A1	2910	NW	3	6.0	1/2	13
F-4J #4 **	B2	3919	NNW	8	3.5	1/2	13
F-4J #5	B2	4119	N	8	3.5	DT1/2	13

MiG-21 Reinforcements: Two MiG-21F enter the game from the East side of playing area at speed 5.0, and altitude 15. They are 1/2 configured with 4 load points. All must enter from adjacent hexes and they do not begin with any F-4s in sight.

Game Length: 30 game-turns.

Notes:

1. All aircraft begin sighted. The MiG-17s are camouflaged, the MiG-19s and 21s are silver. The F-4s are uncamouflaged.

2. Pilot training standards: USN= good, MiG-17s =poor. MiG-19s and MiG-21s= average.

3. MiG loads: MiG-17; stations 1,4= 400L FT. MiG-19 loads: stations 1,4= 600L FT. MiG-21 loads: stations 1,3= one AA-2A IRM each, station 2= 600L FT.

4. F-4 loads: Stations 1,5= empty TR (triple bomb rack), stations 2,4= two AIM-9G IRM each, stations 8,9= one AIM-7E RHM each, station 3= 2200L FT.

5. F-4J #4** is Cunningham and Driscoll's Showtime 100.

6. Smaller Game: For smaller versions of this scenario; delete MiG-17s 3, 4, 7,8 and the MiG-21 reinforcements. Delete F-4s 2 and 3.

7. Victory: The side with the most points wins. 10 bonus points go to the NVAF if they shoot down Showtime 100.

8. Advanced Rules:

- Weather: clear.
- Crew Quality: MiGs (in order of appearance): R, R, R, N, R, N, R, G. R, N, R, R. F-4s: all R. Showtime 100's crew are tactics masters with excellent confidence. No other special characteristics apply, attributes for all pilots and crews (except Showtime 100) may be rolled for.
- Terrain: Ignore all contours, the area is flat with ground level=0.
- Fuel: F-4 start= 600, bingo= 200.
MiG-17 start= 150, bingo= 60.
MiG-19 start= 180, bingo= 110.
MiG-21 start= 210, bingo= 110.
USN Tanker Availability = 7.

Scenario V-20: Death Of Major Lodge! 10 May 1972

Background: "Oyster" flight, composed of four F-4D Phantoms led by veteran MiG killer Major Bob Lodge, was the lead MiGCAP for a major strike. Cleared to fire early, Lodge and his wingman attacked four MiG-21s at long range with Sparrows, downing one apiece. A dogfight ensued with the remaining two and Capt. Steve Richie in Phantom #3 nailed the third MiG as Major Lodge pursued the last, intent on gaining his fourth kill of the war. Suddenly, four MiG-19s surprised the F-4s. They fell in behind Major Lodge, cannons blazing and exploded his F-4; killing him instantly. The rest of Oyster flight, facing more MiGs, withdrew. Richie's kill was the first of five that would make him the Air Force's only pilot ace.

Maps:

C2	B1
A1	B2



Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	Load
MiG-21MF #1	C2	5824	E	13	5.0	DT	7
MiG-21MF #2	C2	5724	E	13	5.0	DT	7
MiG-21PF #3	C2	5424	E	16	5.0	DT	5
MiG-21PF #4	C2	5324	E	16	5.0	DT	5
F-4D #1**	B2	4727	NW	3	5.5	DT	18
F-4D #2	B2	4827	NW	3	5.5	DT	18
F-4D #3*	B2	4729	NW	3	5.5	DT	18
F-4D #4	B2	4730	NW	3	5.5	DT	18

MiG-19SF Farmer Reinforcements: Four MiG-19s enter play on turn five from East edge of play area at any allowed altitude and speed in the LO or ML band. All MiG-19s must enter from adjacent hexes at the same speed and altitude. They enter unsighted with the F-4s in sight.

Game Length: 30 game-turns.

Notes:

1. All aircraft begin unsighted. The F-4s are camouflaged, the MiGs are all silver. Use the F-4C data card to simulate F-4Ds. The difference in the two is in air to ground equipment.

2. Pilot training standards: USAF= good. NVAF= limited.

3. MiG-21 Surprise: The MiG-21s may only do EZ turns and may not change speed or altitude until an F-4 or F-4's missile is sighted or the missile attacks a MiG.

4. Aircraft Loads: MiG-21MF; stations 1,2,4,5= one AA-2A IRM each, station 3= 600L FT. MiG-21PF; stations 1,3= one AA-2A IRM each, station 3= 600L FT. MiG-19 load: stations 1,4= 600L FT. F-4D loads: stations 1,5= 1200L FT, station 2= EP plus two AIM-9J IRMs, station 4= two AIM-9J IRMs, stations 6,7,8,9= one AIM-7E RHM each.

5. Victory: side with the most points wins. NVAF scores 1.5 x normal value for F-4s damaged or destroyed and 10 bonus points are awarded if F-4D #1 is destroyed (**Major Lodge) and 5 bonus points if F-4D #3 is destroyed (*Captain Richie).

6. Advanced Rules:

- Weather: Clear.
- Crew quality: MiG-21s= R,N,R,R. MiG-19s= V,R,R,N. F-4Ds= V/V, R/R, R/R, N/R. Roll for attributes, no special characteristics apply.

- c) Fuel: MiG-21 start= 240, bingo= 100.
 MiG-19 start= 200, bingo= 100.
 F-4D start= 420, bingo= 300.
 USAF Tanker Availability = 8.

Scenario V-21: Strike On Hai Duong! 10 May 1972

Background: The raid that precipitated the major air battle of 10 May, in which Cunningham and Driscoll became aces, was Air Wing Nine's attack on the Hai Duong Rail yards. In the closely coordinated strike, all the nearby SAM sites were suppressed by Shrike armed Corsairs as bomb laden A-6s and A-7s rolled in to blast their targets. AAA fire was heavy but the main threat to the attack birds was several MiG-17s which broke through the escorting F-4s to pursue them. One A-7 managed to damage a MiG with gunfire forcing it off a comrade's tail, and a second MiG was scared off another A-7 by an AIM-9 shot from Lt. Matt Connelly's Phantom. Connelly would shoot down two MiGs later in the same battle.

Maps:

B1	A1
B2	C2



AAA Set Up: KS-12 85mm Hvy. AAA x 2; B1-3613, A1-2203. S-60 57mm Med. AAA x 1; B1-4809. ZU-23 23mm lt. AAA x 2; A1-1603, B1-4213. ZPU-4 14.5mm lt. AAA x 1; B1-4613.

Ground Unit Set Up: Locomotive x 1; B1-4511. Train x 2; B1-4510, 4509. POL X 2; both in B1-4710, Trucks x 3; all in B1-4711. Large buildings (warehouses) x 2; both in 4610.

Aircraft:	Map	Hex	Fac.	Alt.	Spd.	Conf.	load
A-6A #1,#2	A1	1610	NW	15	4.0	1/2	12
A-6A #3,#4	A1	1709	NW	15	4.0	1/2	12
A-7E #1,#2	A1	2010	NW	15	4.0	DT	15
A-7E #3,#4	A1	1911	NW	15	4.0	DT	15
F-4J #1	A1	2212	W	18	5.0	1/2	11
MiG-17F #1	B2	3622	NNE	5	5.0	1/2	4
MiG-17F #2	B2	3623	NNE	5	5.0	1/2	4
MiG-17F #3	B2	3423	NNE	5	5.0	1/2	4

Game Length: 20 game-turns.

Notes:

1. All aircraft begin unsighted. The MiGs are camouflaged, the Navy aircraft are uncamouflaged.
2. Pilot training standards: USN= good. NVAF= limited.
3. Aircraft Loads: A-6s; stations 1,2,4,5= one 2000lb. Mk-84 HE bomb each. A-7s; stations 1,2,3,6,7,8= one 1000lb. Mk-83 HE bomb each. F-4; stations 2,4= two AIM-9G missiles each, station 3= 2200L FT, stations 8,9= one AIM-7E each.
4. The F-4's radar was working intermittantly that day and its radar missiles were unusable as a result.
5. All ground units including AAA and the rail yard hexes of B1-4610, 4611 are eligible targets.
6. Victory: Each of the two rail yard hexes must be damaged and the USN player must have more points to win.
7. Play area: The play area is fixed, USN aircraft may only

exit the South edge. If they exit any other edge they are destroyed. Aircraft safely exiting the play area are considered to escape home.

8. Advanced Rules:

- a) Weather: Clear; contrails at 30.
- b) Crew Quality: All = R, roll for attributes, no characteristics apply.
- c) Terrain: Ignore any contour lines and ridgelines, the area is flat with ground level= 0.
- c) Fuel: A-6,A-7 start= 300, bingo=200.
 F-4 start= 450, bingo= 300.
 MiG start= 140, bingo= 60.
 USN Aerial Tanker Availability = 7.

9. Recommended Variations: Substitute two MiG-19s, or two MiG-21Fs each with two AA-2A for the three MiG-17s, and/or allow the F-4 its radar and radar homing missiles.

Scenario V-22: The Easter Offensive! March 1972 *

Background: In the Spring of 1972, just prior to the Linebacker I campaign, the North Vietnamese launched a major invasion of the South. 12 divisions of troops and armor were committed and these rapidly captured Quang Tri Province and besieged An Loc city near the DMZ. American and South Vietnamese aircraft proved to be the countering force and the invasion failed as hundreds of NVA troop columns were caught on the move and chewed up by Air attack. As a result, North Vietnam would have to wait until 1975 to conquer the South.

Maps:

LO
A1
C2



NVA Ground Unit Set Up: (all on Map A1) Tan Trucks x 6; one each in hexes 1904, 2005, 2105, 2407, 2605, 2705. Tan Infantry x 6; two each in hexes 2206, 2306, 2506. Med. Armor x 2; both in 2508. Sampams x 2; 2406, 2205.

NVA AAA Set Up: (all on map A1) S-60 57mm med. AAA x 1; 1707. M-38 37mm Med. AAA x 2; 2507, 2603. ZPU-1 14.5mm lt. AAA x 3; 1903, 2607, 2411. ZU-23 23mm lt. AAA x 3; 2203, 2505, 2009.

Strike Aircraft: One O-2A, Two F-5A, Two A-37B, and Two AC-130E Spectre Gunships.

Game Length: 30 game-turns.

Notes:

1. Starting Play: All aircraft set up at any allowed speed and altitude in the LO band of megahex C2-6021, facing N.
2. AAA units will fire in accordance with the random AAA rules. AAA units in urban or woods hexes are camouflaged.
3. Aircraft Loads: The jet aircraft may be equipped with any allowed ordnance loads. The O-2 spotter is armed and moves as described in scenario V-10.
4. **AC-130E Spectre Rules:** The AC-130Es were special gunships converted from C-130 transport planes. As for the O-2A, there is no AC-130 data card and a logsheet does not have

to be kept for them. The AC-130s have the following movement options available to them each turn :

- Move 2 hexes forward without changing facing.
- If previous turn's option was a); move 3 hexes forward without facing.
- Move two hexes forward changing facing by up to 30 degrees in each hex.
- Perform any of the above while either gaining 0.5 levels or diving 1 level.

AC-130E Data: Vis.= 10, Size= -2, Vuln.= +2, Cieling= 25.

AC-130E Weapons: The gunship has 4 distinct banks of weapons which fire only into the left 90 and 120 arcs, they are;

Bank	Weapons	Range	ATG Rtn.	Shots.
1)	Two 7.62mm gatlings	2	4**	12
2)	Two 20mm gatlings	4	12*	8
3)	One 40mm cannon	6	4	10
4)	One 105mm cannon	8	8	10

AC-130 Attacks: The AC-130 is allowed to make up to two strafing attacks each game-turn (one per hex entered). As many weapons banks as are in range may fire in each attack but all banks must fire at the same target. The attack strengths of the banks are summed.

Aiming is not required, but the aircraft may only fire when it enters a hex AND faces left 30 degrees (option b) and the target is in its left 90 to 120 degree angle arcs.

5. Victory: To win, the strike player must inflict at least 20 points of damage to the troop column and/or AAA defenses and have more points overall.

6.. Advanced Rules:

- Weather: Generate from the S.E. Asia table.
- Crew Quality: Generate from the "average" table.
- Terrain: Each contour represents an increase in altitude of 2 levels.
- Fuel: All aircraft have sufficient fuel to complete the scenario.
- ECM: The AC-130 has four wing pylons that may carry ECM pods; an RWR-B, and two x DDS-B.
- Decoys: The A-7s and AC-130 are equipped with flare decoys; 8 and 16 respectively.
- Technology: The AC-130 has Terrain Following -B, and IR/TV optics which see into its left side arcs. It also can laser designate into those arcs as if type-B designator.

7. Recommended Variation: Give each infantry unit one shoulder fired infantry SAM (SA-7A).

VIETNAM FINALE AIR TO GROUND COMBAT SCENARIOS (AAA / SAM)

Scenario V-23: Running the Gauntlet! 10 May 1972

Background: One of the toughest missions flown by USAF and USN pilots was that of Post-Strike damage assessment. Recon jets had to overfly the target minutes after the strike birds had left and since this had been done throughout the war, NVA defenses were always ready for them. This

scenario depicts both a Vigilante mission flown on the 10th of May following a morning strike near Haiphong and an RF-4C mission over Hanoi at the same time. On the first, the RA-5C and its escorting Phantom were both damaged by SAMs, one of which blew five large holes clean through the Vigilante without hitting anything vital. On the second, two RF-4Cs had to dodge several SAMs and duck a MiG-17 that made a cannon attack on them; just a typical days work!

Maps:

B1
A2
A1
C1



NVA AAA Defenses: Place the following AAA units one per hex in any hex of maps A1, A2, and B1.

- KS-12 85mm Hvy. AAA x 1.
- S-60 57mm Med. AAA x 2.
- ZU-23 23mm Lt. AAA x 2.
- ZPU-4 14.5mm Lt. AAA x 3.
- FCR type A x 3; stack with KS-12 and S-60s.

NVA SAM Defenses: EWR-A plus CCU in hex A2-1929. SA-2C Fire Units x 2; A1-1206, A2-2526. M-38 37mm and ZPU-1 14.5mm; one each within two hexes of each SA-2 Fire unit and the CCU unit.

Aircraft: Map Hex Fac. Alt. Spd. Conf. load

(Both set ups)

MiG-17F B1 3512 SSE 10 5.0 1/2 4

(US Navy - Haiphong Version)

RA-5C C1 6013 N 4 7.0 CL 0

F-4J C1 6115 N 4 7.0 1/2 11

(USAF- Hanoi Version)

RF-4C #1 C1 6908 NNW 4 6.0 CL 7

RF-4C #2 C1 6610 NNW 5 6.0 CL 7

Game-Length: 20 game-turns.

Notes:

1. No aircraft begin sighted. The MiG and USAF jets are camouflaged, the Navy Jets are uncamlouflaged.

2. Pilot training standard: USAF/USN= good, NVA= Avg.

3. Aircraft loads: MiG; stations 1,4= 400L FT. F-4J; stations 1,5= 1200L FT, stations 2,4= two AIM-9G IRM each, stations 8,9= One AIM-7E RHM each. RF-4C; stations 1,5= 1200L FT, station 7= ALQ-101 AJM-B pod.

4. Victory: To win, the U.S. player must photograph at least two of the following target hexes by overflying them with a recon aircraft in level flight (not turning or maneuvering) between an altitude of 3 and 6 inclusive. He must then exit the recon aircraft from the North edge of the play area. In the USAF version, each recon jet may take a single separate target as long as both successfully exit.

Photo Targets: A2-1822, 1929, 2219, 2323, or 2126.

5. Advanced Rules:

- Weather: Clear.
- Crew Quality: U.S.= all R. MiG= R. Roll for

Attributes, no Characteristics apply.

c) Terrain: Ignore all contours and ridgelines, the area is flat with ground level=0.

c) Fuel: MiG start= 150, bingo= 30.

F-4 Starts= 400, bingo= 250.

RA-5C start= 800, bingo= 250.

USAF/USN Aerial Tanker Availability = 7.

d) ECM: No aircraft have decoys.

6. Recommended Variations:

a) Substitute a MiG-19SF, or substitute a MiG-21PF with two AA-2A IRMs for the MiG-17.

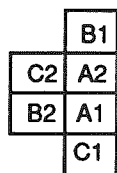
b) Substitute an F-4D armed like the F-4J (except use AIM-9J IRMs) for one of the RF-4Cs.

c) 1967 USN or USAF scenario: use an RF-8A Crusader escorted by an F-8C armed with four AIM-9Bs, or two RF-101C Voodoos. Replace SA-2Cs with SA-2B.

Scenario V-24: Fall of the Paul Doumer! 10 May 1972

Background: Hanoi's main railway bridge, the mile long Paul Doumer, had been damaged and had portions of it knocked out many times during the war. Always, in the past, this had required a major effort from masses of strike aircraft and the bridge was usually repaired within a month. On the 10th of May, USAF jets attacked the bridge using new weapons, Laser Guided Bombs. The accuracy of the LGBs was such that just a few F-4s dropping them were able to demolish the bridge and render it unusable for the rest of the war.

Maps:



NVA AAA / SAM Defenses: Set up the following units, one per hex in any hexes of maps B1, A2, C2 and A1:

- KS-12 85mm Hvy. AAA x 3.
- S-60 57mm Med. AAA x 3.
- FCR-A x 3, one per S-60 and/or KS-12.
- M-38 37mm Med. AAA x 3.
- ZPU-4 14.5mm Lt. AAA x 3.
- ZPU-1 14.5mm Lt. AAA x 3.
- EWR-A plus CCU(in same hex).
- SA-2F SAM fire units x 3.

MiGs: Pick either two MiG-19SF, or two MiG-21MF, or four MiG-17F. Set selected MiGs up in megahex B1-3513, facing S, at any allowed speed and altitude.

USAF Force: The attack force consists of three flights. The first flight enters on game-turn 1, the second on game-turn 3 and the third on game-turn 5. They enter from the South edge of map C1 at any allowed speed and altitude. The flights consist of the following aircraft:

- 1) Two F-105G Wild Weasel.
- 2) Four F-4D Phantoms.
- 3) Two F-4E Phantoms.

Game Length: 30 game-turns.

Notes:

1. All aircraft begin unsighted. All USAF jets are camouflaged. MiG-17s are camouflaged, the others are silver.

2. Pilot training standard: USAF= excellent, NVAF= average.

3. NVAF Aircraft Loads: MiG-19 stations 1,4= 600L FT, stations 2,3= AA-2A IRM, conf.= DT, load= 8. MiG-21MF stations 1,2,4,5= one AA-2b IRM each, station 3= 600L FT, conf.= 1/2, load= 6. MiG-17 stations 1,4= 400L FT, conf.= 1/2, load= 4.

4. Wild Weasel loads: Stations 1,5= AGM-45 Shrike ARM, station 2= ALQ-87 BJM pod, station 4= TR plus two CBU-71 cluster bombs.

5. F-4D loads and notes: Station 1= 1200L FT, stations 2,5= one 2000lb GBU-10 LGB each, station 4= Pave Knife laser designator pod, stations 7,8,9= one AIM-7E RHM each, station 6= ALQ-87 BJM pod. Use the F-4C data card for performance data. F-4D has ballistic bomb sights (-1) and is allowed to carry BG weapons and LP pods as depicted above. Conf. DT, load= 17.

6. F-4E loads: Stations 1,5= 1200L FT each, stations 2,4= two AIM-9J IRMs each, station 6= ALQ-87 BJM pod, stations 7,8,9= one AIM-7E2 RHM each. Conf.= 1/2, load= 14.

7. Victory: The USAF player must damage two of the three Paul Doumer bridge hexes (A2-1822 to A2-2021) and have more points overall to win.

8. Corridor Chaff: Prior to the arrival of the current three flights, two flights of F-4 chaff bombers had succeeded in laying a corridor of chaff into which ground and air radars could not see into. The chaff corridor starts in hexes A1-1904 and A1-2004 and extends straight North to hexes A2-1925 and A2-2025. The corridor exists from alt. level 3 to alt. level 15 and any aircraft in the corridor cannot be locked onto or tracked by SAM or aircraft radars, nor can FCRs aid AAA shots at aircraft in the corridor.

9. Advanced Rules:

- Weather: Clear.
- Crew quality: All R.
Roll for attributes and characteristics.
Neither side may have tactics masters.
- Terrain: Ignore all contours and ridgelines, the area is flat with ground level= 0.
- Fuel: MiG starts= 200, bingo= 100.
EF-105 start= 350, bingo= 200.
F-4 starts= 400, bingo= 280.
USAF Aerial Tanker Availability = 8.
- ECM: No aircraft carry decoys.

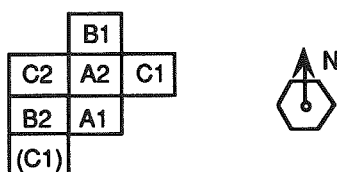
10. Recommended Variation: Try this as a Navy strike with the following aircraft:

- Two A-7Es for Iron Hand carrying two AGM-45s and two CBU-71s apiece plus 8 chaff and 8 flare decoys.
- Four A-6Es as bombers each with two AGM-62 Walleye-I glide bombs apiece plus 8 chaff and 8 flare decoys.
- Two F-4Js carrying two 1200L FTs, four AIM-9H IRMs and four AIM-7E2 RHMs. The Phantoms have no decoys.

Scenario V-25: Linebacker-III! Enter the BUFFs! December 1972

Background: For an intense 11 day period, American B-52 bombers were committed to attacks on Hanoi and surrounding areas. They came in at night in trains of three plane cells, supported by heavy jamming and defense suppression aircraft. Each BUFF could carry eightyfour 500lb. bombs and they literally flattened entire military complexes, airfields, and storage areas. Despite shooting down 15 B-52s, the North Vietnamese were unable to stand up to the assault and by the end of the campaign, their defenses had crumbled and U.S. aircraft were roaming freely about their country. This cracked them and they finally sued for peace. A month later, America's involvement in Vietnam had effectively ended and President Nixon commenced the withdrawel of U.S. troops which lasted until late 1973.

Maps:



Note: Once USAF aircraft have exited map C1 East of A2, shift map C1 to under B2.

Ground Targets: Two large buildings (warehouses); one each in A2-2223, 2224. Two POL markers, both in A2-2425. All runway hexes in megahex A2-2523. Two hangars, one each in A2-2423, 2523. One tower in A2-2225.

NVA AAA / SAM defenses: as in Scenario V-24.

MiGs: Two MiG-21PFs, set up in any hex of megahex B2-4026 facing NE at any allowed speed and altitude.

USAF / USN Aircraft: The U.S. player has three flights of attackers which enter play one flight at a time on game-turns 1, 3, and 5 respectively. They enter at any allowed speed and altitude from the East edge of map C1. The flights consist of the following aircraft:

- 1) Two F-105G wild weasel or two A-6B Intruders.
- 2) Two F-111A, or two A-6E Intruders.
- 3) Three B-52D Stratofortress.

Game Length: 30 game-turns.

Notes:

1. The scenario is intended as a night scenario utilizing advance rules 30. It may be played as a day scenario but expect increased U.S. losses due to AAA.

2. All aircraft begin play unsighted, the MiGs are silver, the USN jets are uncamoouflaged, and the rest are camouflaged.

3. Crew Quality: Generate all aircrew from Average table.

4. NVA Aircraft Loads: MiGs stations 1,3= AA-2B IRM, station 2= 600L FT, Conf.= DT, load= 5.

5. F-105G loads: Stations 1,5= AGM-45 ARM each, station 2= ALQ-87 BJM, station 4= AGM-78 ARM, station 3= 2200L FT. Conf.= DT, Load= 15.

6. A-6B loads: Stations 1,5= AGM-78 ARM each, stations

2, 3, 4= TR with three CBU-71 each, Conf.= DT, load= 27. A-6E loads: stations 1, 2, 4, 5= TR plus three MK.83 1,000lb. HE each. Conf.= DT, load= 28.

7. F-111A loads: Stations 2, 3, 7, 8= TR plus three CBU-58 each, station 4= ALQ-71 BJM pod, station 6= ALQ-83 DJM pod, conf.= DT, load= 32.

8. BUFF loads: Stations 2, 4= two MR each, holding 12 MK.82 500lb. HE bombs, station 3 (bomb-bay)= 84 Mk.82 500lb. HE bombs, stations 1, 5= one BUFF FT each (10,000lbs.). Conf. = DT. load =78.

9. Victory: The side with the most points wins, however the listed ground targets are worth double points if damaged by B-52 bombs.

10. **Special Rule: BUFF CARPET BOMBING** - On the turn they drop bombs, B-52s may not change altitude or heading. They may however, drop bombs in more than one hex during their move (in up to six hexes). In the first hex bombed, a primary target is designated and the number of bombs dropped on it is announced. All other hexes bombed that turn will receive an equal number of bombs (unless the B-52 runs out first in the last hex). Attacks are resolved normally. Aiming is only required for the first target hex in a string. If the BUFF moves onto a hexline while carpet bombing, the player must declare which hex on either side of the line the bombs will fall into. That side remains constant should the Buff enter additional hexsides in its run that turn.

11. Advanced Rules:

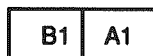
- a) Weather: Generate from S.E. Asia table.
- b) Terrain: Ignore all contours, and ridgelines, the terrain is flat with ground level= 0.
- c) Fuel: B-52; unlimited.
F-105 start= 500, bingo= 200.
F-111 start= 750, bingo= 400.
A-6 starts= 350, bingo= 250.
MiG start= 200, bingo= 100.
USAF/USN Aerial Tanker Availability = 7.
- d) ECM: The A-6 Intruders carry 10 chaff and 5 flare decoys, the BUFFs have full decoys as per ADC.

12. Recommended Variation: Try using B-52Gs with their improved ECM though smaller bomb load.

Epilogue Scenario: Attack on Tan Son Nhut! 28 April 1975

Background: Within a year and a half of America's pull out from Vietnam, the poorly led ARVN forces collapsed while under pressure from a major North Vietnamese Army offensive. The NVA had recovered from Linebacker and being liberally supplied with new arms from China and Russia, they were unstoppable. During their drive towards Saigon they overran several airbases capturing many South Vietnamese aircraft. On 28 April, North Vietnamese pilots, led by a South Vietnamese defector, flew 3 captured A-37Bs on a daring raid on Tan Son Nhut airfield. The jets made several passes destroying a dozen aircraft before fleeing to safety. The startled South Vietnamese launched two F-5s in pursuit but failed to catch the raiders. Within a month, the conquest of South Vietnam was complete. The War was over.

Maps:



Ground Unit Set Up: Hangars x 2, both in A1-1405, tower x 1 in A1-1305, POL x 1 in A1-1306, C-130 aircraft x 2, both in A1-1304. F-5A x 4, two in A1-1405, and two in A1-1304.

AAA set up: ZPU-1 14.5mm AAA x 3 (simulating .50 cal M.G.s), one each in A1-1204, 1504, and 1306.

Alert Fighters: The two F-5s in 1304 represent single jets ready to scramble. The F-5s may take off once alerted, see notes below.

NVAF A-37s: Three Dragonflies set up one per hex in any hex of megahex B1- 4011, facing SE, at any altitude in the LO band, at speed 4.0.

Game Length: 30 game-turns.

Notes:

1. All aircraft are camouflaged. All begin unsighted. All aircraft on the ground, including the alert fighters, are treated as ground targets with a soft defense strength of 3 and a visibility range of 12.

2. Air to ground attack results of K, 2D, D and S translate into kill, cripple, heavy and light damage respectively on the alert fighters. The other aircraft counters represent groups of 3 aircraft, one of which is disabled with each D result on the counter. 5 V.P.s are awarded for each disabled aircraft. Normal V.P.s are awarded against the alert fighters.

3. Due to surprise, the ARVN AAA cannot fire at the A-37s until the game-turn after any A-37 makes an attack. After that they may fire freely.

4. Alert Jet Scramble. Roll one die for each alert jet at the beginning of each game turn. If the result is less than or equal to the current game turn number, that F-5 may scramble. A scrambling jet moves first in the game turn. On the first turn, it moves only one hex down the runway and is still considered a ground target. On the second turn, it moves another hex and is now considered an airborne target with a speed of 1.5 at "T" level. After that the F-5 moves and accelerates normally.

5. Aircraft Loads: F-5A stations 1,7= one AIM-9B IRM each. Conf. = CL, load= 2. A-37 stations 1,2,7,8= one 500lb. HE bomb each, stations 3,4,5,6 = one 750lb. Napalm each. Conf.= DT, load= 14.

6. Advanced rules:

- a) Weather: Clear.
- b) Crew Quality: Generate both sides from Poor table, except A-37 #1 is always at least an R pilot. Roll for attributes, no characteristics apply.
- c) Fuel: F-5 start= 210, bingo= 40.
A-37 start= 80, bingo= 40.

DESIGNER'S COMMENTS

AIR SUPERIORITY (AS), my first jet air combat game design, was published by Game Designer's Workshop in 1987 and has been enjoyed by the many gamers interested in military aviation ever since. A fair measure of its success is the large and dedicated following of enthusiasts it has generated and the many letters and comments I have received on a monthly basis.

I have always felt that a good air combat game should play swiftly, be fluid and that the game mechanics should work naturally so that the gamer is free to concentrate on the tactics of air fighting rather than the intricacies of moving game counters. AS went a long way toward fulfilling that goal. However, after three years of being in the market, numerous rules glitches had been identified plus, as usual, some errata that needed fixing. What resulted from the clean up effort was a new set of rules based on the original AIR SUPERIORITY game system but greatly improved. Dubbed the AIR POWER system, this set of game rules corrects all of the original glitches and forms the basis for an updated line of jet air combat games.

"...THE SPEED OF HEAT!" (TSOH) is the first of two new games which will cover modern air combat in full detail. In TSOH the so called "golden age" of jet aviation, the Fifties and Sixties is addressed. In this period, jets were not the all powerful machines they are today and the guided missile was still getting the bugs worked out of it. Air combat was of the more traditional tail chase variety requiring a willingness to get in close and fight it out "mano a mano" so to speak. Gamewise, this means less will depend on the luck of the die and more on the player's ability to maneuver his jet. The more modern oriented AS often turned into a duel of dice with numerous all aspect missiles darting across the board to face sophisticated jamming and decoy defenses from game-turn one on.

Not so with TSOH! The lack of all aspect weapons will force you to maneuver behind your foes to shoot and they will be anything but cooperative in this matter. You will also discover that the cannon is your most reliable armament and many times it will be the preferred weapon in the close-in battles that will result from trying to employ rear aspect missiles. As in real life, the truly successful players will be those who can maneuver in such a way as to continuously force opponents into predictable moves that are easily countered. In this manner, the hapless opponent is steadily manipulated into defeat over several game-turns via cause and effect moves; much like how a chessmaster defeats a lesser opponent.

TSOH offers a greater challenge for players with less reliance on good die rolls. Even though the early jet aircraft lack the sophisticated defenses of modern ones, their missiles are not so good that they can't be outmaneuvered or outrun! This will definitely present new and interesting challenges to both veteran AS players and TSOH beginners alike. Ever wonder what it would be like to be caught in a gunless Phantom next to a highly agile, and cannon armed MiG-17? Find out as you enjoy the game and learn some history in the process!

Sincerely, J. D. Webster

Ground Unit Victory Point Table

Unit Type	Kill	"2D"	"D"
-----------	------	------	-----

Target Markers:

Truck	4	2	1
Locomotive	12	8	4
Train	5	3	2
POL Marker	15	10	5
Small Bridge	6	3	1
Large Building	7	5	3
Aircraft Hangar	8	6	4
Tower	5	3	2
Sampam/Barge	4	2	1

AAA Units:

ZPU-1 14.5mm	3	2	1
ZPU-4 14.5mm	5	3	2
ZU-23 23mm	6	4	2
M-38 37mm	6	4	2
S-60 57mm	8	5	3
KS-12 85mm	9	6	5

Ground Units:

Infantry Platoon	5	3	2
Infantry with SA-7 *	9	6	3
Medium Armor	10	6	2

Radars and SAMs:

FCR - A and B	6	4	2
EWR - A and B	12	8	4
CCU Facility	10	6	4
SA-2B/C Guideline *	8	5	3

* Add 2 V.P.s for every missile destroyed or lost due to damage to the SAM equipped unit.

Terrain Hexes:

Railroad	5	3	2
Runway	8	6	4
Built Up Area	8	6	4
Urban/Village Area	2	1	0
Major Bridge **	30	20	10
Minor Bridge **	18	12	6
Small Bridge **	6	3	1

** A major bridge is one two or more hexes long. A minor bridge is one one hex long. A small bridge exists where roads cross streams and rivers without a bridge symbol depicted.

Aircraft Type	Kill	Cripple	Heavy	Light
B-29 or Tu-4	24	16	8	4
B-36 or Tu-95	30	20	10	5
O-1E Birdog	3	2	1	0
O-2A Skymaster	5	3	2	1
OV-10 Bronco	8	5	3	1
AC-130 Spectre	30	20	10	5
HH-53 Jolly Green	30	20	10	5

RANDOM AIRCRAFT MOVEMENT RULES

The following Tables provide randomly moving targets for practice scenarios. Randomly moving aircraft need only have their speed and altitude recorded each game-turn. A full log is not required. Randomly moving aircraft always move first.

To use the tables, reference the angle-off position an attacking missile or aircraft is in with regard to the randomly moving one. Roll one die and consult the appropriate column of the chart. The result will be a series of coded actions, separated by commas, that the randomly moving aircraft must perform. Aircraft perform as many commas worth of actions from left to right as it has speed points. The codes are as follows:

- H = Move forward one hex or hexside.
- L = Face left 30 degrees.
- R = Face Right 30 degrees.
- C = Climb one altitude level.
- D = Dive one altitude level.

Note: Damaged aircraft always perform one action less than their listed speed and have all "C" codes changed to "H".

RANDOM MOVEMENT TABLES

Die Roll Random Aircraft Moves

Attacker in Target's 150 to 180 Arcs

1, 2	=	H, H, H, HL, H, H
3, 4	=	H, H, H, HR, H, H
5, 6	=	H, HD, HD, HL, H, H
7, 8	=	H, DR, DD, H, H, H
9	=	H, DDL, H, DD, H, H
10	=	H, DDR, H, DD, H, H

Attacker in Target's 90 to 120 Arcs

1, 2	=	H,H,HL,H,HL,H
3, 4	=	H,H,HR,H,HR,H
5, 6	=	H,C,HL,CL,H,H
7, 8	=	H,CR,H,CR,H,H
9	=	H,DD,DL,H,HL,H
10	=	H,DD,DR,H,HR,H

Attacker in Target's 60 or Less Arcs

1, 2	=	H,HL,HL,H,HL,H
3, 4	=	H,HR,HR,H,HR,H
5, 6	=	H,HL,CL,H,H,HL
7, 8	=	H,HR,CR,H,HR,H
9	=	H,HL,DD,DL,H,HL
10	=	H,HL,DD,DR,H,HL

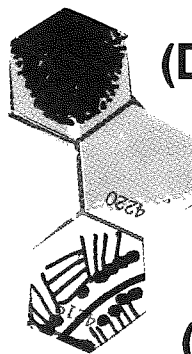
Acknowledgments

I would like to thank the following people who devoted a lot of time and effort into helping me prepare this booklet.

- Bob Gross: For his historical background research and draft outlines which I used to do my write ups.
- Tim Tynan: For his tireless proofreading, grammar correcting and scenario playtesting.
- Tony Stanfl: For his excellent artwork.
- Phil Boinske: For his moral support and continuous encouragement and for publishing this whole thing!



**FIELDS
(CLEAR)**



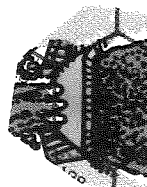
**LEVEL 3
(DK. GREEN)**

**LEVEL 2
(BROWN)**

**LEVEL 1
(LT. GREEN)**



RAIL YARD



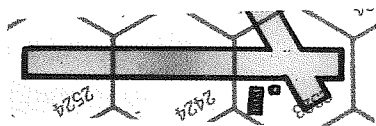
**HO CHI MINH
MEMORIAL DAM**



VILLAGE/TOWN/CITY



WOODS



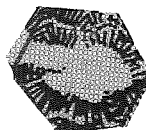
AIRFIELD



**RIVER
(BLUE)**

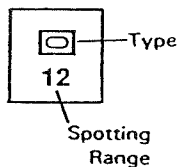


BRIDGE



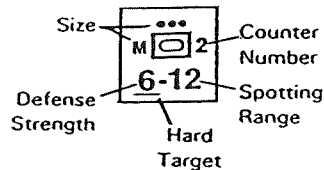
RIDGE

Front



Ground Units

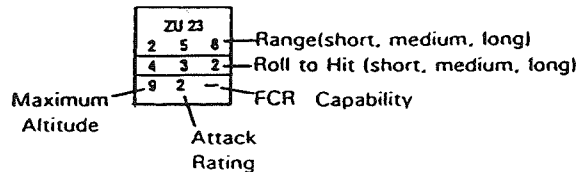
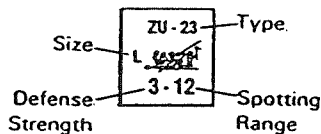
Back



Unit Type

- Infantry
- Armor
- Artillery
- Transports

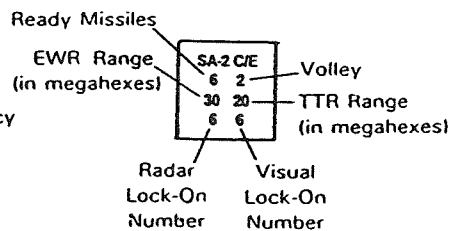
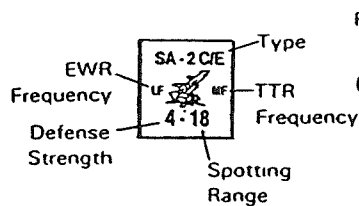
AAA Units



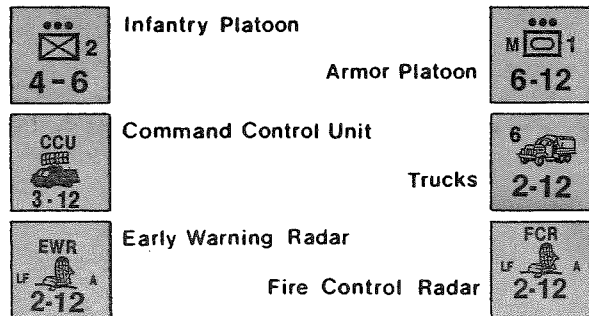
Unit Size

- • Team
- • • Platoon
- I Battery
- L Light
- M Medium
- H Heavy

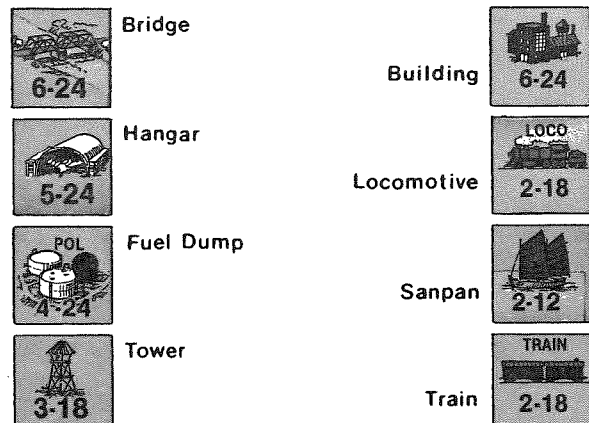
SAM Fire Units



GROUND UNITS



TARGETS



MARKERS



AIR POWER! RADAR RANGE TABLES

RADAR CONTACT TABLE

RADAR STRENGTH	Die Roll or Less for Contact										
	10	9	8	7	6	5	4	3	2	1	0-
3	6	8	9	10	11	12	13	—	14	—	15+
6	12	15	18	20	22	24	26	28	29	30	31+
8	16	20	24	28	30	32	34	36	38	40	41+
10	20	25	30	35	38	40	42	45	48	50	51+
12	24	30	36	42	45	48	51	54	57	60	61+
15	30	38	45	52	56	60	64	68	72	75	76+
18	36	45	54	63	68	72	76	81	86	90	91+
20	40	50	60	70	75	80	85	90	95	100	101+
25	50	63	75	87	94	100	106	113	119	125	126+
30	60	75	90	105	113	120	128	135	143	150	151+
40	80	100	120	140	150	160	170	180	190	200	201+
50	100	125	150	175	188	200	213	225	238	250	251+
EWR	150	188	225	263	280	300	319	338	356	375	376+

Above = Maximum Range in Hexes for each Column

1. No Aircraft may contact targets at a range greater than the maximum listed on its ADC.
2. Regular A/C radar may not detect or track tgt.s within 4 levels of ground unless searcher is at lower altitude.
3. If tgt. below searcher & within 10 levels of ground, diff. in alt. between the A/C must be < tgt.'s alt. above ground.
4. Lookdown radar may ignore cases 2 & 3. Boresight radar may ignore case 3 against visually sighted targets.

RADAR SEARCH MODIFIERS

1. AJM # - Air Radar or EWR ECCM.
2. BJM # - Air Radar or EWR ECCM.
3. CHAFF PPL Effectiveness No.
4. Mini-Jammer PPL Effectiveness No.
5. A/C Size Modifier from ADC.
6. +4 if A/C has Stealth Technology.
7. Tactics Master or Veteran = -1 (-2 if both).
8. Novice = +1, Green = +2.

RADAR BORESIGHT MODE

1. Radar Arc = Limited.
2. Max Range = Search Strength No.
3. Previous contacts and locks lost when mode declared.
4. Nearest Visually sighted target in A/C's Limited arc automatically contacted.
5. Lock-on roll allowed, no mnvr. limitations.

RADAR AUTO-TRACK MODE

1. Radar Arc = 180 + unless normally it's limited; in which case it remains limited.
2. Max Range = Search Strength No.
3. Nearest target in radar arc is automatically contacted.
4. If nearest A/C was a friendly with IFF on, it may be ignored and next nearest is automatically contacted etc.
5. A visually sighted aircraft in arc may be selected for auto contact if not the closest by rolling 7 or less.
6. Lock-on roll allowed, no mnvr. limitations..
7. Previous contacts and lock-ons lost when mode declared.

BREAKING RADAR LOCK-ONS

Locks are broken when: 1). A/C stalls, departs, or becomes engaged. 2). A/C does ET turns, Viffs, or does other than vertical rolls. 3). A/C takes H or C hit, or radar operator GLOCs. 4). Target cannot be kept in radar arc while Illuminating. 5). Target deploys decoys and rolls effectiveness # or less. 6). Target employs EW jammers and makes break lock die roll.

RADAR SEARCH LIMITATIONS

1. Pilot Only A/C may not search if they:
 - a). Snap-turned or turned at HT or greater rate.
 - b). Fired Guns or made an air to ground attack.
2. Multi-crew A/C may not search if they:
 - a). Snap-turned or turned at BT or greater rate.
3. Neither type A/C may search if they:
 - a). Are stalled, departed, or engaged.
 - b). Performed more than one vertical roll in the turn.
 - c). Performed any other roll types or Viff maneuvers.
 - d). Did an Unloaded Dive or Damage Control.
 - e). Were Hit and "H" or greater damage ensued.
 - f). Had their radar operator go into GLOC.

Note: Boresight and Auto-Track Modes allow maneuver restrictions to be ignored but not attack, damage, or operator GLOC restrictions; these always apply.

RADAR VERTICAL LIMITS TABLE

Type Radar	Vertical Dive	Steep Dive	Level Flight	Sust. Climb	Zoom Climb	Vertical Climb
Limited	-2, -9	-5, -3	+ .5, - .5	+ 2, + 0	+ 4, +.5	+ 9, + 2
180+	-1, -X	-0, -5	+ 1, - 1	+ 3, -.5	+ 5, + 0	+ X, + 1
150+	-.5, -X	-0, -8	+ 2, - 2	+ 4, - 1	+ 8, + 0	+ X, +.5
120+	-0, -X	+.5, -X	+ 4, - 4	+ 6, - 2	+ X, -.5	+ X, + 0

Note: X = infinity. Above numbers = upper and lower altitude limits of target in terms of levels above / below searcher, per hex of range away from searcher based on searcher's flight type

AIR POWER! PILOT/CREW QUALITY TABLES

PILOT/CREW GENERATION TABLES

NATIONAL TRAINING STANDARD

Quality	Excellent	Good	Average	Limited	Poor
Veteran	1 - 3	1 - 2	1	1	NA
Regular	4 - 8	3 - 7	2 - 6	2 - 4	1 - 4
Novice	9 - 10	8 - 9	7 - 9	5 - 8	5 - 7
Green	NA	10	10	9 - 10	8 - 10

- Roll one die per aircrew; reference training standard and roll to find crew quality at left. Example; die roll of "6" under Good = Regular.

AIRCREW ATTRIBUTES DETERMINATION

Attr. Level	Eyesight	Fitness	Confidence
Excellent	1 - 2	1 - 3	1 - 2
Average	3 - 9	4 - 8	3 - 8
Poor	10	9 - 10	9 - 10

- Roll once per attribute per aircrew; cross reference as above to find level of attribute (either excellent, average, or poor).
- Excellent Eyesight = -1 and Poor Eyesight = +1 for sighting die rolls.
- Excellent Fitness = +1 and Poor Fitness = -1 for GLOC and Post-Egress Fate die rolls.
- Excellent Confidence = +1 and Poor Confidence = -1 to Initiative, Departure and Post-Egress Fate die rolls.

AIRCREW SPECIAL CHARACTERISTICS DETERMINATION

Crew Quality	Sierra Hotel	Tactics Master	Combat Hero
Veteran	1	1 - 3	1 - 2
Regular	1	1 - 2	1
Novice	1	1	NA

- Roll once per characteristic per Veteran, Regular, and Novice aircrew. Result <= to above number gives them the characteristic.
- Tactics Master acquisition modifiers = -1 if Training Standard = Excellent; +1 if Training Standard = Limited or Poor.

PILOT/CREW ABILITY MODIFIERS SUMMARY TABLE

Action	Spec. Characteristic			Crew Quality			
	S.H.	T.M.	C.H.	Vet.	Reg.	Nov.	Green
Initiative	+1	+1	+1	+1	0	-1	-2
Sighting	0	-1	0	0	0	+1	+2
Radar Use	0	-1	0	-1	0	+1	+2
Wpn. Launch	0	-1	-1	-1	0	0	+1
Gun & Atg Attack	0	0	-1	-1	0	+1	+2
Departure	+1	0	0	+1	0	-1	-2
Recovery	-1	0	0	-1	0	0	+2

- Sierra Hotel pilot increases position of advantage one level.
- These modifiers are also shown on the other play aids charts.

LOSS OF AIRCREW V.P.S FOR CAMPAIGN SCENARIOS

Crew Quality	Killed	FATE M.I.A.	P.O.W.
Green	6	2	10
Novice	8	4	10
Regular	10	6	12
Veteran	15	8	15
Combat Hero	+6	+2	+10

EJECTION / BAIL-OUT SUCCESS TABLE

Aircraft Damage	TYPE EJECTION SEAT			
	None	Early	Standard	Advanced
None	7	8	9	9
L, or 2L	6	7	8	9
H, or C	5	6	7	8
Kill by Progressive Damage die roll.	3	5	6	8
Kill by weapon with attack rating of 6 or less.	2	4	6	7
Kill by weapon with attack rating of 7 or more.	1	2	4	6

- Roll one die when egressing. If result, after applying modifiers is <= to above numbers; Egress succeeds.
- Bail-outs allowed only if speed <= 4.0 and if A/C was destroyed, only if at least 4 levels above ground.

Ejection / Bailout Die Roll Modifiers:

1. Aircraft at T-Level = +2
2. Aircraft 1 or 2 levels above ground = +1
3. Aircraft Speed <= 3.0 at egress = -1
4. Aircraft Speed >= 5.0 at egress = +1
5. Aircraft Speed >= High Mach at egress = +3

POST EGRESS FATE TABLE

Die Roll:	1 - 2	3 - 5	6 - 10
Fate:	M.I.A.	P.O.W.	Rescued

Fate Die Roll Modifiers:

1. Crew Egressed over friendly territory = +2.
2. Crew Egressed over enemy territory = -2.
3. Dedicated search and rescue forces available = +2.
4. Excellent fitness = +1. Poor fitness = -1.
5. Excellent Confidence = +1. Poor Confidence = -1.

PILOT QUALITY FLIGHT RESTRICTIONS

- Green:
1. No ET turns, no Snap turning.
 2. No T-level flight, no Viff maneuvers.
 3. No VTOL flight, no Vert. Rev. maneuvers.
 4. May not use High Pitch Rate A/C abilities.
 5. May not engage attacking missiles.
 6. Risks disorientation for rolling maneuvers.
 7. Risks disorientation for Vert. climbs/dives.
 8. -2 die roll modifier for GLOC.

- Novice:
1. No Vertical Reverse maneuvers.
 2. May not use High Pitch Rate A/C abilities.
 3. Risks disorientation for Vertical rolls.
 4. -1 die roll modifier for GLOC.

PILOT DAMAGE CONTROL RESTRICTIONS

- Green: May do damage control only if in multi-crew A/C and other crewmember is Reg. or Vet. In this case damage control is as for Novice.
- Novice: Must perform damage control for two turns in a row to complete unless in multi-crew A/C and other crewmember is Reg. or Veteran. In this case damage control is done normally.

AIR POWER! ELECTRONIC WARFARE TABLES: PAGE 1

BJM STAND-OFF JAMMING TABLE

BJM Type	Allowed Stand-Off Attacks Pilot Only / Multi-Crew A/C		Angle-Off Coverage
A	1	1	180+ and 30-
B	2	2	150+ and 60-
C	2	3	As B, or into any 3 adjacent arcs.
D	2	4	As B, or into any angle-off arcs.

Jamming Success Die Roll = BJM No. - Radar ECCM.

Note: Noise Jamming Arcs = as for A, B, C above.
Treat a BJM D as a C when noise jamming.

BJM PROGRAMMING FLEXIBILITY

TYPE	PROGRAMMING OPTIONS
A	Pick Frequencies and Mode before play.
B	Pilot Only: as "A". Multi-crew: may pick Frequencies and Mode during Aircraft Decisions Phase of game-turn.
C	Pilot Only: as for Multi-crew above. Multi-crew: Same as above.
D	Pilot Only and Multi-crew: may change Frequencies and Mode at start of SAM Interaction Phase.

EWR PASSDOWN MODIFIERS

1. Target IFF is On = - 2
2. Target AJM is On = + AJM No. - EWR ECCM.
3. BJM Noise in effect = + BJM No. - EWR ECCM.
4. Tgt. DDS Prog. On = + Chaff and/or Mini-jammer effectiveness numbers.

Note: If multiple BJMs are in play, consider only the most effective one against the radar.

RADAR SAM UNIT LOCK-ON MODIFIERS

1. Target IFF is On = - 2
2. CCU inoperative = + 2
3. Passdown recieved = - 3
4. Tgt. DDS Prog. On = + Chaff and/or Mini-jammer effectiveness numbers.
5. Target AJM is On = + AJM No. - TTR ECCM.
6. BJM Noise in Effect = + BJM No. - TTR ECCM.

Note: If multiple BJMs are in play, consider only the most effective one against the radar.

IR, OG, LG SAM UNIT LOCK-ON MODIFIERS

1. Associated CCU inoperative = + 2
2. Unit in Target's SUN Clutter = + 3

DECOY PPL EFFECTIVENESS TABLE

DDS Program		EWR Passdown Modifier and TTR Lock-on Modifier					TTR Break-Lock No.		Air Radar Search and Lock-on Modifier		Air Radar Break-lock No.	
Chaff PPL #	Mini-jam. PPL #	RADAR FREQUENCY					SAM Type		TYPE		TYPE	
		LF	MF	HF	VF	MW	BR/CG	CW/TVM	Lim./180	150/120	Lim./180	150/120
1	-	1	1	-	-	-	-	-	1	-	1	-
2	1	2	1	1	-	-	1	-	1	1	1	1
3	-	2	2	1	1	1	2	1	2	1	2	1
4	2	3	2	1	1	1	3	1	2	2	2	2
5	3	3	2	2	2	1	3	2	3	2	3	2
6	4	3	3	2	2	2	4	2	4	3	4	3
-	5	4	3	3	2	2	5	3	4	3	5	3
-	6	4	4	3	3	2	5	4	4	4	6	4

RWR AND INTERNAL DJM / AJM COVERAGE TABLES

RWR or Jammer Type	Detectable and Jammable Radar Frequencies												RWR also Detects					
	EWR			FCR				TTR					SAM Launches				AIR Search	AIR Lock
	LF	MF	HF	LF	HF	VF	MW	LF	MF	HF	VF	MW	BR	CG	CW	TVM		
A	X	-	-	X	X	-	-	X	X	X	-	-	X	X	-	-	-	X
B	X	X	X	X	X	X	-	X	X	X	-	-	X	X	-	-	-	X
C	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	-	X	X
D	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

- Notes 1. "X" indicates radar operating in that frequency is detectable to RWR and vulnerable to DJMs and AJMs.
2. DJM and AJM pods have their frequency capabilities listed in the external stores tables under EPs.
3. Internal DJMs A and B cannot break CW or TVM lock-ons. Internal DJM C cannot break TVM lock-ons.

AIR POWER! ELECTRONIC WARFARE TABLES: PAGE 2

SAM UNIT BREAK-LOCK TABLE

SAM Type	ECM Type	BREAK-LOCK Die Roll Number
BR, CG	DJM - A, B, C, D	DJM No. - TTR ECCM
CW	DJM - C, D	DJM No. - TTR ECCM
TVM	DJM - D	DJM No. - TTR ECCM
BR,CG,CW,TVM	CHAFF	Decoy Effectiveness #
BR,CG,CW,TVM	Mini - Jammer	Decoy Effectiveness #
BR, CG	AJM	1/2 AJM No. - TTR ECCM
CW, TVM	AJM	No Break-lock Capability
OG, LG	FLARE	"1" If any PPL # in Effect.

Notes: 1. Round up all half values.

2. Some DJM - A, B and some AJM pods may be noted as effective against CW and TVM SAMs, see EP tables.

AIR RADAR SEARCH AND LOCK-ON MODIFIERS

ECM Type	Die Roll Modifiers
CHAFF	Decoy Effectiveness No.
Mini - Jammer	Decoy Effectiveness No.
AJM	AJM No. - Air Radar ECCM
BJM Noise	BJM No. - Air Radar ECCM
Radar Using Boresight for lookdown + 2	

AIR RADAR BREAK LOCK TABLE

ECM Type	BREAK-LOCK Die Roll Number
CHAFF	Decoy Effectiveness No.
MINI-JAMMER	Decoy Effectiveness No.
DJM	DJM No. - Air Radar ECCM

VISUAL SIGHTING TABLES

RELATIVE RANGE EFFECTS

Visual Range in Hexes	=	0-3	4-6	7-9	10-12	13-15	16-20	21-30	31 +
Die Roll Modifier	=	-2	-1	0	+1	+2	+3	+5	+8
V.A.S. Range in Hexes	=	0-20	21-30	31-40	41-50	51-60	61-70	71-80	81 +
Die Roll Modifier	=	0	+1	+2	+3	+4	+5	+6	+8

PAINT SCHEME / POSITION / WEATHER EFFECTS

TARGET A/C POSITION:	Lower	Level	Higher	In Haze	In Stratus	Silh. by Cloud
Silver	= -2	-1	-1	+1	+3	-1
Uncamouflaged	= -1	0	0	+1	+3	-1
Camouflaged	= +1	0	-1	0	+3	-2
Low Vis. Grey	= 0	+1	+1	+2	+3	-1
A/C Smoking	= -1	-2	-2	NA	NA	NA

ADDITIONAL MODIFIERS

Number of A/C Searching: 1 or 2 = 0

3 or 4 = -1

5 to 8 = -2

9+ = -3

* Tgt. is just launched Missile or SAM

= -3

Multi-crew A/C Searching

= -1

* Tgt. is A/C which just launched Missile

= -3

Hud Interface Technology used

= -1

Tgt. is in all searcher's Restricted Arcs

= +2

Searcher has RWR indications

= -1

Searcher is Looking out of Stratus

= +2

Has Poor Eyes = +1

is Novice = +1

Searcher is Veteran and Tactics Master

= -2

Has Exc. Eyes = -1

is Green = +2

Searcher is Veteran or Tactics Master

= -1

* does not apply to smokeless missiles.

Target using DDS Flare program = + PPL No.

NOTE: All modifiers are cumulative. Disoriented or GLOC aircrew may not search.

SIGHTING RULES SUMMARY

Maximum Sighting Ranges

- by Eyeball = 4 x A/C Vis. No.
- by V.A.S. = 6 x A/C Vis. No.
- by V.A.S. with radar assist = 10 x A/C Vis. No.
- at Night = 2 hexes.
- at Night in A/B = 6 hexes.

Target I.D. Ranges

- by Eyeball = 2 x A/C Vis. No.
- by V.A.S. = 4 x A/C Vis. No.
- at Night = Same position, facing and speed required.
- With Tgt. I.D. radar technology available = 2d turn of Lock.

Padlocking (PL)

- One PL allowed per A/C.
- Two PLs if multi-crew A/C.
- No PLs allowed into blind arcs.
- No PLs by Novices or Greens.
- 1 extra PL per Vet. or Tac. Mstr.
- No PLs if in Target Sun Arc.

EXPANDED SEQUENCE OF PLAY

AAA Interaction Phase

1. Record target hex and altitude of plotted fire.
2. Place Barrage markers on units using Barrage fire.

SAM Interaction Phase

1. Attempt to reactivate shutdown radars (Die Roll 6 -).
 2. Attempt to shutdown alerted radars (Die Roll 6 -).
 3. Declare BJM Noise Jamming arcs.
 4. Execute BJM Stand-Off Jamming attacks.
- Multiple attacks against single radars allowed.
5. Attempt Quick Reaction SAM unit Lock-ons.
 6. Attempt SAM Missile Launches.
 7. Attempt EWR / CCU Passthroughs (Die Roll 7 -).
 8. Attempt Regular SAM unit Lock-ons.
 9. Roll to Break Radar SAM lock-ons with DJMs.
 10. Roll to Break Radar SAM lock-ons with Chaff and / or Mini-Jammers.
 11. Roll to Break OG / LG SAM lock-ons with Flares.
 12. Attempt Self-Defense ARM Launches.

Stalled Aircraft Phase

1. Attempt Recovery from Departures (Die Roll 6-).
2. Determine if Stalled Aircraft Depart (Die Roll 5-).

DEPARTED FLIGHT RECOVERY MODIFIERS:

Fly by Wire Aircraft	= - 2	Veteran Pilot	= - 1
Sierra Hotel Pilot	= - 1	Green Pilot	= + 2

AVOIDING DEPARTED FLIGHT MODIFIERS:

Fly by Wire Aircraft	= + 2	Veteran Pilot	= + 1
Sierra Hotel Pilot	= + 1	Exc. Conf. Pilot	= + 1
Poor Conf. Pilot	= - 1	Novice Pilot	= - 1
Green Pilot	= - 2		

Visual Sighting Phase

1. Ground FACs place Laser Spots and Smoke Marks.
 2. Check lines of sight if necessary.
 3. Declare aircraft searching for ground units.
 4. Determine which ground units are openly sighted.
 5. Attempt to sight camouflaged units.
(1/2 sighting range, Die Roll 5-)
 6. Roll to I.D. Ground units (Die Roll 10 - range to unit).
 7. Announce Padlocked targets.
 8. Enemy aircraft or missiles not padlocked are unsighted; roll for each unsighted target to see if it is sighted anew.
 9. Check for aircraft I.D.
- Count each 2 alt. levels difference as 1 hex of range if looking down and each 4 levels as 1 if looking up.
 - At Night, 2 alt. levels difference equal 1 hex of range if looking up or down.

Aircraft Decisions Phase

1. Declare DDS programs on or off.
2. Declare illuminating for RH/AH missiles.
3. Declare Engaging Missiles.
4. Declare Laser Designating aircraft.
5. Declare Target Marking FAC aircraft.
6. Declare special radar or weapons modes.
(IR Uncage, Autotrack on/off etc.)

Note: Damage Control is declared in Flight Phase upon commencing one's move.

Order Of Flight Determination Phase

1. Check Aircraft relative positions; determine who is Disadvantaged, non-advantaged, and advantaged.
- To be advantaged over target, target must be in your 150+ arc, within 9 hexes range, no more than 6 levels higher or 9 levels lower than you.
2. Roll one die per side to establish base initiative.
 3. Each aircraft uses base number plus any applicable modifiers. Low number in each category moves first. Ties are rolled off, no mods.apply.

INITIATIVE MODIFIERS TABLE

Training Standard		Pilot Quality		Pilot Char. / Attr.	
Excellent	+ 2	Veteran	+ 1	Sierra Hotel	+ 1
Good	+ 1	Regular	+ 0	Tactics Mstr.	+ 1
Average	+ 0	Novice	- 1	Cbt. Hero	+ 1
Limited	- 1	Green	- 2	Exc. Conf.	+ 1
Poor	- 2			Poor Conf.	- 1

Side gaining first Kill = +1, Side with most kills = + 1

Flight Phase

1. Move air to ground weapons not in shoot out.
 2. Move departed aircraft, then stalled aircraft.
 3. Move GLOC'd aircraft, then disoriented aircraft.
 4. Move Engaged aircraft.
 5. Move FAC aircraft marking targets.
 6. Move Joint Attack Laser Designating aircraft.
 7. Move aircraft guiding air to ground weapons.
 8. Move disadvantaged, non-advantaged then advantaged aircraft in order.
 9. Move unsighted but radar detected aircraft.
 10. Move unsighted and undetected aircraft.
- Missiles move when their targets do.
 - Illuminating aircraft move when their targets do.
 - Tailing aircraft move immediately after tailtees do.
 - Defensive Pre-emptions, and shoot-outs may alter the order of movement.

Air To Air Missile Launch Phase

1. Determine If launch prerequisites met.
2. Declare and attempt to launch one or two missiles.
3. If all declared attempts fail, one additional try allowed.

Air Radar Search and Lock-on Phase

1. Roll for radar contacts (4 rolls per turn per aircraft).
 2. Roll for radar lock-ons.
 3. Roll to break lock-ons due to DJMs.
 4. Roll to break lock-ons due to Chaff or Mini-jammers.
- Regular radars limited to one lock-on attempt per turn.
 - Multi-tgt. Track radars may make as many lock-on attempts as capability allows per turn.
 - Regular radars upon gaining lock, lose all other tgts.
 - TWS radars retain other targets even with a lock-on and may continue to search for more.
 - Limited TWS radars retain other targets with a lock but may not search for more.

Ground Unit Interaction Phase

1. Remove last game-turn's plotted fire markers.
2. Reveal target hex and alt. of this turn's plotted fire.
3. Resolve any plotted fire attacks and place markers.
4. Conduct ground unit movement allowed.
5. Resolve any required or permitted ground combat.

Aircraft Administrative Phase

1. Remove Missiles whose time of flight is ended.
2. Check for Progressive Damage.
3. Check for early recovery from GLOC.
4. Update Aircraft Logs as required.
5. Remove aircraft meeting disengagement criteria.

End of Turn Administrative Phase

1. Remove laser spots unless weapons still in flight.
2. Remove Blast Zone markers.
3. Remove Suppression Removal markers.
4. Remove Smoke-2 markers.
5. Flip Suppression markers to Suppr. Removal side.
6. Flip Smoke-1 markers to Smoke-2 side.
7. Flip Barrage fire markers to Out of Ammo side.
8. Roll for AAA resupply (Die Roll 2 -).
9. Roll for infantry SAM reloads (Die Roll 3 -).
10. Auto-reload capable SAM units that did not guide or launch missiles may reload up to two expended rails.

G-INDUCED LOSS OF CONSCIOUSNESS

- Check for GLOC if A/C turns at ET rate while in the LO, ML, or MH altitude bands.
- Roll one die after each facing at the ET rate for each crewmember. A "1" or less indicates he has GLOC'd.

Die Roll Modifiers

- | | | |
|--|---|-----|
| 1. Non-pilot Crewmember | = | - 1 |
| 2. A/C used Snap-turn this Phase | = | - 1 |
| 3. A/C has canted seat (i.e. F-16) | = | + 1 |
| 4. Crewmember has Exc. Fitness | = | + 1 |
| 5. Crewmember has Poor Fitness | = | - 1 |
| 6. 2d or subsequent GLOC die roll in GLOC cycle (cumulative) | = | - 1 |

- Cycle lasts until no BT / ET turns used in a game-turn.

GLOC / DISORIENTED FLIGHT TABLE

Die Roll	Aircraft Random Movement Based on Current Flight Type
----------	---

LEVEL FLIGHT

- | | | |
|----|---|---|
| 1 | = | Stay level, no turns. |
| 2 | = | Stay level, TT turn. |
| 3 | = | Stay level, HT turn. |
| 4 | = | Descend one level, TT turn as above. |
| 5 | = | Descend one level, HT turn as above. |
| 6 | = | Maximum Sustained Climb, EZ turn. |
| 7 | = | Maximum Zoom Climb, TT turn. |
| 8 | = | Minimum Zoom Climb, HT turn. |
| 9 | = | Maximum Steep Dive, HT turn. |
| 10 | = | Half Roll Dive, Minimum Vertical dive. Random Vertical Rolls. |

CLIMBING FLIGHT

- | | | |
|----|---|---|
| 1 | = | Maximum Sustained Climb, EZ turn. |
| 2 | = | Minimum Zoom Climb, HT turn. |
| 3 | = | Maximum Zoom Climb, no turns. |
| 4 | = | Maximum Zoom Climb, TT turns. |
| 5 | = | Minimum Vertical Climb, no Vert. Rolls. |
| 6 | = | Maximum Vert. Climb, random V- Rolls. |
| 7 | = | Level flight, TT turns. |
| 8 | = | Level flight, HT turns. |
| 9 | = | Half Roll Dive, Minimum Steep Dive. |
| 10 | = | Half Roll Dive, Maximum Steep Dive. |

DIVING FLIGHT

- | | | |
|----|---|---|
| 1 | = | Level flight if able or meet Steep Dive requirements while exiting Vertical Dive. |
| 2 | = | As above plus TT turns. |
| 3 | = | As 1 above plus HT turns. |
| 4 | = | Minimum Steep Dive, no turns. |
| 5 | = | Minimum Steep Dive, TT turns. |
| 6 | = | Minimum Steep Dive, HT turns. |
| 7 | = | Maximum Steep Dive, TT turns. |
| 8 | = | Maximum Steep Dive, HT turns. |
| 9 | = | Minimum Vertical Dive, random V-rolls. |
| 10 | = | Maximum Vertical Dive, random V-rolls. |

DIRECTIONS

- Expend all remaining FPs via directions above, it is allowed to switch between climbs and dives in mid-move if required. Randomly determine direction of turns. Random vertical rolls occur on last VFP only, roll for direction and number of facings.
- For climbs and dives use maximum allowed VFPs. A maximum climb/dive means each VFP gains max possible levels. Minimum means each gains least amount possible.

RECOVERY FROM GLOC

- Automatic during admin phase of 2d game turn following the one in which GLOC occurred.
- Early recovery possible in admin phase of game turn of GLOC occurrence and in the admin phase of the turn following if crewmember has excellent fitness, or is in multi-crew A/C where other member not GLOC'd. Die roll of 4 or less equals early recovery.

MISSILE DATA TABLES: PAGE 1

"The Speed Of Heat!"														Launch Envelopes			Base Speed & Sustainer			Act. Homing			Die Roll to Hit		Attack Rating	
U.S. Air to Air Missiles			Weight	Load	Seeker	Launch G	Lau. Roll	Turn Rate	Flight Time	Visibility	ECCM #	Chaff #	Flare #	Front 150-180	Side 90-120	Rear 0-60							Direct	Prox.	Direct	Prox.
Year	Type	Name																								
1956	AIM-4A	Falcon	130	1	RH	EZ	7	HT/2	1	7	-	5	-	18 - 9	15 - 6	15 - 4	16 - 0	-	-	-	-	-	5	-	6	-
1956	AIM-4B	Falcon	130	1	E	TT	7	HT/2	1	7	-	-	6	NA	NA	12 - 2	16 - 0	-	-	-	-	-	5	-	6	-
1957	AIM-4C	Falcon	130	1	I	TT	7	BT/2	1	7	-	-	5	NA	NA	12 - 2	16 - 0	-	-	-	-	-	6	-	6	-
1963	AIM-4D	Falcon	140	1	M	TT	7	BT/2	1	7	-	-	5	NA	15 - 4	18 - 2	18 - 0	-	-	-	-	-	6	-	6	-
1958	AIM-4E	Super Falc.	150	1	RH	TT	7	BT/2	1	7	-	4	-	24 - 6	18 - 6	18 - 4	18 - 0	-	-	-	-	-	6	-	7	-
1959	AIM-4F	Super Falc.	150	1	RH	TT	8	BT/2	1	7	1	4	-	24 - 6	18 - 6	18 - 4	18 - 0	-	-	-	-	-	6	-	7	-
1959	AIM-4G	Super Falc.	150	1	M	TT	8	BT/2	1	7	-	-	5	NA	15 - 4	18 - 2	18 - 0	-	-	-	-	-	6	-	7	-
1960	AIM-26A	Nuc. Falcon	200	1	RH	TT	8	BT/2	2	8	-	-	-	24 - 9	18 - 9	18 - 6	16 - 0	-	-	-	-	-	Nuclear Warhead			
1960	AIM-26B	Super Falc.	260	1	RH	TT	8	BT/2	2	8	-	4	-	24 - 9	18 - 9	18 - 6	16 - 0	-	-	-	-	-	4	8	6	4
1956	AIR-2A	Genie	825	2	—	W.Lvl.	8	—	1	9	-	-	-	(See Adv. Rule 9.6)			15 - 0	-	-	-	-	-	Nuclear Warhead			
1956	AIM-9B	Sidewinder	160	1	E	TT	7	HT/2	2	7	-	-	6	NA	NA	9 - 2	10 - 0	-	-	-	-	-	3	7	5	2
1962	AIM-9C	Sidewinder	190	1	RH	TT	6	HT/2	5	7	-	5	-	24 - 6	12 - 6	18 - 4	18 - 0	-	-	-	-	-	2	7	5	2
1965	AIM-9D	Sidewinder	200	1	I	TT	7	HT/2	5	7	-	-	5	NA	NA	12 - 2	18 - 0	-	-	-	-	-	7	-	7	-
1967	AIM-9E	Sidewinder	170	1	I	TT	7	BT/2	2	7	-	-	5	NA	NA	12 - 2	10 - 0	-	-	-	-	-	4	7	5	3
1968	AIM-9E2	Sidewinder	170	1	I	TT	7	BT/2	2	5	-	-	5	NA	NA	12 - 2	12 - 0	-	-	-	-	-	4	7	5	3
1967	AIM-9G	Sidewinder	190	1	M	HT	7	BT/2	5	7	-	-	5	NA	9 - 4	12 - 2	18 - 0	-	-	-	-	-	7	-	7	-
1970	AIM-9H	Sidewinder	185	1	M	HT	8	ET/2	5	7	-	-	5	NA	9 - 4	12 - 2	18 - 0	-	-	-	-	-	7	-	7	-
1975	AIM-9J	Sidewinder	175	1	I	HT	8	ET/2	3	7	-	-	5	NA	NA	12 - 1	16 - 0	-	-	-	-	-	5	8	5	3
1956	AIM-7A	Sparrow-I	300	1	BR	EZ	7	HT/2	5	8	-	5	-	NA	NA	15 - 4	8 - 0	-	-	-	-	-	2	7	6	4
1958	AIM-7C	Sparrow-III	400	1	RH	TT	7	HT/2	5	8	-	4	-	45 - 9	30 - 9	20 - 4	8 - 0	-	-	-	-	-	3	6	7	4
1960	AIM-7D	Sparrow-III	450	1	RH	TT	7	HT/2	5	9	-	4	-	45 - 9	30 - 9	20 - 4	10 - 0	-	-	-	-	-	4	7	8	4
1962	AIM-7E	Sparrow-III	450	1	RH	TT	7	HT/2	5	9	-	4	-	60 - 9	40 - 6	24 - 3	12 - 0	-	-	-	-	-	4	7	8	4
1970	AIM-7E2	Sparrow-III	450	1	RH	HT	8	BT/2	5	9	-	4	-	60 - 9	40 - 6	24 - 2	12 - 0	-	-	-	-	-	4	7	8	4
Russian Air to Air Missiles																										
1958	AA-1A	Alkali	200	1	BR	EZ	6	HT	2	7	-	5	-	NA	NA	12 - 3	6 - 0	-	-	-	-	-	2	6	6	4
1965	AA-1B	Alkali	200	1	RH	TT	7	BT	2	7	-	5	-	15 - 9	9 - 6	12 - 2	6 - 0	-	-	-	-	-	3	7	6	4
1960	AA-1C	Alkali	200	1	E	EZ	7	BT	2	7	-	-	6	NA	NA	9 - 2	6 - 0	-	-	-	-	-	2	6	6	4
1959	AA-2	Atoll	160	1	E	TT	7	HT/2	2	7	-	-	6	NA	NA	9 - 2	10 - 0	-	-	-	-	-	3	7	5	3
1966	AA-2B	Atoll	180	1	I	HT	7	ET/2	2	7	-	-	5	NA	NA	12 - 2	14 - 0	-	-	-	-	-	4	8	5	3
1967	AA-2-2	Adv. Atoll	200	1	RH	TT	7	BT	2	7	-	4	-	24 - 6	12 - 6	15 - 4	14 - 0	-	-	-	-	-	2	7	5	3
1962	AA-3A	Anab	600	1.5	I	TT	7	BT/2	4	9	-	-	5	NA	NA	18 - 4	10 - 0	-	-	-	-	-	3	7	9	4
1962	AA-3B	Anab	600	1.5	RH	TT	7	BT/2	4	9	-	5	-	36 - 9	24 - 9	21 - 4	10 - 0	-	-	-	-	-	3	7	9	4
1972	AA-3-2	Anab	600	1.5	RH	HT	8	ET/2	4	9	-	4	-	45 - 9	30 - 9	24 - 3	12 - 0	-	-	Y/N	-	-	4	8	9	4

NOTES: 1. Instant Arming Missiles are indicated by a boldface typed name. There are none in "The Speed Of Heat".
2. Lookdown Missiles are indicated by "()" around the Launch roll #. There are none in "The Speed Of Heat".

MISSILE DATA TABLES: PAGE 2

"The Speed Of Heat!"																		Die Roll to Hit		Attack Rating	
Russian Radar Guided SAMs					Guid. Mode	Launch Roll	Turn Rate	Flight Time	Visibility	ECCM #	Chaff #	Flare #	Act. Homing	Home On Jam	Boost Phase	Base Speed & Sustainer	Minimum Altitude	Direct	Prox.	Direct	Prox.
Year	Type	Name	Radar Freqs. EWR	TTR																	
1957	SA-2B	Guideline	LF	LF	CG	8	ET	5	10	-	5	-	-	-	15	18 - 2	2	2	7	10	5
1960	SA-2C	Guideline	LF	MF	CG	8	ET	5	10	-	4	-	-	-	15	20 - 2	1	2	8	10	5
1962	SA-2E	Guideline	LF	MF	CG	8	ET	5	10	1	4	-	-	-	12	20 - 2	T+3	2	8	10	5
1967	SA-2F	Guideline	LF	LF	CG	8	ET	5	10	1	3	-	-	-	12	18 - 2	T+3	3	8	10	5
Russian Optically Guided SAMs																					
1967	SA-2F	Guideline	LF	----	OG	8	BT	5	10	-	1	-	-	-	12	18 - 2	T+3	2	7	10	5
Russian IR Guided Infantry SAMs																					
1966	SA-7A	Grail	NA	NA	I	7	HT	1	6	-	-	5	-	-	-	8 - 0	T	5	6	4	2
1972	SA-7B	Grail	NA	NA	I	7	BT	1	6	-	-	5	-	-	-	10 - 0	T	5	7	4	2

NOTES: 1. No SA-2E SAMs were ever exported outside of the USSR.
2. No BR, CW, TVM, or Laser guided SAMs are in "The Speed Of Heat!".

3. The SA-2F is a dual guidance mode SAM with both radar and optical capabilities.
4. The infantry SAM's max lock-on range = 9 and visual lock-on die roll = 7 or less.

ARM CLASS WEAPONS

U.S. Anti-Radiation Missiles

Year	Type	Name	Weight	Load	Flight Time	Seeker Lock-On Arc	Range Min-Max	Lau. Roll	Speed	Attack Strength		Frequency Coverage					Self-Def. Mode	Target Switch	Target Memory
										Soft	Hard	LF	MF	HF	VF	MW			
1966	AGM-45	Shrike	400	2.0	5	Limited	6 - 24	8	12.0	6.0	4.0	X	X	X	-	-	No	No	No
1968	AGM-78	Std. ARM	1500	3.0	8	150 - 180+	6 - 60	8	14.0	8.0	4.0	X	X	X	X	-	No	Yes	No

- 1. Each AGM-45 Shrike must have one of the three listed frequencies selected for it before play; these cannot be changed. VF frequency can be selected after 1976.
- 2. Each AGM-78 Standard Arm must have one frequency selected before play, but A/C may change one AGM-78's frequency in each Aircraft Decisions Phase.
- 3. ARMs always attack land based radar equipped units (whether soft or hard targets) with their soft attack strength and Naval targets with their hard attack strength.

"The Speed Of Heat!" AIR TO AIR MISSILE NOTES:

1. AIM-4, AIM-26, Genie, AIM-9E, & AIM-9J missiles were used only by the USAF.
2. AIM-9C, AIM-9D, AIM-9G, & AIM-9H missiles were used only by the USN/USMC.
3. AIM-9C RHM's were used only on USN/USMC F-8 Crusader aircraft.
4. AIM-9G and AIM-9H missiles are IR Uncage Technology compatible.
5. AA-1 missiles were used by MiG-17PFU, MiG-19PFU, MiG-21PF and SU-9 A/C.
6. AA-2-2 RHM's may only be used on MiG-21MF, & MiG-21PFM A/C.
7. AA-3 missiles were used only by SU-11 A/C.
8. No Instant Arming, or Look Down missiles are depicted in "The Speed Of Heat!"

EXTERNAL STORES TABLES: PAGE 1

BB CLASS WEAPONS

Name	Type	Weight	Load	Attack Strength		Hi-Drag Option
				Soft	Hard	
U.S. Bombs (Korean War Era)						
M30	HE	100	0.5	1.0	0.0	N
M57	HE	250	1.5	2.0	0.5	N
M64	HE	500	2.0	3.0	1.0	N
M65	HE	1000	3.0	6.0	3.0	N
M66	HE	2000	4.0	10.0	6.0	N
M74	Incend.	100	0.5	1.5	0.0	N
M76	Incend.	500	1.5	4.0	0.5	N
BLU-1	Napalm	750	2.5	6.0	2.0	N

U.S. BOMBS (POST KOREA TO VIETNAM WAR ERA)

M117	HE	750	2.0	4.0	2.0	Y
M118	HE	3000	5.0	15.0	12.0	N
Mk-81	HE	250	1.0	2.0	0.5	Y
Mk-82	HE	500	1.5	3.0	1.0	Y
Mk-83	HE	1000	2.5	6.0	3.0	Y
Mk-84	HE	2000	3.0	10.0	6.0	N
BLU-10	Napalm	250	1.0	2.0	1.0	Y*
BLU-11	Napalm	500	1.5	4.0	1.0	Y*
Mk-77	Fire	750	2.0	6.0	2.0	Y*
Mk-79	Fire	1000	2.5	8.0	3.0	Y*
CBU-20	AT	500	1.5	2.0	4.0	Y (1960)
CBU-41	Napalm	850	2.0	4.0	2.0	Y (1960)
CBU-58	AP	800	2.0	6.0	0.5	N (1964)
CBU-59	Mixed	750	2.0	4.0	4.0	Y (1968)
CBU-71	AP	800	2.0	6.0	2.0	Y (1968)

RUSSIAN BOMBS

FAB-50	HE	110	1.0	1.0	0.5	N
FAB-100	HE	225	1.5	2.0	0.5	N
FAB-250	HE	550	2.0	3.0	1.0	N
FAB-500	HE	1100	3.0	6.0	3.0	N
FAB-750	HE	1650	3.5	8.0	4.0	N
FAB-1000	HE	2200	4.0	10.0	6.0	N
ZAB-100	Incend.	225	1.5	2.0	0.5	N
ZAB-250	Incend.	550	2.0	4.0	0.5	N
ZAB-1000	Incend.	2200	4.0	8.0	2.0	N
PLAB-250	Napalm	550	2.0	4.0	1.0	Y*

- 1. Napalm and fire weapon soft attack strengths are multiplied by 1.5 versus infantry in the open (not in bunkers or buildings).
- 2. Incendiary, napalm and fire weapons are double attack strength versus already damaged POL markers, buildings, and urban hexes.
- 3. Y* indicates a weapon is always Hi-Drag.
- 4. CBU (cluster bombs), napalm and fire weapons have "0" attack strength when used against runways, roads, bridges, dams, piers and rail lines.

BG CLASS WEAPONS

Name	Type	Weight	Load	Attack Strength		Hi-Drag Option
				Soft	Hard	
U.S. LASER GUIDED BOMBS (PAVEWAY-I Series 1968+)						
KMU-388	Mk-82 HE	550	2.0	3.0	2.0	N
KMU-342	M117 HE	800	2.5	4.0	3.0	N
KMU-421	Mk-83 HE	1050	3.0	6.0	4.0	N
KMU-351	Mk-84 HE	2100	3.5	10.0	6.0	N

- 1. Paveway-I series LGBs were introduced in Vietnam in 1971. Paveway-I series LGB may not be used for TOSS BOMBING attacks.
- 2. LGBs only get the -4 to the attack roll if laser spot on target at time of impact.

BS CLASS WEAPONS

Name	Weight	Load	Guid.	Range	Lau.	Attack Strength	
			Mode	Min-Max	Roll	Soft	Hard
U.S. SMART GLIDE BOMBS (AGM-62 Series)							
Walleye-I (1967)	1200	3.0	TV	2 - 18	7	6.0	6.0
Walleye-II (1974)	2400	4.0	TV	3 - 30	8	8.0	10.0

- 1. Walleye-I data-link (DP) guidance option available in 1969.
- 2. Walleye-II may be used with or without data-link option.

RK & RP CLASS WEAPONS

				Attack Strength	
Name	No. &Type	Weight	Load	Soft	Hard
U.S. ROCKETS					
HVAR	127mm	140	1.0	2.0	1.0
Tiny Tim	270mm	1200	3.0	4.0	4.0
U.S. ROCKET PODS (1955)					
LAU-68	7 x 70mm	250	2.0	3.0	1.0
LAU-3A	19 x 70mm	450	3.0	6.0	3.0
LAU-10	4 x 127mm ZUNI	550	3.0	4.0	4.0
LAU-37	7 x 127mm ZUNI	850	3.5	6.0	6.0
RUSSIAN ROCKETS					
S-8	80mm	25	0.5	0.5	0.5
TRS-190	190mm	100	1.0	1.5	1.0
ARS-212	212mm	260	1.0	1.5	2.0
S-24	240mm	350	1.5	2.0	2.0
EAST BLOCK ROCKET PODS (1960)					
UV-8-57	8 x 57mm	175	2.0	2.0	1.0
UV-16-57	16 x 57mm	300	3.0	4.0	3.0
UV-32-57	32 x 57mm	500	3.5	8.0	4.0

EXTERNAL STORES TABLES: PAGE 2

RG CLASS WEAPONS

Name	Weight	Load	Guid. Mode	Range Min-Max	Lau. Roll	Speed	Attack Soft	Strength Hard
U.S. GUIDED ROCKETS (AGM-12 Series)								
Bullpup (1959)	600	1.5	RCG	6 - 15	7	10.0	2.0	2.0
Bullpup-A (1960)	600	1.5	RCG	6 - 21	7	12.0	3.0	3.0
Bullpup-B (1960)	1800	3.0	RCG	6 - 30	8	12.0	8.0	6.0

AIRCRAFT ACCESSORIES

WEAPON RACKS "WR"

Type	Code	Weight	Load	Capacity
Dual Rack	DR	100	1.0	2 weapons up to 1100 lbs. each.
Triple Rack	TR	100	1.0	3 Weapons up to 1100 lbs. each.
Multi. Rack	MR	200	2.0	4 to 6 weapons up to 800 lbs. each.

- 1. All weapons on a rack must be identical.
- 2. DRs and TRs may carry BB, BG, RP, RK, & AGM-65 RG and RS weapons.
- 3. MRs may carry any BB class weapons.

U.S. SPECIAL RACKS

Missile-DR	MDR	100	1.0	Two Aim-9 Sidewinder missiles.
ARM-DR	ADR	200	2.0	Two AGM-45 Shrike ARMs.

AIRCRAFT GUN PODS

Type	Weight	load	"GP" Shots	Air to Air Roll to Hit	Attack Rating ATA	ATG
U.S. GUNPODS						
SUU-16 20mm Vulcan	(1966) 1600	4.0	6	6 - 4 - 3	6	6*
SUU-23 20mm Vulcan	(1970) 1700	4.0	6	6 - 4 - 3	6	6*
GPU-2/A Triple 20mm	(1966) 600	2.0	5	5 - 3 - 2	3	4*
Mk.4 Twin 20mm	(1964) 1400	3.5	5	6 - 4 - 2	5	5*
SUU-11B/A 7.62MM	(1965) 350	1.5	8	5 - 3 - NA	2	2**
.50 Cal. Single M.G.	(1960) 300	1.5	5	3 - 1 - NA	2	1**

RUSSIAN GUNPODS

GP-9 GSh Twin 23mm	(1970) 600	2.0	2	6 - 4 - 2	5	4
Ext. GSh Twin 23mm	(1971) 850	3.0	2	5 - 3 - 2	5	4

- 1. SUU-16 pod is powered by wind driven generator and will not fire unless A/C speed is 2.5 or more.

OTHER U.S. AIRCRAFT PODS

Name & Type	Code	Weight	Load	Notes:
SUU-25 Illumination Flare Pod	EP	400	1.5	4 x flare clusters
Pave Knife Laser Designator - B	LP	1000	3.0	(1969)
Pave Spike Laser Designator - B	LP	420	2.0	(1974)
Weapons Data Link Pod	DP	350	1.5	Used with Walleye-II

ELECTRONIC WARFARE PODS "EP"

Type	Class	Weight	Load	Rating	Frequency Coverage
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USAF ECM PODS

ALQ-71	BJM	500	2.0	A-3	Both LF and MF	(1967)
ALQ-72	BJM	500	2.0	A-3	Both MF and HF	(1968)
ALQ-87	BJM	500	2.0	A-4	Both MF and HF	(1968)
QRC-335	AJM	350	1.0	A-3	LF only	(1966)
ALQ-101	AJM	500	2.0	B-4	LF to VF, & Air Srch.	(1967)*
ALQ-81	DJM	500	2.0	A-3	Both LF and MF	(1966)
ALQ-83	DJM	500	2.0	B-3	LF, MF, and HF	(1967)*

USN / USMC ECM PODS

ALQ-31	BJM	600	2.0	A-3	Both LF and MF	(1965)
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U.S. IRM JAMMER PODS "EP"

Type	Class	Weight	Load	IRM & IR SAM Attack Modifiers:
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ALQ-123 IR-Jammer	500	2.0	+1 in 60 arc, +2 in 30 arc.	(1971)
ALQ-132 IR-Jammer	500	2.0	+2 in 30,60 & 90 arcs.	(1974)

- 1. ALQ-83 pod jams in all three frequencies at the same time.
- 2. ALQ-101 must choose any two of LF, MF, HF, and VF before play.

AIRCRAFT FUEL TANKS "FT"

Liter Capacity	Weight	Load Full	Points Empty	Fuel Points	Primary Users:
250L	550	1.5	1.0	24	All
400L	700	2.0	1.0	30	U.K., Russia
450L	800	2.5	1.5	40	U.K., Russia
600L	1100	3.0	2.0	50	All
700L	1300	3.0	2.0	60	U.S.
850L	1500	3.5	2.5	75	U.S., U.K., Russia
1000L	1800	3.5	2.5	85	U.S.
1200L	2200	4.0	2.5	100	All
1400L	2700	4.0	3.0	120	U.S.
1700L	3000	5.0	3.5	140	U.S., U.K., France
1900L	3500	6.0	4.0	175	U.S.
2200L	4500	8.0	5.0	200	U.S., NATO, Russia

**AIR TO AIR GUN AND
ROCKET ATTACK MODIFIERS:**

Aircraft Related:

Firer Snap Shooting	=	+ 1
Firer L or 2L damaged	=	+ 1
Firer H damaged	=	+ 2
Firer C damaged	=	+ 3
RE Radar Ranging	=	- 1
CA Radar Ranging	=	- 2
IG Radar Ranging	=	- 3
Each 1/3d FPs of SSGT	=	- 1
Target A/C Size	=	Var. +, -
Gunsight Turn Rate	=	Var. +, -

Angle-Off Related:

0 line	=	- 2	120 Arc	=	+ 4
30 Arc	=	+ 0	150 Arc	=	+ 4
60 Arc	=	+ 2	180 Arc	=	+ 3
90 Arc	=	+ 4	180 line	=	+ 2
Vertical Attack = + 2					

Crew Related:

Veteran Pilot	=	- 1
Combat Hero Pilot	=	- 1
Novice Pilot	=	+ 1
Green Pilot	=	+ 2

CUMULATIVE HITS EFFECTS

Three L	=	H Damage
Two H	=	C Damage
Two C	=	K Aircraft Killed
C + H	=	K Aircraft Killed

PROGRESSIVE DAMAGE TABLE

Current Damage	Die Roll or less	Increased Damage
L or 2L	2	H
H	3	C
C	4	K

AIRCRAFT DAMAGE TABLE

Die Roll	Weapon Attack Rating									
	1	2	3	4	5	6	7	8	9	10
0 -	K	K	K	K	K	K	K	K	K	K
1	C	C	K	K	K	K	K	K	K	K
2	H	H	C	K	K	K	K	K	K	K
3	L	H	H	C	K	K	K	K	K	K
4	L	L	H	H	C	C	K	K	K	K
5	L	L	2L	H	C	C	C	K	K	K
6	L	L	L	H	H	C	C	C	K	K
7	-	L	L	L	H	H	C	C	C	K
8	-	-	L	L	2L	H	H	H	C	C
9	-	-	-	L	L	2L	H	H	H	C
10+	-	-	-	-	L	L	2L	H	H	H

Damage Modifiers:

1. Shift one column right if aircraft already L or more damaged.
2. Shift one column left if hit was from gun snap shot.
3. - 2 to die roll if air to air rocket hit or direct hit from missile.
4. Plus or Minus Aircraft Vulnerability as listed on target ADC.

AIR TO AIR ROCKETRY TABLE

Range to TGT	Total Rocket Factors Fired									
	1	2	3	4	5	6	7	8	9	10
1 =	1	2	2	3	3	4	4	5	6	6
2 =	1	1	2	2	2	3	3	4	4	5
3 =	0	1	1	1	2	2	2	2	3	3
4 =	0	0	1	1	1	1	2	2	2	2
(above = die roll to hit numbers)										
Attack Rating =										
3	4	4	5	5	6	6	7	7	8	

Rocketry modifiers

1. If C.C. Rocket Attack Technology in effect, apply a -2 modifier to the hit roll.
2. All other gun and rocket attack modifiers apply as well.

C.C. Rocket Attack Procedure:

Target must be locked-on by radar, and firer may only use TT or less turns, altitude changes of no more than 1 level, and no maneuvers except slides up to the point of firing.

AIRCRAFT DAMAGE EFFECTS

- = Superficial Damage; no adverse effects.
- L = Light Damage; no ET turns allowed, lose High Pitch Rate, aircraft becomes Low Roll Rate.
- 2L = Light Damage; as L plus no BT turns allowed, + 1 to all preparatory move requirements.
- H = Heavy Damage; as 2L plus Mil and A/B power halved, CCC halved, no roll maneuvers allowed, no supersonic flight allowed. Roll once for Systems Loss.
- C = Crippled; as H plus lose A/B power, no HT turns, A/C smokes, lose all technology. Roll for again Systems loss.
- K = Aircraft Killed (shot down), remove from play.

Note: If end speed > High Transonic when "H" or "C" damaged, roll twice for prog. damage even if Damage Control done.

SYSTEMS LOSS TABLE

Die Roll	Critical System Lost
1	Cockpit: Pilot Killed, remove aircraft from play.
2	Cockpit: Crewman Killed. Lose multi-crew bonuses, and lose radar and weapon technology. Bomb system = manual.
3	One Engine permanently flamed out.
4, 5	Radar disabled. Lose all radar functions.
6, 7	ECM disabled. Lose all ECM functions.
8	Weapons System disabled, aircraft may no longer attack. Jettison stores.
9	Internal guns and any gunpods disabled.
10	Technology disabled, lose all technology.

**AIR TO AIR MISSILE
LAUNCH MODIFIERS TABLE**

IR Missiles:

- + 2 for each Turn Rate over Launch Gee.
- + 2 If fired from LO or ML alt. band at lower target.
- + 3 If fired into sun clutter; if fired out-of-envelope.
- + 3 If fired at lower target above highest cloud layer.
- + lesser of Flare PPL or missile Flare Vulnerability number if DDS program in effect.

BR, RH, and AH Missiles:

- + 2 for each Turn Rate over Launch Gee.
- + 3 If Snap Fired; if fired out-of-envelope.

Crew Quality Effects:

- Green = +1 Veteran = -1
- Tactics Master, Combat Hero or both = -1

Aircraft Damage Effects:

- L or 2L = +1 H = +2 C = +2

SAM LAUNCH MODIFIERS TABLE

IR SAMs:

- + lesser of Flare PPL or missile Flare Vulnerability number if DDS program in effect.
- + 3 if fired into SUN Clutter.

BR, CG, CW, TVM, OG, and LG SAMs:

No launch modifiers apply.

**AIR TO AIR AND SAM MISSILE
ATTACK MODIFIERS TABLE**

IRMs and IR SAMs:

- 3 If target in Afterburner Power.
- 1 If target in Military Power.
- + 1 If target in Idle Power.
- + 2 If missile must lose 2 or more levels during proportional move of attack against tgt. in LO alt. band (ground clutter).
- + 1 If target in Terrain Following Flight.
- + lesser of Flare PPL or missile Flare Vulnerability no.

BRMs, RHMs, AHMs & BR, CG, CW and TVM SAMs:

- + DJM rating - missile ECCM.
- + lesser of Chaff PPL or missile Chaff Vulnerability.
- + lesser of Mini-jammer PPL or Chaff Vulnerability +1.
- + Ground clutter (air to air missiles only) = 6 - target Altitude above terrain - missile ECCM.
- + Listed "T" level modifier (SAMs only, if applicable).

OG and LG SAMs:

No modifiers other than angle-off and A/C size apply.

ALL Missiles:

- + / - Target A/C Size Modifier from ADC.
- 1 if Target A/C did not Engage the missile.

Reminder: Max launch range of RHM/AHM = 3 x radar Track Str.#.

MISSILE ANGLE-OFF MODIFIERS TO ATTACK

**ANGLE -
OFF ARC**

MISSILE SEEKER TYPE or SAM GUIDANCE TYPE

E I M A BR RH AH CG CW TVM OG LG

0 Line	-1	-1	-1	-2	0	-1	-2	-1	-1	-1	0	-1
30 arcs	0	0	0	0	0	0	0	0	0	0	0	0
60 arcs	+1	0	0	0	+1	0	0	0	0	0	+1	0
90 / 120 arcs	+3	+2	+2	+2	+3	+3	+2	+2	+3	+2	+3	+2
150 arcs	+4	+3	+2	+2	+5	+2	+2	+2	+2	+1	+2	+2
180 arcs, line	+5	+4	+3	+1	+5	+1	+1	+1	+1	+1	+1	+1

AAA UNIT ATTACK MODIFIERS

- + 1 If AAA unit "D" damaged.
- + 2 If AAA unit "2D" damaged.
- + 1 If firing into SUN Clutter.
- + 2 If integral FCR jammed or not used.
- 1 If FCR-A unit in use.
- 2 If FCR-B or C unit in use.
- 3 If FCR-D unit in use.

DJM / CHAFF EFFECTS VERSUS FCRs

DJM TYPE	CHAFF PPL #	LF	HF	VF	MW
A	1	+1	+1	0	0
B	2 - 3	+2	+2	+1	0
C	4 - 5	+2	+2	+2	+1
D	6	+2	+2	+2	+2

JINKING VERSUS AAA

AAA Range	Maneuvering Required
Short	BT Turns, Snap-Turns, or Rolls or VIFF Maneuvers.
Medium and Long	As above plus HT Turns.

DIE ROLL TO EVADE HIT:

- 6+ If AAA not FCR aimed.
- 8+ If AAA is FCR aimed.
- Apply Aircraft Size Modifier from ADC to this die roll.

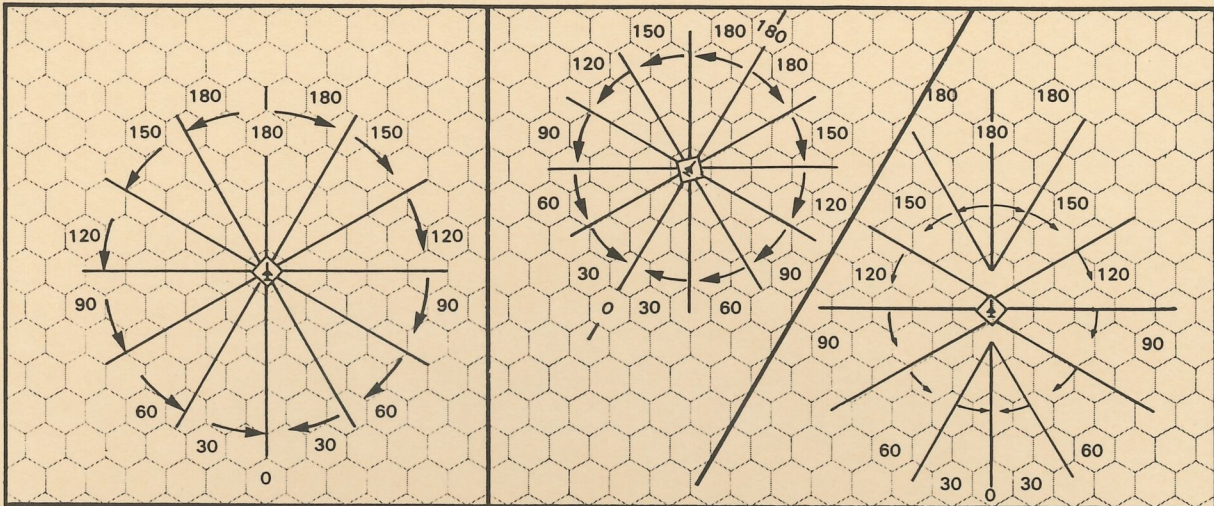
RANDOM AAA FIRE TABLE

Aimed Fire Attempt Roll	
Range To Target A/C	Die Roll To Fire
Short	8 or Less
Medium	6 or Less
Long	4 or Less

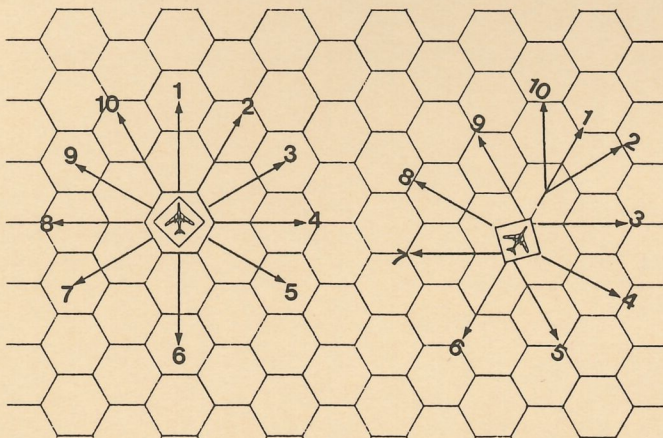
Plotted Fire Procedure

- Target A/C is one nearest Heavy AAA unit.
- Roll one die referencing Random Plotted Fire Diagram.
- Roll Die Twice; Subtract 2d roll from first for Altitude difference in levels from Target Altitude.

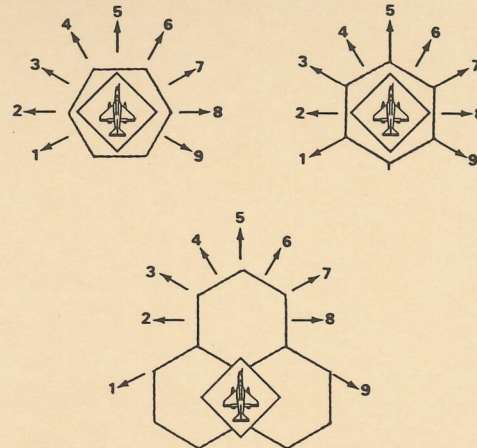
Angle-Off Arcs Diagram



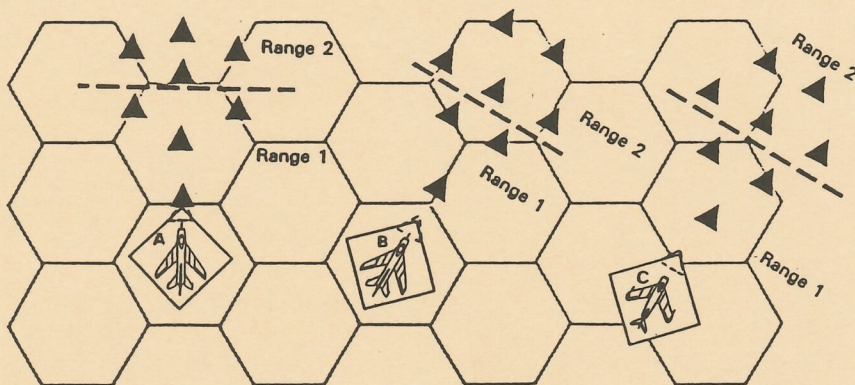
AIR-2 Genie Scatter Diagram



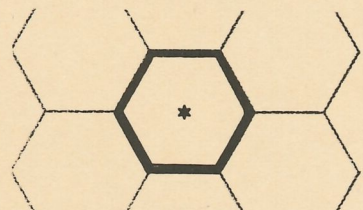
Random AAA Plotted Fire Diagram



Air to Air Gun Attack: Legal Target Positions Diagram



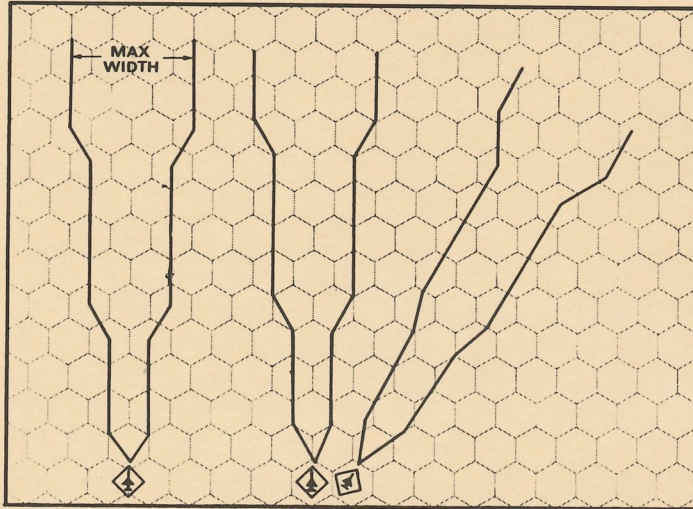
Blast & Frag. Danger Zone Diagram



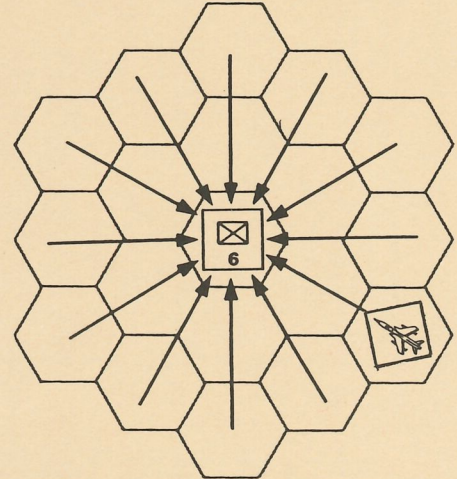
AAA Barrage & Plotted Fire Zone of Effect Diagram



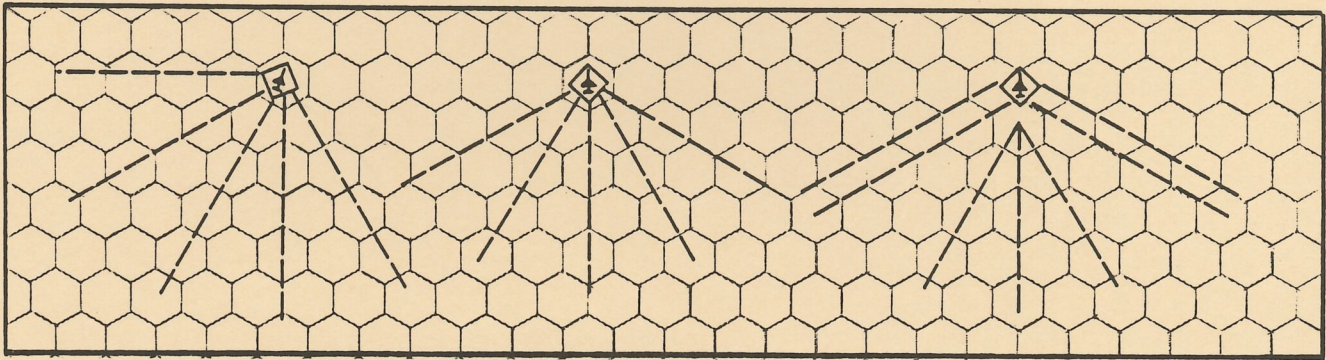
Limited Radar Arcs Diagram



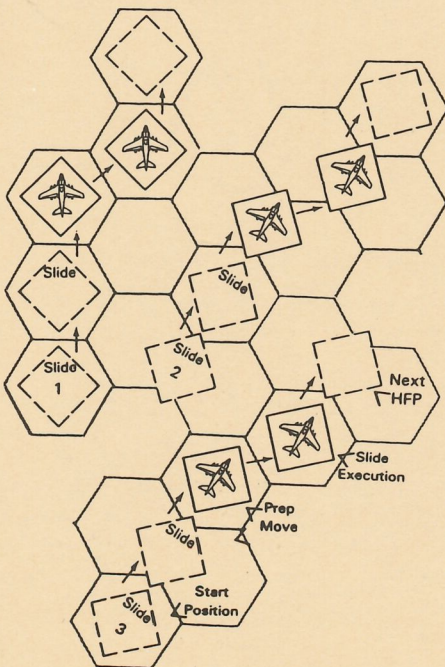
Air to Ground Attacks:
Lines Of Approach Diagram



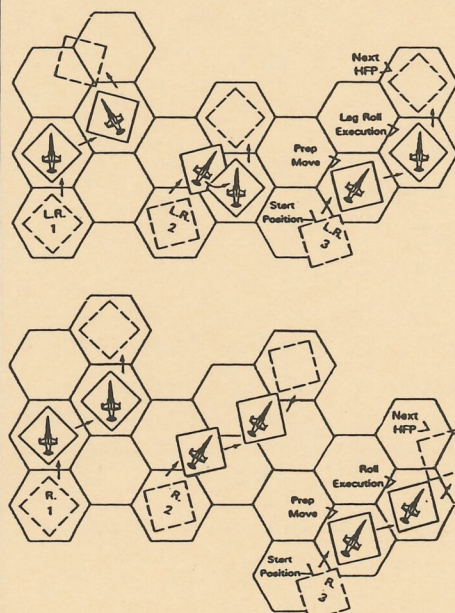
SSGT Steady State Gunsight Tracking: Legal Lines of Approach Diagram



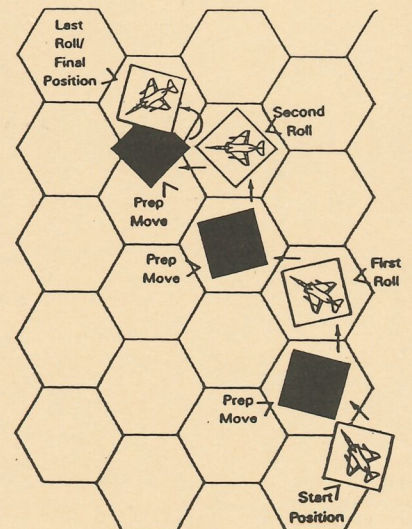
Slide Maneuver Diagram



Lag & Displacement Rolls Diagram



Barrel Roll Diagram



AIR POWER! COMBAT AND DAMAGE TABLES: PAGE 3

AIR TO GROUND ATTACK RELEASE POINTS

ATG ROCKETS		LEVEL BOMBING					DIVE BOMBING				
Range In Hexes	Allowed Levels	Low Drag		High Drag			Low Drag		High Drag		
		Range In Hexes	Allowed Levels	Die Roll Modifier	Allowed Levels	Die Roll Modifier	Range In Hexes	Allowed Levels	Die Roll Modifier	Allowed levels	Die Roll Modifier
0	—	0	—	—	T-2	-1	0	1-3	-2	1-3	-1
1	T-4 *	1	1-2	0	3-6	0	1	4-6	-1	4-8	0
2	1-8	2	3-4	0	7-10	+1	2	7-10	0	9-14	+2
3	2-12	3	5-6	+1	11-14	+2	3	11-12	+1	15-20	+4
4	2-10	4	7-8	+2	15-18	+3	4	13-15	+2	—	—
5	3-10	5	9-10	+3	19-24	+5	5	16-20	+4	—	—
6	4-9	6-7	11-15	+5	25-32	+7	6-7	—	—	—	—
7	4-7	8-9	16-25	+7	33-40	+9	8-9	—	—	—	—
8	4-5	10-12	26-40	+8	—	—	10-12	—	—	—	—

ATG ROCKET MODIFIERS

Slant Range	Die Roll Modifiers
1-4	0
5-6	+1
7	+2
8	+3
9-10	+5

* If A/C in TFF+2

FINAL ATTACK STRENGTH COMPUTATIONS

INDIVIDUAL WEAPONS:

ALL - Use listed Strength versus Hard / Soft Target.

MULTIPLE WEAPONS:

GUNS - Sum of Attack Ratings of all guns & GPs fired.

CBUs, RPs - Sum of Attack Strengths.

RK Volley - 2/3 Sum of Attack Strengths (Round up).

BBs, BGs, Fire, Napalm - 2/3 Sum as above.

FAE - 1/2 Sum of Attack Strengths (Round up).

VERSUS SECONDARY TARGETS:

CBUs, Fire, Napalm, and RP salvos of 4 or more pods = 2/3 FAS used on Primary Target.

All Others Weapons = 1/3 FAS used on Primary Target (Note: make adjustments for Hard / Soft targets).

AIMING REQUIREMENTS TABLE

SYSTEM	TIME
Manual	2/3 aircraft FPs
Ballistic	1/2 aircraft FPs
Computed	1/3 aircraft FPs
Advanced	1/3 aircraft FPs

Note: Always round down fractions.

AIR TO GROUND ATTACK TABLE

FAS - DEFENSE STRENGTH ODDS RATIO

DIE ROLL	1-4 or less	1-3	1-2	1-1	1.5-1	2-1	3-1	4-1	5-1	6-1	8-1	10-1	12-1 or more
0 or less	S	D	2D	K	K	K	K	K	K	K	K	K	K
1	S	D	2D	2D	K	K	K	K	K	K	K	K	K
2	S	S	D	D	2D	2D	K	K	K	K	K	K	K
3	—	S	S	D	2D	2D	2D	2D	K	K	K	K	K
4	—	S	S	S	D	2D	2D	2D	2D	K	K	K	K
5	—	—	S	S	D	D	D	2D	2D	2D	K	K	K
6	—	—	—	S	S	D	D	D	2D	2D	2D	K	K
7	—	—	—	—	S	S	D	D	D	2D	2D	2D	K
8	—	—	—	—	S	S	D	D	D	D	2D	2D	K
9	—	—	—	—	—	S	S	D	D	D	D	2D	2D
10 +	—	—	—	—	—	—	S	S	S	D	D	2D	2D

AIR TO GROUND ATTACK DIE ROLL MODIFIERS

A/C L, 2L Damaged	= +1
A/C H Damaged	= +2
A/C C Damaged	= +3
Aiming Not Complete	= +3
Attack on Secondary Tgt.	= +3
Novice Pilot / Crewman	= +1
Green Pilot / Crewman	= +2

Aircraft Bombsight	= variable, see A/C ADC.
If using Fire or Napalm type weapons;	
for each Level above 1 over tgt. at release	= +1
Each 3 BB / BG weapons dropped at once	= -1
Each 1/3 FPs expended as Tracking Time	= -1
Using laser spot tracker & tgt. laser marked	= -1
Combat Hero / Veteran Pilot / Crewman	= -1

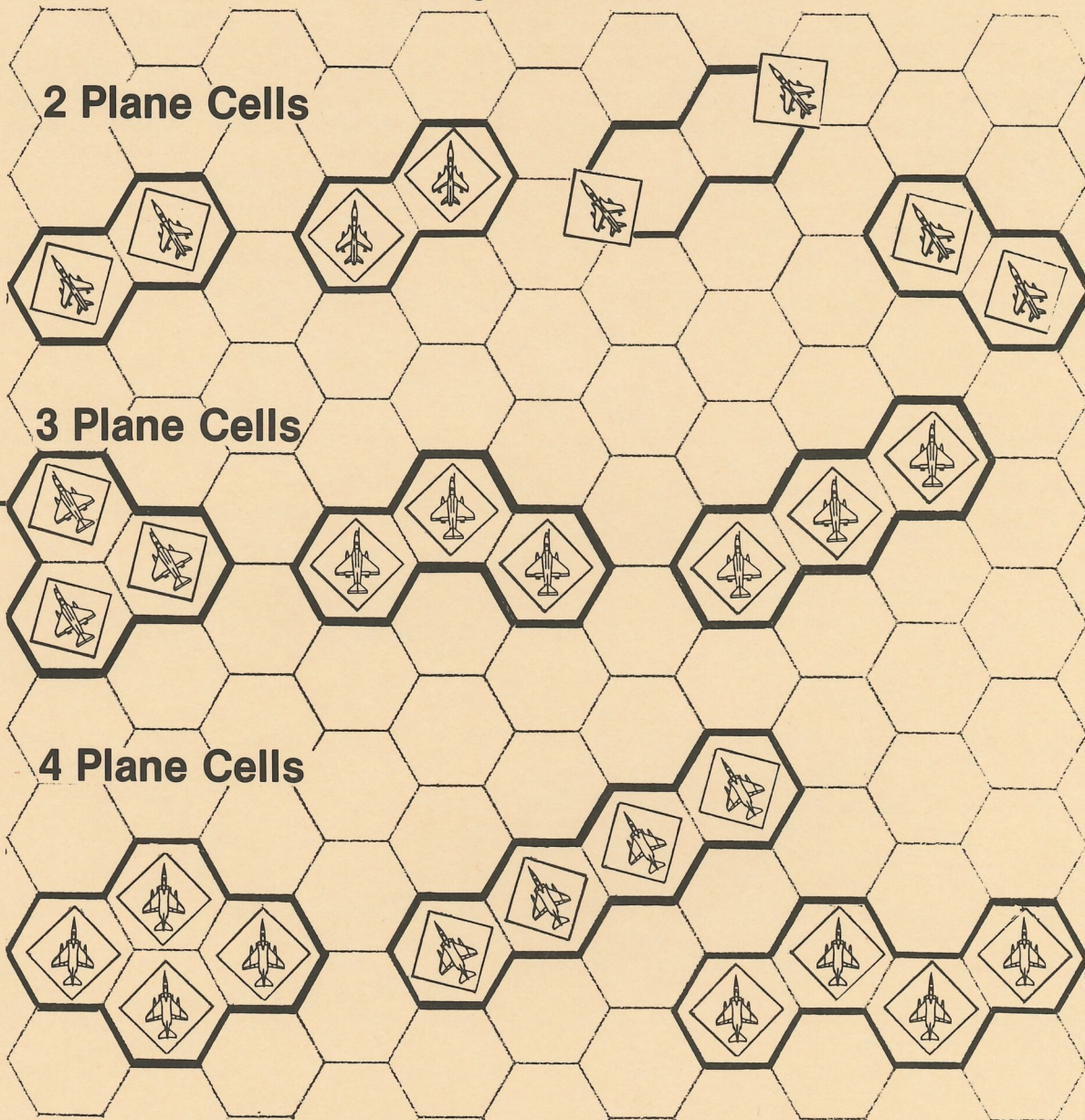
Release Point Effect	= see above.
Strafing at range 3 or 4	= +2
CG guided Weapon	= -2
ACG guided Weapon	= -3
Smart Guided Weapon	= -4
Laser Guided Weapon	= -4
Terrain Effects variable, see TEC.	

Toss Bombing = +1 per hex of distance, +2 per hex if target unsighted.

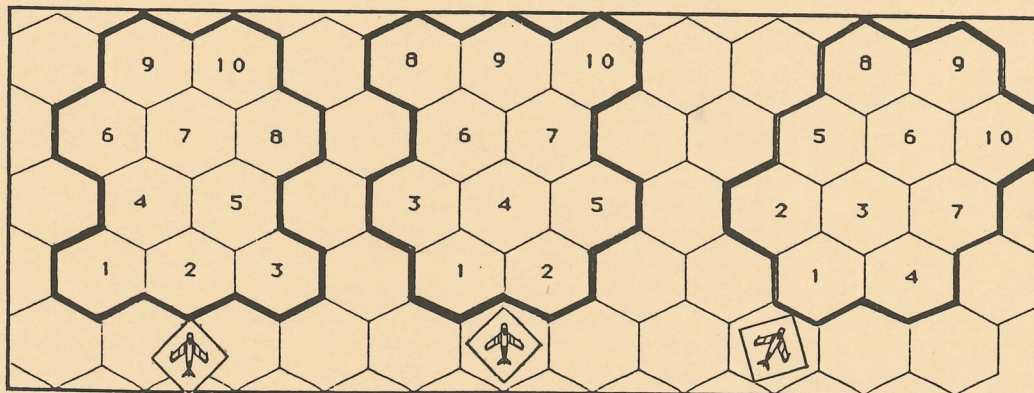
Laser Toss Bombing = +1 per two hexes distance, +1 per hex if target unsighted.

ARM and ASM weapons use only Terrain modifiers when attacking.

Jamming Cell Formations



Crash Site Determination Diagram



AIRCRAFT FLIGHT RULES SUMMARY

ACCEL / DECEL

1. Each 2.0 accel accumulated = + 0.5 speed normally.
2. Each 1.5 accel = + 0.5 speed for Rapid Accel aircraft.
3. If speed \geq Mach 1, each 3.0 accel = + 0.5 speed for normal A/C and each 2.0 = + 0.5 for Rapid Accel A/C.
4. Each 2.0 Decel accumulated = - 0.5 speed always.

LEVEL FLIGHT

1. All FPs are HFPs. An aircraft may descend one altitude level freely at any point in its move.

TURNING FLIGHT

1. Turn Drag decel based on highest rate used in game turn. Incur it only once per game turn even if A/C faced more often than once.
 2. Extra facings in a game turn constitute **sustained** turns. 1.0 decel is incurred for each facing change after first in a game turn. **High Bleed Rate** A/C incur 2.0 decel for each facing change after the first.
 3. TT, HT, BT, ET turns require start speed of 0.5, 1.0, 1.5, and 2.0 > minimum respectively to perform.
 4. **Low Roll Rate** A/C take 1 FP of flight to enter a left or right bank before turning and 2 FPs of flt. to reverse bank.
 5. **High Roll Rate** A/C may instantly switch from one angle of bank to another; others require 1 FP of flight to reverse.
 6. No attacks or weapon launches allowed during or after an ET turn until a **Recovery Period** passes.
- A recovery period = half the A/C's flight (round up) while not ET turning and not doing rolls or prep-moving for them.

Snap Turning

1. Aircraft must be capable of BT turn rate.
2. One allowed per game-turn; costs one HFP; allows immediate facing change of 30 degrees or of 60 degrees if turn chart = 60 or 90 without moving forward.
3. One HFP prep required if wings not level or if speed \geq High Transonic if both cases apply, two preps required.
4. Incur Decel as for BT turn unless aircraft uses ET rate.
5. Unless ET turns follow a snap turn; the snap counts as a BT turn for purposes of combat and weapon launch modifiers until a recovery period passes.
6. **Risky Snap turns** may be tried if aircraft is capable of HT turns but roll for a departure upon facing (1 to 4).

FP EXPENDITURE RESTRICTIONS

1. If going from level to climbing or diving flight; the first FP expended must be an HFP.
2. If going from dive to climb or climb to dive; FPs = to half the aircraft's speed (round down) must be expended as HFPs before using VFPs. **High Pitch Rate** aircraft need only expend FPs = to 1/3 speed (round down) in this case.
3. If continuing a climb or dive from the previous turn; HFPs and VFPs may be mixed in any order.

SPEEDBRAKES USAGE

1. FPs up to amount listed on the ADC may be eliminated.
2. Eliminated FPs may not be used for any turns or other maneuver / combat / proportional move requirements.
3. 1.0 decel is incurred for each 0.5 FP eliminated.

CLIMBING FLIGHT

Zoom Climbs

1. At least one, but up to 2/3rds FPs may be VFPs.
2. If CCC rate for power setting \leq 2.0, then each VFP

can gain 1 altitude level only.

3. If CCC rate for power setting is $>$ 2.0, each VFP can gain 1 or 2 altitude levels.
4. If this is the first turn of climbing flight, 1.0 decel is incurred per level climbed.
5. If this is second or subsequent turn of climbing flight, 1.5 decel is incurred per level climbed.
6. ET turn rates not allowed in zoom climbs.

Sustained Climbs

1. Start speed must be at least 1.0 > minimum speed.
2. If start speed less than climb speed then halve CCC values (retain fractions).
3. If CCC value is $<$ than 1.0, only one VFP may be used in game-turn and it gains only the fractional altitude level.
4. If CCC value \geq 1.0 but \leq 2.0, up to 2/3's the FPs may be VFPs. The first VFP gains any listed fraction (or 1 if no fractions listed), and the rest gain one altitude level each.
5. If CCC value is $>$ 2.0, up to 2/3's the FPs may be VFPs. The first VFP gains 1.0 level + any fraction, the rest may gain 1.0 or 2.0 altitude levels each.
6. If enough VFPs exist, an A/C may climb more levels than listed on the CCC. However, the extra levels climbed cause decel as if zoom climbing.
7. Only EZ turns and **Slide** maneuvers allowed.
8. 0.5 decel is incurred for each level gained up to the CCC limit. Extra levels incur decel as for zoom climbing.

Vertical Climbs

1. Previous game-turn must have involved climbing flight.
2. Exception; **High Pitch Rate** aircraft may enter vertical climbs from level flight if start speed $<$ 4.0.
3. On first turn of vertical climb, 1/3 of FPs must be HFPs. If vertical climb continued, not more than 1/3 of FPs may be HFPs and up to all may be VFPs.
4. Each VFPs may gain 1.0 or 2.0 altitude levels each.
5. Each level climbed causes 2.0 decel points.
6. No turns or maneuvers except **Vertical Rolls** allowed.
7. Diving flight may not follow Vertical climbs.
8. Exception, **HighPitch Rate** aircraft may enter Steep Dives or Unloaded Dives on turn after.
9. Exception, normal aircraft may use a **Half-Roll and Dive** maneuver to enter Steep Dives after a Vertical Climb.

DIVING FLIGHT

Steep Dives

1. At least one FP must be, and up to 2/3's FPs may be VFPs.
2. Each VFP may Lose 1.0 or 2.0 altitude levels.
3. Each level dived gains 0.5 accel on first turn of Diving.
4. If this is the second or subsequent game-turn of continuous Diving, each level dived gains 1.0 accel.

Unloaded Dives

1. All FPs are HFPs.
2. At least 1 HFP must be expended with aircraft "unloaded". More than 1 and up to all may be expended "unloaded".
3. Each HFP expended while unloaded moves the aircraft forward one hex / hexside and loses it one altitude level.
4. The aircraft gains accel as if Steep Diving.
5. An aircraft may not make any attacks, guide weapons or aim while unloaded.
6. HFPs done while unloaded may not be used for turning or prep-moving.
7. All unloaded HFPs done in a single game-turn must be done in one continuous string.

Vertical Dives

1. Previous game turn must have involved diving flight.
 2. Exceptions; a vertical dive may be entered from level flight using a **Half Roll and Dive** maneuver. If start speed ≤ 4.0 , it may also be entered from a zoom or sustained climb by using a **Half Roll and Dive** Maneuver.
 3. On first turn of vertical diving, 1/3 of FPs must be HFPs. If vertical dive continued, not more than 1/3 of FPs may be HFPs and up to all may be VFPs.
 4. Each VFP must lose 2.0 or 3.0 altitude levels.
 5. Each altitude level gained gains 1.0 accel.
 6. No turns or maneuvers except vertical rolls allowed.
 7. Climbing flight may never follow vertical dives.
 8. Level flight may follow if A/C's new start speed is 3.0 or less for **High Pitch Rate** A/C, or 2.0 or less for others.
- If case 8 does not apply, diving flight must follow vert. dive.
9. When Steep or Unloaded dives follow a vertical dive; at least half an A/C's FPs (round down) must be expended as VFPs or Unloaded HFPs; except **High Pitch Rate** aircraft need only expend 1/3 FPs as VFPs or unloaded HFPs.

STALLED FLIGHT

1. Aircraft does not move or change facing.
2. Altitude loss = start speed (round 0.5 up) + 1.0; increase loss by 1.0 per additional turn of stalled flight.
3. Aircraft gains accel as if steep diving and via power.
4. Aircraft may recover to level or diving flight including entering an immediate vertical dive.

DEPARTED FLIGHT

1. Stay in same hex; randomly change facing left or right.
2. Roll die to find number of facing changes in that direction.
3. Altitude loss = start speed (round 0.5 up) + 2.0; increase altitude loss by 2.0 per additional turn of departed flight.
4. Power has no effect, all accel / decel = 0 while departed.
5. Recovery is via recovery die roll (6- including mods.).
6. Upon recovery aircraft must enter diving flight (vert. dives allowed). High Pitch Rate aircraft may recover into level flt.
7. Upon recovery, start speed reverts to higher of Minimum speed or speed at which departure occurred.

AIRCRAFT MANEUVERS

Slides

1. Expend two HFPs to prep for slide. One HFP to execute.
2. 1 slide allowed if speed ≤ 9.0 , two if > 9.0 but at least 4 FPs must be expended between execution of first and start of preps for second.
3. One slide causes no decel; two slides cause 1.0 decel.

Lag / Displacement Rolls

1. Expend one HFP to prep for rolls. One HFP to execute.
2. Shift in direction of roll (see diagram) and optionally face 30 degrees in direction opposite to roll.
3. A displacement roll from a hexside shifts the aircraft, to a hexside as in slide and not sideways as depicted for the lag roll. Decel for these rolls varies, see ADC.

Vertical Rolls

1. Aircraft must be in vertical climb or dive and must have just expended a VFP.
2. Change facing left or right up to 180 degrees.
3. Decel cost varies; see ADC.
4. Multiple vertical rolls allowed in a single game turn but each must occur after separate VFP expenditures.

Barrel Rolls

1. Executed as 2 or more consecutive Lag/Displacement rolls.
2. If done in level flight, 1 altitude level may be gained or lost upon executing last roll at no additional FP cost.
3. If done in diving or climbing flight, 1 altitude level may be lost or gained respectively upon executing each roll.
4. Altitude changes that occur in a diving or climbing B-Roll may be in lieu of, or in conjunction with altitude changes done via VFP expenditure.
5. Incur 2.0 decel per level gained in a climbing Barrel Roll, and gain 0.5 accel per altitude level lost in a Barrel Roll.

Half Roll and Dive

1. Declare at start of move, perform normal Vertical dive except no vertical rolls allowed until last FP expended and then only if it was a VFP.
 2. Allows vertical dive entry from level flight, or if speed ≤ 4.0 , allows entry from zoom / sustained climbs.
 3. Allows steep dive entry from vertical climbs, with normal turning allowed.
 4. No attacks or weapon launches allowed that turn.
- For purposes of weapon launch modifiers and gunsights, rolls count as BT turns until recovery period met.
- Incur 1.0 extra decel for each roll over one executed in a single game-turn.

VIFF MANEUVERS (VIFF Capable A/C only)

VIFF Sidestep

1. Executed as slide except no prep-moves required but those imposed by altitude and supersonic speed.
2. Multiple sidesteps allowed so long as 1 HFP expended in forward flight between execution of each sidestep.
3. Each costs to HFPs to execute and each causes 2.0 decel.

VIFF Assisted Turn

1. Reduce listed turn requirements by one (90 is best allowed).
2. Treat aircraft as High Bleed Rate, incur 2.0 decel to use.

VIFF Vertical Pitch

1. Treat as Half Roll and Dive except aircraft may go from vertical climb direct to vertical dive, incur 2.0 decel to use.

VIFF Pop-up

1. Allows gain of one Alt. Lvl. from level flight once per turn.
2. Costs 1 HFP, incurs 2.0 decel, aircraft must be wings level.

BINGO FUEL TABLE

% of Bingo Fuel remaining at Disengagement	Safe Return to Base	Divert to Emergency Base	Run Out of fuel and Crash
100 % or more	1 - 10	11 +	NA
90 - 99 %	1 - 9	10 - 12	13 +
80 - 89 %	1 - 6	7 - 9	10 +
75 - 79 %	1	2 - 4	5 +
74 % or less	—	1 - 2	3 +

Die Roll Modifiers

A/C L, 2L damage =	+1	Veteran pilot =	-1
A/C H damaged =	+3	Novice Pilot =	+1
A/C C damaged =	+5	Green Pilot =	+2

AIR TO AIR REFUELING RULES

If A/C is Ata Refuel capable and reaches Tanker (die roll \leq Tanker availability no.); a safe return is automatic.
Die Roll Modifier = +1 per each 20 % under bingo fuel.

AIR POWER! MISSILE FLIGHT TABLES

MISSILE FLIGHT RULES SUMMARY

FP COSTS

1. One FP to move forward one hex / hexside.
2. One FP to climb 1 or 2 Altitude levels.
3. Free loss of 1 level per hex entered.
4. One FP to dive 2 or 3 Altitude levels.
5. Once per turn may dive 1 level with 1 FP.
6. One FP to Snap-turn or Slide. 0 FP to vert. roll.

MANEUVER LIMITS

1. One Snap-turn allowed during entire flight.
2. Only Slide and Vertical roll maneuvers allowed.
3. Normally, 1 Vert. roll allowed in entire flight except anytime target performs one, missiles. may in next move.
4. If Snap-turn first action other than forward flight after missile arms, no prep-move required.
5. If missile turns, or switches between climbs and dives before Snap-turning, normal prep-move must be met.

FLIGHT RESTRICTIONS

1. Missiles may climb and dive in same game turn, and some may do both in same proportional move.
2. Vertical roll allowed when msl. expends 2 or more FPs while climbing or diving in same position.
3. If turn ability is not BT/2, ET/2, or ET/3 then missile is limited in switching between climbs and dives. Such missiles may do either in proportional move but not both. Before changing between the two, missile must spend 1 proportional move in level flt.
4. Missiles may never dive if already below their target.
5. Missiles may only climb if already above their target if:
 - a). They are CG SAMs in boost phase.
 - b). They are TVM SAMs or MCG missiles.

MISSILE SPEED CHANGES

1. If missile gained altitude over turn, - 1 to speed for each set of alt. levels climbed equal to half or less of missile's speed.
2. If missile lost altitude over turn, + 1 to speed for each set set of alt. levels dived equal to half or more of missile's speed.

MISSILE SPEED LIMITS

Alt. Band	Minimum Speed	Maneuver Speed	Maximum Speed
LO	2	4	24
ML	3	5	26
MH	3	6	28
HI	4	7	30
VH	4	8	32
EH	5	10	34
UH	7	14	36

1. If missile start speed below maneuver speed, no turns or maneuvers are allowed.
2. If missile start speed below minimum speed, remove it from play (it stalls out).
3. No missile may accelerate beyond maximum allowed speed for altitude band it ends in.
4. Maximum Ceiling for all missiles is 100 levels.

IR SEEKER FIELD OF VIEW LIMITS FOR LAUNCH

1. Regular FOV = As Limited radar arc.
2. Uncaged FOV = 180+ angle-off arcs.
3. Uncaged FOV with Helmet sight = 150+ angle-off arcs.
4. Uncaged FOV with radar assist = lesser of 150+ or radar arc.
5. Uncaged FOV with VAS assist (M, A only) = 180+ arcs.
6. IRSTS Assisted FOV = Same as IRSTS system.

- If target one of several in unassisted Uncaged FOV a roll of 8- is required for seeker lock-on; 9- if with Helmet sights. Modifier of +1 to roll for each A/C the seeker must look past.

Type Seeker ALLOWED TARGET ANGLE-OFF ARCS

E	=	30 - arcs, or 60 - arcs if target used A/B Pwr.
I	=	60 - arcs with any target power setting.
M	=	90 - arcs, or 120 - arcs if target used A/B Pwr.
A	=	Any angle-off arc with any target power setting.

MISSILE SPEED DETERMINATION

1. Air to air first turn= (Base + A/C) x Speed Att. Factor.
2. SAM first turn= listed Base Speed.
3. Subsequent turns= (Previous \pm changes) x Speed Att. factor.
4. If sustainer motor in effect, Speed Att. Factor = 1.0.

SPEED ATTENUATION FACTOR TABLES

Alt. Band	Game Turn of Flight					
	1	2	3	4	5	6+
LO	.6	.6	.6	.7	.8	.8
ML	.7	.7	.6	.7	.8	.8
MH	.8	.7	.6	.7	.8	.8
HI	.8	.8	.7	.8	.8	.8
VH	.9	.8	.7	.8	.8	.9
EH	.9	.9	.8	.8	.9	.9
UH	1.0	.9	.9	.9	.9	.9

MATH SAVER TABLE

Miss. Spd.	.9	.8	.7	.6	Miss. Spd.	.9	.8	.7	.6
2 =	2	2	1	1	20 =	18	16	14	12
3 =	3	2	2	2	21 =	19	17	15	13
4 =	4	3	3	2	22 =	20	18	15	13
5 =	5	4	4	3	23 =	21	18	16	14
6 =	5	5	4	4	24 =	22	19	17	14
7 =	6	6	5	4	25 =	23	20	18	15
8 =	7	6	6	5	26 =	23	21	18	16
9 =	8	7	6	5	27 =	24	22	19	16
10 =	9	8	7	6	28 =	25	22	20	17
11 =	10	9	8	7	29 =	26	23	20	17
12 =	11	10	8	7	30 =	27	24	21	18
13 =	12	10	9	8	31 =	28	25	22	19
14 =	13	11	10	8	32 =	29	26	22	19
15 =	14	12	11	9	33 =	30	26	23	20
16 =	14	13	11	10	34 =	31	27	24	20
17 =	15	14	12	10	35 =	32	28	25	21
18 =	16	14	13	11	36 =	32	29	25	22
19 =	17	15	13	11					

AIR POWER! INTEGRATED TURN CHARTS

LO and ML ALTITUDE BANDS (1 - 7 and 8 - 16)														Accel Point Summary • A/C Power = + Variable. • Steep or Unloaded dives = + 0.5 per level initially, then +1.0 per level. • Vert. dive = +1.0 per M. Decel Point Summary • Turning = Variable. • Sust. climb = 0.5 per M. • Zooms = 1.0 per level initially, then 1.5 per M. • Vert. climb = 2.0 per M. • Speed brake usage = 1.0 per 0.5 speed lost. • 1.0 if Idle or Normal Pwr. and above cruise speed. • Sustained turns and rolls 1.0 each, or 2.0 if HBR.			
Turn Rate	1	2	3	4	5	Start Speed			6	7	8	10	12		14	18+	Notes
EZ	60	1	2	3	4	6	8	10	12	14	16	20	• GLOC possible.				
TT	90	60	1	2	3	4	5	6	8	10	12	14					
HT	NA	90	60	1	2	2	3	4	6	8	10	12					
BT	NA	NA	90	60	1	1	2	3	4	6	8	10					
ET	NA	NA	NA	60	60	1	1	2	3	4	6	8					
MH ALTITUDE BAND (17 - 25)																	
Turn Rate	1	2	3	4	5	Start Speed			6	7	8	10	12	14	18+	Notes	
EZ	1	2	3	4	6	8	10	12	14	16	18	22	• GLOC possible.				
TT	60	1	2	3	4	6	7	8	10	12	14	18					
HT	NA	60	1	2	3	4	5	6	8	10	12	14					
BT	NA	NA	60	1	2	2	3	4	6	7	10	11					
ET	NA	NA	NA	60	1	1	2	2	4	5	7	9					
HI ALTITUDE BAND (26 - 35)																	
Turn Rate	1	2	3	4	5	Start Speed			6	7	8	10	12	14	18+	Notes	
EZ	2	3	4	6	8	10	12	14	16	18	20	24	• Add 1 prep-move to all maneuvers and to snap turns. • No more GLOC risk.				
TT	1	2	3	4	5	6	8	10	12	14	16	20					
HT	NA	1	2	3	4	5	6	8	9	10	13	16					
BT	NA	NA	1	2	3	3	4	6	7	8	10	12					
ET	NA	NA	NA	1	2	2	3	4	5	6	8	10					
VH ALTITUDE BAND (36 - 45)																	
Turn Rate	1	2	3	4	5	Start Speed			6	7	8	10	12	14	18+	Notes	
EZ	2	4	6	8	10	12	14	16	18	20	22	24	• Add 2 prep-moves to all maneuvers and snap turns. • Reduce A/C power to 2/3ds that listed.				
TT	1	2	4	6	8	9	10	13	15	17	20	22					
HT	NA	NA	3	4	6	7	8	10	12	14	17	20					
BT	NA	NA	NA	3	4	5	6	7	9	11	14	16					
ET	NA	NA	NA	NA	3	4	5	6	7	8	10	12					
EH and UH ALTITUDE BANDS (46 - 60 and 61 +)																	
Turn Rate	1	2	3	4	5	Start Speed			6	7	8	10	12	14	18+	Notes	
EZ	3	6	8	10	12	14	16	18	20	22	24	28	• Add 3 prep-moves at EH & 4 Preps at UH to all maneuvers and snap Turns. • Reduce A/C Power to 1/3 that listed.				
TT	NA	4	6	8	10	12	13	14	16	18	21	24					
HT	NA	NA	4	6	7	8	10	11	13	15	18	21					
BT	NA	NA	NA	4	5	6	7	8	10	12	14	18					
ET	NA	NA	NA	NA	4	5	6	7	9	10	12	14					
Notes: 1. Add 2 to all turn requirements if in UH band. 2. If A/C or missile speed falls between two columns refer to the one on the left. 3. NA = not allowed. 60 or 90 = degrees of facing change per FP expended.																	
TRANSONIC / SUPERSONIC SPEED REFERENCE				TRANSONIC DRAG DECEL PENALTY				SUPERSONIC PENALTIES									
Alt. Band	Low Trans.	High Trans.	Mach One	Aircraft Type	Low Trans.	High Trans.	Mach One	• Add 1 prep to all maneuvers and snap turns. Climb cap. = 2/3ds. • PSSM A/C = + 2.0 decel if any turns or rolls done, and reduce maximum turn rate by one but not to less than HT. • Normal A/C = + 1.0 decel if any turns or rolls done. • GSSM A/C = No additional decel for turns or rolls. • If in MIL pwr., + 1.0 decel per 0.5 speed over High Transonic. • If in Normal pwr., + 2.0 decel per 0.5 speed over High Transonic. • If in Idle pwr., lose 0.5 more speed than listed on ADC. • Takes 3.0 accel to gain 0.5 speed (2.0 if Rapid Accel A/C).									
LO, ML	6.5	7.0	7.5	LTD	0.0	0.5	1.0										
MH, HI	6.0	6.5	7.0	NORMAL	0.5	1.0	1.5										
VH+	5.5	6.0	6.5	HTD	1.0	1.5	2.0										

TheSpeedOfHeat!

Where is the data card for the TU-14 "Bosun"?(see below!)

SEE OTHER SHEET

Hex	Type	SR	DefStr	CombatEffects
Clear		NA	NA	None
Forest		NA	NA	All units camouflaged +2 to Strafe, +1 other atks
River		NA	NA	None
	Rail Line		24	6 soft None
Road	24	8 soft		units on road treated as cir
Trail	12	6 soft		units on trail defend as other
terrain in hex; except vehicles not considered camouflaged				
Runway	36	10 hard		none
Mjr Bridge	48	18 hard		none
Mnr Bridge	36	12 soft		none
City	48	5 soft		all units except hv AAA,
SAMs and radars camouflaged. +2 all attacks				
Twn/Village	36	3 soft		Infantry Camo., +1 all attacks

Angle Off Diagram

Terrain Effects Chart

Scenario K-4, Paragraph 4, use TU-14 counters to represent B-29s

Scenario V-12, All F8 s : Config. DT, Load 6, Paragraph 4, Add 1 MDR to F8 stations 1 & 2.

AIRPOWER RULES:

Page 46 The following description should be added to the jamming cell table:"

Jamming Cell Diagram: Should say "All aircraft in jamming cell must be in +- 1 altitude level for increased jammer effectiveness

The benefit is +1 to the jammer effectiveness number.

Page 19 Substitute the above "Angle Off" diagram for the diagram on the page.

The above Terrain Effects Chart was left off of the play aids..

DATA CARDS:

F8 C/D add to stations 1 & 2: MDR

Add note to weapons station list: * May carry two LAU 33 per MDR.

F8 E/J

Add note to weapons station list: * May carry two LAU 33 per MDR.

External Stores Table Page 1: Add LAU-33 2x Zuni Rockets wt 300, LD 2.0

SFT 2.0, HRD 2.0

TU-16 A/B/G Internal Bomb Bay Load options change none to nine.

Contrary to the box, there are only 11 play aid cards.

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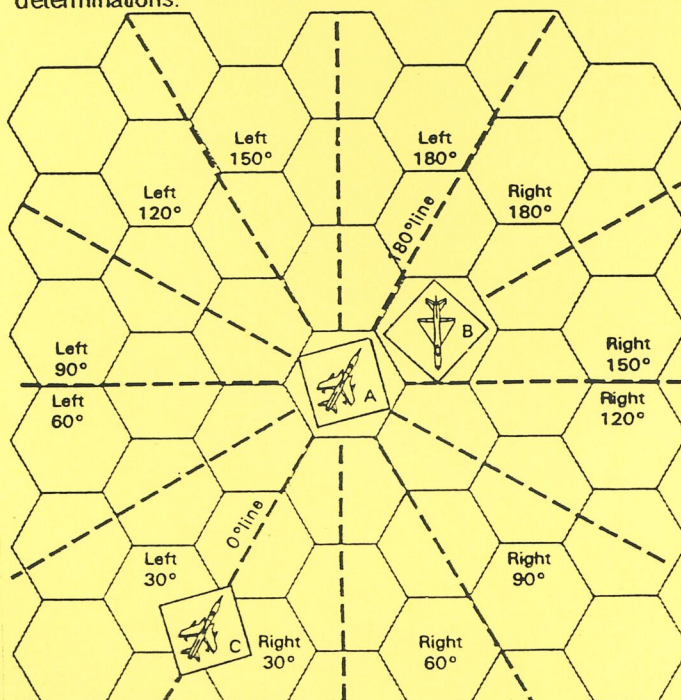
TSOH

INTERNAL DDS TABLE

Type	Capacity	Allowed Decoys	Load Options
U.S./Nato/European			
A	16	CH, FL	16 of any one, 8 of each, 12 of one + 4 of the other.
B	16	CH, FL, JM	16 of any one, 8 each of any two, 12 of one + 4 of another, 5 each of all three, 8 of one + 4 each of the other two.
C	32	CH, FL, JM	10 each of all three, 32 of any one, 16 each of any two, 16 of one + 8 each of the other two, 24 of one + 8 of another, 24 of one + 4 each of the other two.
D	32	CH, FL, JM	32 decoys total, any desired mix allowed.
Soviet/Warsaw Pact			
A	10	FL	10 Flares only.
B	20	CH, FL	10 of each, 20 of any one.
C	40	CH, FL	20 of each, 40 of any one, 30 of one + 10 of the other.
D	NA	NA	NA

- Notes:
1. Type A and B dispensers must be programmed before play and may not be changed.
 2. Type C dispensers may have PPLs changed each A/C Decisions Phase if they are a multi-crew type aircraft and roll a six or less when attempting change.
 3. Type D dispensers may have PPLs changed freely each A/C Decisions Phase.

The following illustrations show examples of angle-off arc determinations:



- A is the reference aircraft.
B is the right 150° arc.
C is on the 0° line.

AIR POWER! A/C LOGSHEET

AIRCRAFT:				Pilot / Crew Quality:						Total Initiative Modifier:					
GAME TURN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Start Altitude															
Start Speed															
0.5 FP Carry															
Visual Contacts/ Padlocks															
Initiative Number															
Power Setting															
Flight Type															
Accel Points + Accel Carry															
Decel Points + Decel Carry															
Speed Change															
Altitude Change															
Climb carry															
Turn carry															
Angle Of Bank															
Radar Contacts/ Radar Lock-ons															
Fuel Used Fuel Left															
Start Fuel: Bingo Fuel:	A/C Paint Scheme: A/C Current Damage:									Notes: Current Conf:					
Crew Notes:	Pilot	Crewman	A/C Load Data:												
Tactics Mstr.: Combat Hero: Sierra Hotel: Eyesight: Fitness: Confidence:			Wpn. Station	Store Type	Initial Qty.	Total Weight	Total Load	GT & Qty. Expended	Hard A.S.	Soft A.S.					
Die Roll Modifiers: Initiative: spotting: Radar Use: Wpn. Launch: Attacks: Departure: Recovery: GLOC:															
Chaff Decoys Expended															
Flare Decoys Expended															
Mini-jammers Expended															
PPL Code:	Jammer Notes:														

AIR POWER! MISSILE LOGSHEETS

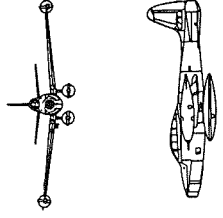
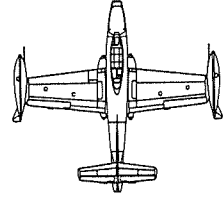
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F-84E/G Thunderjet

Crew: Pilot only

Power Chart (Accel) *				
Power	CL	1/2	DT	Fuel
Military-E	1.0	0.5	0.5	1.0
Military-G	1.0	1.0	1.0	1.0
Normal	0.0	0.0	0.0	0.5
Idle FP	0.5	0.5	0.5	0.0
Sp.Br.FP	0.5	0.5	1.0	—

Smoker in Military Power



Cruise Speed: 4.5 Restr.Arcs: 60-
Climb Speed: 3.5 BlindArcs: 30-
Visibility: 5 Internal Fuel: 295*
Size Modifier: 0 Ata Refuel: (G- Yes)
Vulnerability: 0 Ejection Seat: Early

Air Power

Maneuver Costs: HFP Decel
Lag/Displ. Rolls: 1.0 1.5
Vertical Rolls: 0.0 0.5

Turn Drag Chart (Decel)
CL 1/2 DT

TT	0.0	1.0	1.0
HT	1.0	2.0	2.0
BT	2.0	2.0	2.0
ET	NA	NA	NA

* Int. fuel includes tip-tank fuel.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +	—	—	—	—	—
VH 36-45	2.5-5.0	—	2.5-5.0	—	6.0
HI 26-35	2.5-5.5	—	2.5-5.0	—	6.5
MH 17-25	2.0-5.5	—	2.0-5.5	2.5-5.0	6.5
ML 8-16	1.5-6.0	—	2.0-5.5	2.0-5.0	7.0
LO 1-7	1.5-6.0	—	1.5-5.5	2.0-5.5	7.0

Climb Capability Chart

CL	E	G	1/2	E	G	DT	E	G	Alt. Bnd.
—	—	—	—	—	—	—	—	—	EH+
0.5	0.5	0.5	0.5	0.5	0.5	—	—	—	VH
0.5	0.5	0.5	0.5	0.5	0.5	—	—	—	HI
1.0	1.0	1.0	0.5	1.0	0.5	—	—	—	MH
1.0	1.0	1.5	1.0	1.5	0.5	—	—	—	ML
1.5	1.5	1.5	1.0	1.5	0.5	—	—	—	LO

Radar: Radar Gunsight

ECCM: 0

Arcs: —

Search: —

Track: —

Lock-On: 6

ECM: F-84

IFF: Yes

RWR: —

DDS: —

DJM: —

AJM: —

Gun Type: Six .50 Cal M.G.

Roll to Hit: 0=6, 1=3, 2=0

Ammunition: 8.0

Gunsight Mods: HT+1, BT+2

Radar Ranging: RE

AtA / AtG Rating: 4 / 4 **

Technology:

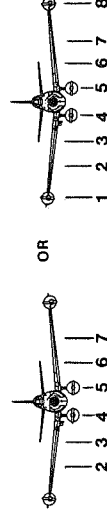
NONE

Bomb System: Manual (-0)

Notes and Variants:

1. High Transonic Drag (HTD).
2. E version not Air to air refuel capable.
3. F-84Es and Gs have no A/B; Mil power and climb capability of each model is shown separately above.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 4
1/2 = 5 - 12
DT = 13+

Load Limit: 4,500

Weapon Stations	Station Limits	Allowed Loads
--------------------	-------------------	------------------

1,8	560	RK, FT.
2,3,6,7	420	RK only.
4,5	1700	BB, FT, RK.

* Stations 1,8 normally carry tip-tanks. If RK weapons carried, reduce internal fuel to 145. Up to 4 RK allowed on each station.

* 3 RK allowed on each of stations 2 to 6.

* 4 RK allowed on each of stations 4 and 5.

V.P.s: F-84E= 8, 5, 3, 1 F-84G= 9, 6, 3, 1

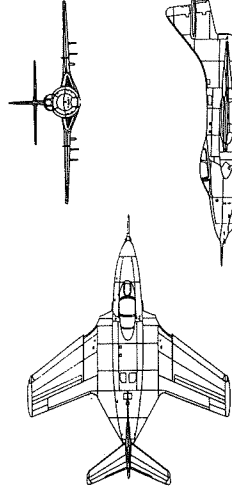
F9F-6/8 Cougar

Crew: Pilot only

Power Chart (Accel) *

Power	CL	1/2	DT	Fuel
Aft. Bur.	—	—	—	—
Military	1.5	1.0	1.0	1.0
Normal	0.0	0.0	0.0	0.5
Idle FP	0.5	0.5	0.5	0.0
Sp.Br FP	0.5	0.5	1.0	—

Cruise Speed: 5.0 Restr.Arcs: —
Climb Speed: 3.5 BlindArcs: 30-
Visibility: 5 Internal Fuel: 345
Size Modifier: 0 Ata Refuel: (8- Yes)
Vulnerability: 0 Ejection Seat: Early



Air Power

Maneuver Costs: HFP Decel
Lag/Displ. Rolls: 1.0 1.0
Vertical Rolls: 0.0 0.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	1.0	1.0	1.0
HT	1.0	1.0	2.0
BT	3.0	3.0	3.0
ET	NA	NA	NA

Minimum - Maximum Velocity Chart

Alt.	Conf.	CL	1/2	DT	Dive
Bnd.	Ceil.	44 / 42	40 / 38	38 / 34	Vel.
EH+ 46 +	—	—	—	—	—
VH 36-45	3.0-5.5	—	3.5-5.5	—	6.5
HI 26-35	2.5-6.0	—	3.0-5.5	3.5-5.0	7.0
MH 17-25	2.0-6.5	—	2.5-6.0	2.5-5.5	7.0
ML 8-16	1.5-6.5	—	2.0-6.0	2.0-5.5	7.5
LO 1-7	1.5-6.5	—	1.5-6.5	2.0-6.0	7.5

Climb Capability Chart

	CL	1/2	DT	Alt.
	AB	Other	AB	Bnd.
EH+	—	—	—	EH+
VH	—	0.5	—	VH
HI	—	0.5	—	HI
MH	—	1.0	—	MH
ML	—	1.0	—	ML
LO	—	1.0	—	LO

Radar: Radar Gunsight

ECCM: 0

Arcs: —

Search: —

Track: —

Lock-On: 6

ECM: F9F-6/8

IFF: Yes

RWR: —

DDS: —

DJM: —

AJM: —

Gun Type: Four 20mm Mk.12

Roll to Hit: 0= 6, 1= 4, 2= 3

Ammunition: 6.0

Gunsight Mods: HT+1, BT+2

Radar Ranging: RE

ATA / AtG Rating: 5 / 6 *

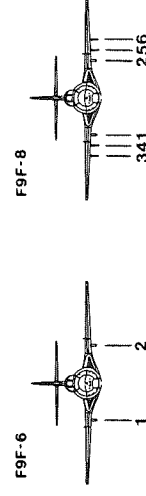
Bomb System: Manual (-0)

Notes and Variants:

1. High Transonic Drag (HTD).
2. Cielings for F9F-6 and F9F-8 respectively.
3. F9F-6 not air refuel capable.

Variants: F9F-6P/8P Photo-Recon versions - Delete internal guns; camera filled nose. Recon options = Oblique camera, overhead camera. All else as respective fighter versions.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 4

F9F-6= 2,000 1/2 = 5 - 8

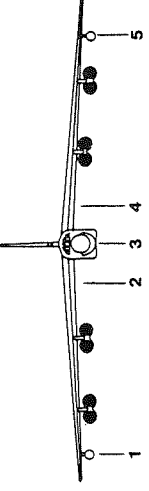
Load Limit: F9F-8= 4,000 DT = 9+

Weapon Stations	Station Limits	Allowed Loads
F9F-6	1,2	1000 BB, FT.
F9F-8	1,2	1,000 BB, RK, RG, FT.
	3,4,5,6	500 BB, RK, RP, IRM.

Note: F9F-8 may only use AGM-12 RG and AIM-9 IRMs beginning in 1958.

V.P.s: F9F-6= 9,6,3,1 F9F-8= 12,8,4,2

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Radar: Nav. Tail Warning ECCM: 3 2 Arcs: 150+ 60- Search: Gr.Nav. (300) 40 - 8 Track: Gr.Att. (180) 18 - 6 Lock-On: 8 * 7				ECM: B-52D B-52G IFF: Yes Yes RWR: B C DDS: A B DJM: B3 C4 AJM: B3 C4 BJM: B3 B3				Weapons Stations Diagram: 			
Gun: Quad. .50 Tail Turret Roll to Hit: 0=5, 1=3, 2=1 Ammunition: 8.0 Gunsight Mods: NA Radar Ranging: RE ATA / AtG Rating: 4 / NA				Technology: B-52D NONE B-52G Terrain Following - A				Configuration Points Limits: CL = 0 - 40 D= 60,000 1/2 = 41 - 70 Load Limit: G= 64,000 DT = 71 +			
Bomb System: Ballistic (-1)				Weapon Stations Station Limits Allowed Loads 1,5 * 20,000 FT only. 2,4 ** 10,000 BB, ASM, Decoys. 3 *** 49,500 BB, ASM, Decoys.				* B-52 FTs: 750 gallon; Wt.= 6000, Ld= 10, Fuel= 240. 3000 gallon; Wt.= 20000, Ld.=20, fuel= 975. ** Stations 2,4 may each carry twelve BB, or two ADM-120 Quail Decoys, or one AGM-28 Hound Dog, or (G model only) six AGM-69 SRAM. *** Internal Bomb Bay may hold 8 Nuc. BB and two Quail, or 66x 750lb. BB, or 84x 500lb. BB, or (G only) 16x SRAM or 8x SRAM and two Quail.			
Notes: 1. B-52D Blind Arc = 30L. 2. DDS load = 240 Chaff, 60 Flare. 3. High Transonic Drag (HTD). 4. Low Roll Rate. 5. Tail Gun Rules: Turret may return fire twice per turn against gun attacks in the 30- arcs; or it may fire once against any moving target in its 30- arc to which it has a tail radar lock-on. If it fires with a lock-on, the ranging modifier applies. Tail radar searches and locks are done in the Air Radar Phase. Ranging may be attempted if firing without a lock-on.				V.P.s: B-52D=60,40,20,10 B-52G=70,50,30,10							

B-57 B/G Canberra

Crew: Pilot, Weapons Officer

Power Chart (Accel) ••

Power CL 1/2 DT Fuel

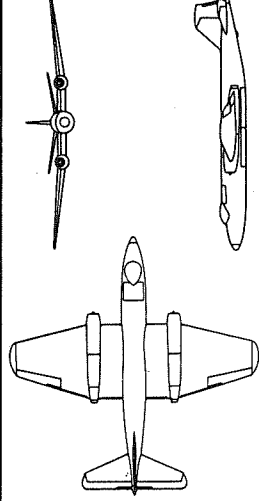
Aft. Bur. — — — — —

Military 1.0 1.0 0.5 3.0

Normal 0.0 0.0 0.0 1.0

Idle FP 0.5 0.5 1.0 0.0

Sp.Br. FP 0.5 0.5 1.0 —



Cruise Speed: 4.5 Restr. Arcs: 60-
Climb Speed: 3.5 Blind Arcs: 30-
Visibility: 8 Internal Fuel: 875
Size Modifier: -1 Aft Refuel: No
Vulnerability: 0 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 | 2.0
Vertical Rolls: 0.0 | 1.0

Turn Drag Chart (Decel)

CL	1/2	DT
TT	0.0	0.0
HT	1.0	1.0
BT	1.0	1.0
ET	NA	NA

Aircraft limited to one vertical roll maneuver per game-turn.

Minimum - Maximum Velocity Chart

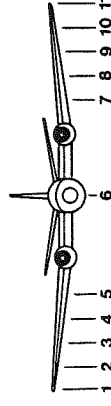
Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
EH+ 46 +		3.0-5.0	—	—	6.0	— 0.5	— —	— —	EH+
VH 36-45		2.5-5.5	3.0-5.0	—	6.0	— 0.5	— 0.5	— —	VH
HI 26-35		2.5-5.5	2.5-5.5	3.0-5.0	6.5	— 0.5	— 0.5	— 0.5	HI
MH 17-25		2.0-5.0	2.5-5.0	2.5-5.0	6.5	— 1.0	— 0.5	— 0.5	MH
ML 8-16		2.0-5.0	2.0-5.0	2.5-4.5	6.5	— 1.0	— 1.0	— 0.5	ML
LO 1-7		1.5-5.0	2.0-5.0	2.0-4.5	6.5	— 1.0	— 1.0	— 1.0	LO

Climb Capability Chart

Radar: APW-11 Tail Warning
ECCM: 0 0
Arcs: 180+ 30-
Search: Gr.Nav (90) 30-10
Track: Gr.Attack (30) NA
Lock-On: 7 * NA

ECM: B-57B B-57G
IFF: Yes Yes
RWR: — A
DDS: — A
DJM: —
AJM: —

Weapons Stations Diagram:



Gun Type: B= Four 20mm M39
Roll to Hit: 0= 4, 1= 2, 2= 1
Ammunition: 8.0
Gunsight Mods: TT+1, HT+2, BT+3
Radar Ranging: —
AtA / AtG Rating: 5 / 7 *

Technology:

B-57B
NONE

B-57G
TV/IR Optics
Laser Designator - A

Bomb System: B= Ballistic (-1)

G= Computed (-2)

Notes and Variants:

1. High Transonic Drag (HTD).
2. Low Roll Rate.
3. B-57G has no internal guns; only the B-57B does.
4. B-57G may carry BG weapons on stations 4, 5, 7, 8.

Variant: Pakistani B-57B - As U.S. B-57B except Radar= RB-1A: Arcs= 180+, Gr. Nav (180), Gr. Attack (60), lock-on= 7 *. Add FT to allowed loads on stations 4, 5, 7, 8.

Configuration Points Limits: CL = 0 - 8
1/2 = 9 - 15
DT = 16+

Load Limit: 12,000

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,11	2200	FT only.
------	------	----------

2,3,9,10 *	250	BB, RP, RK.
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4,5,7,8 *	750	BB, RP, RK.
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6 **	6000	BB (HE types only).
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* Up to two RK allowed per station.

** Internal Bomb Bay carries 6 illumination flares, plus one of the following Load options;

- a) six 1000 lb. BB. b) eight 750 lb. BB.
c) nine 500 lb. BB. d) twelve 250 lb. BB.

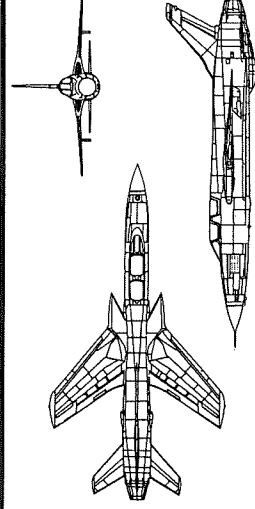
V.P.s: B= 16,10,6,3 G= 20,14,8,4

EF-105F/G Wild Weasel

Crew: Pilot, Weapons Officer

Power Chart (Accel) *				
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.5	2.0	1.5	9.0
Military	1.0	1.0	1.0	3.0
Normal	0.0	0.0	0.0	1.0
Idle FP	0.5	0.5	0.5	0.0
Sp.Br.FP	0.5	1.0	1.0	—

Smoker in Military Power



Cruise Speed: 5.5 Restr. Arcs: —
 Climb Speed: 4.5 Blind Arcs: 60-
 Visibility: 7 Internal Fuel: 500
 Size Modifier: 0 Ata Refuel: Yes
 Vulnerability: +1 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
 Lag/Displ. Rolls: 1.0 | 1.0
 Vertical Rolls: 0.0 | 0.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	2.0	2.0	2.0
HT	3.0	4.0	4.0
BT	4.0	5.0	5.0
ET	NA	NA	NA

Minimum - Maximum Velocity Chart

Alt.	Conf.	CL	1/2	DT	Dive Vel.	Climb Capability Chart		
Bnd.	Ceil.		40	35		CL	1/2	DT
EH+ 46 +		—	—	—	—	AB	Other	Alt.
VH 36-45	4.0-9.0	—	4.0-8.5	—	11.0	1.0	0.5	—
HI 26-35	3.5-8.5	—	3.5-8.0	4.0-7.5	10.5	2.0	0.5	—
MH 17-25	3.0-8.5	—	3.0-7.5	3.5-7.0	10.0	3.0	1.0	1.0 0.5
ML 8-16	2.5-8.0	—	2.5-7.5	3.0-6.5	9.5	3.0	1.0	1.0 0.5
LO 1-7	2.0-7.5	—	2.5-7.0	2.5-6.0	8.5	4.0	2.0	2.0 1.0
								EH+ VH HI MH ML LO

Radar:

ECCM: 0

Arcs: 180+

Search: 60 - 15

Track: 40 - 10

Lock-On: 7

Gun Type: 20mm M61 Vulcan

Roll to Hit: 0= 7, 1= 5, 2= 3

Ammunition: 5.0

Gunsight Mods: HT+1, BT+2

Radar Ranging: RE

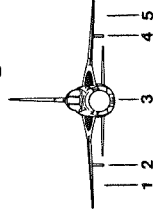
AtA / AtG Rating: 6 / 8 *

Bomb System: F= Manual (-0)

Notes and Variants:

1. Radar air to ground mode; Gr. NAV (180), Gr. Attack (90).
2. EF-105F ECM upgrade: RWR=B in 1968.
3. EF-105G post-war ECM upgrade: RWR=C, AJM=B4.
4. Rapid Accel Aircraft when CL configured.
5. Low Transonic Drag (LTD).
6. EF-105F may not use AGM-78 ARM until 1968+.

Weapons Stations Diagram:



Configuration Points Limits:

CL = 0 - 4

1/2 = 5 - 10

DT = 11+

Load Limit: 12,500

Weapon Stations

Station Limits

Allowed Loads

1,5 1000 BB, RP, RG, WR, EP, MDR, IRM, ARM.

2,4 3500 BB, RP, RG, WR, EP, ADR, ARM, FT.

3 5000 BB, RP, WR, EP, FT.

Note: May use AIM-9B IRMs, AGM-48 and AGM-78 ARMs, AGM-12 RGs only.

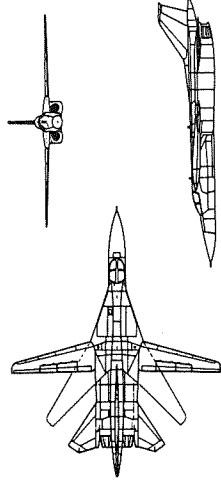
V.P.s: EF-105F= 26,18,9,4 EF-105G=28,20,10,5

F-III A/E
Aardvark

Crew: Pilot. Weapons Officer

Power Chart		(Accel)		••	
Power	CL	1/2	DT	Fuel	
Aft. Bur.	2.0	1.5	1.0	16.0	
Military	1.0	1.0	0.5	4.0	
Normal	0.0	0.0	0.0	2.0	
Idle	FP	0.5	0.5	1.0	0.0
Sp.Br.	FP	0.5	1.0	1.0	—

Smoker in Military Power



Air Power

Maneuver Costs:	HFP	Decel
Lag/Displ. Rolls:	1.0	2.0
Vertical Rolls:	0.0	1.0

Turn Drag Chart		(Decel)
	CL	1/2 DT
TT	2, 2, 3	2, 2, 3
HT	4, 4, 5	4, 4, 5
BT	5, 6, 6	5, 6, 6
ET	NA	NA

**Decel is for swing-wing positions
Fwd, Mid, and Aft respectively.**

Minimum - Maximum Velocity Chart

Alt. Conf. Bnd. Ceil.	CL 51	1/2 36	DT 24	Dive Vel.
EH+ 46 +	4.0 - 13.0	—	—	15.0
VH 36 - 45	3.0 - 14.0	3.5 - 11.0	—	14.0
HI 26 - 35	2.5 - 12.0	3.0 - 10.0	—	13.0
MH 17 - 25	2.5 - 10.0	3.0 - 9.0	3.0 - 7.5	12.0
ML 8 - 16	2.0 - 9.5	2.5 - 8.5	2.5 - 7.0	10.0
LO 1 - 7	1.5 - 8.5	2.0 - 7.5	2.5 - 6.5	9.0

Climb Capability Chart

CL		1/2		DT		Alt.
AB	Other	AB	Other	AB	Other	Bnd.
1.0	0.5	—	—	—	—	EH+
1.0	0.5	1.0	0.5	—	—	VH
2.0	1.0	1.0	0.5	—	—	HI
2.0	1.0	1.0	0.5	1.0	0.5	MH
3.0	1.0	2.0	1.0	1.0	0.5	ML
3.0	1.0	2.0	1.0	1.5	0.5	LO

Radar: APQ-113/110

ECCM: 1

Arcs: 180+

Search: Gr. Nav. (420)

Track: Gr. Attack (120)

Lock-On:

Gun Type: 20mm M61 gunpack

Roll to Hit: $0 = 5, 1 = 3, 2 = 2$

Ammunition: 10.0

Gunsight Mods: HT+2, BT=3

Badar Banding: BE

AtA / AtG Rating: 6/8*

Bomb System: (See Tech.)

Notes: 1. High Bleed Rate when swing-wings are Aft.

2. Low Transonic Drag (LTD).

3. Poor Supersonic Maneuverer (PSSM).

4. Variable Swing-Wing with 3 positions; Fwd, Mid, and Aft. Position may be changed one step at end of each turn.

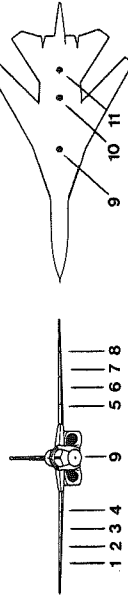
5. Swing-Wing Limits: FWD- Max speed= 3.5, no BT turns.

MID- Max speed= 8.0, add 0.5 to LO min. speed.

AFT- Add 0.5 to minimum speeds in all bands.

6. Stations 3 to 6 may carry one AIM-9 IRM in addition to other non-missile stores.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 8

Wings only = 30,000 $1/2 = 9 - 18$

Load Limit: Total= 34,000 DT = 19+

Weapon Stations	Station Limits	Allowed Loads
3, 4, 5, 6	5000	BB, BG, WR, FT, IRM.
9	4000	Internal Weapons Bay.*
10, 11	600	EP only.

* 20mm gunpack (load=1, wt=2000) installed in bay. One nuc. BB may be carried there as well, or gun may be deleted and two nuc. BB carried.

1,8	2500	BB, WR.
2,7	5000	BB, WR, FT.

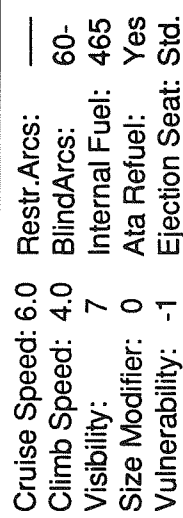
Stations 1,8 never used operationally. Stations 1,2,7 and 8 do not swivel; when fitted, wings must remain FWD until all stores are jettisoned from them.

V.P.s: A= 32, 20, 20, 5 E=32, 22, 12, 6

F-106A
Delta Dart

Crew: Pilot only

Power Chart		(Accel) *		
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.5	2.5	2.0	9.0
Military	1.5	1.5	1.0	3.0
Normal	0.0	0.0	0.0	1.0
Idle	FP	0.5	0.5	0.0
Sp.Br.	FP	0.5	0.5	—

Smoker in Military Power

Maneuver Costs:	HFP	Decel
Lag/Displ. Rolls:	1.0	1.5
Vertical Rolls:	0.0	0.5

Turn Drag Chart	CL	1/2	(Decel) DT
TT	1.0	2.0	2.0
HT	2.0	3.0	3.0
BT	3.0	4.0	4.0
ET	4.0	NA	NA

Climb Capability Chart

Radar:	Hughes MA-1
ECCM:	2
Arcs:	180+
Search:	180 - 30
Track:	60 - 30
Lock-On:	7
Gun Type:	20mm M-61 Vulcan
Roll to Hit:	0 = 7, 1 = 5, 2 = 3
Ammunition:	3.0
Gunsight Mods:	HT+1, BT+2
Radar Ranging:	RE
ATA / AtG Rating:	6 / 8 *
Bomb System:	NA

1. Before 1971, no F-106s had an internal gun.
2. Starting in 1971, F-106s had their weapons bay modified to allow the carriage of a Vulcan gatling in place of the Genie Rocket.
3. Low Transonic Drag (LTD).
4. Poor Supersonic Maneuverer (PSSM).
5. High Bleed Rate.

ECCM: 2
Arcs: 180+
Search: 180 - 30
Track: 60 - 30
Lock-On: 7

IFF: _____ Yes _____
RWR: _____
DDS: _____
DJM: _____
AJM: _____

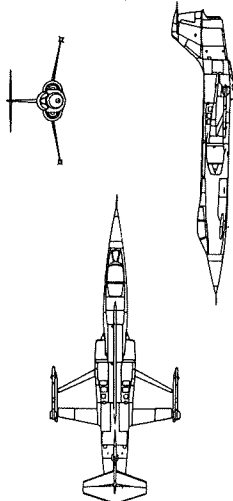
Technology:
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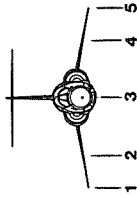
A diagram of a flower showing the ovary (1), style (2), and stigma (3).

Weapon Stations	Station Limits	Allowed Loads
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V.P.S: F-106= 25, 19, 12, 6

F-105D Thunderchief					Air Power				
Crew: Pilot only					Maneuver Costs: HFP Decel				
Power Chart (Accel) *					Lag/Displ. Rolls: 1.0 1.0				
Power	CL	1/2	DT	Fuel	Vertical Rolls: 0.0 0.0				
Aft. Bur.	2.5	2.0	2.0	9.0	Turn Drag Chart (Decel)				
Military	1.0	1.0	1.0	2.0					
Normal	0.0	0.0	0.0	1.0					
Idle FP	0.5	0.5	0.5	0.0					
Sp.Br.FP	0.5	1.0	1.0	—					
Smoker in Military Power					CL	1/2	DT		
					TT	2.0	2.0	2.0	
					HT	3.0	4.0	4.0	
					BT	4.0	5.0	5.0	
					ET	NA	NA	NA	

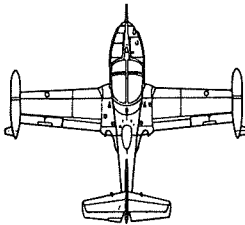
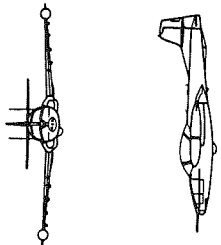
F-104A/C Starfighter				Air Power									
Crew: Pilot only				Maneuver Costs: HFP Decel									
Power Chart (Accel) *				Lag/Displ. Rolls: 1.0 1.0									
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 0.0									
Aft. Bur.	3.5	3.5	3.0 5.0	Turn Drag Chart (Decel)									
Military	2.0	2.0	1.5 2.0										
Normal	0.0	0.0	0.0 1.0										
Idle FP	0.5	0.5	0.5 0.0										
Sp.Br.FP	0.5	0.5	1.0 —										
Smoker in Military Power				CL 1/2 DT									
				TT	2.0	2.0	2.0	2.0					
				HT	3.0	3.0	3.0	4.0					
				BT	4.0	NA	NA	NA					
				ET	NA	NA	NA	NA					
				Cruise Speed: 6.0 Restr. Arcs: —									
				Climb Speed: 4.5 Blind Arcs: 30-									
				Visibility: 5 Internal Fuel: 290									
				Size Modifier: 0 Ata Refuel: C = Yes									
				Vulnerability: 0 Ejection Seat: Std.									
Minimum - Maximum Velocity Chart				Climb Capability Chart									
				Alt. Bnd.	Conf. Ceil.	CL 59	1/2 52	DT 44	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
				EH+ 46 +	6.0-13.5	6.0-11.0	—	13.5	3.0 1.0	1.0 0.5	— —	EH+	
				VH 36-45	4.5-13.5	4.5-11.0	4.5-10.0	13.5	4.0 1.0	2.0 0.5	1.0 0.5	VH	
				HI 26-35	3.5-13.0	3.5-11.5	4.0-10.0	13.5	5.0 2.0	3.0 1.0	2.0 0.5	HI	
				MH 17-25	3.0-12.0	3.5- 9.5	3.5- 9.0	12.0	6.0 2.0	4.0 1.0	2.0 1.0	MH	
				ML 8-16	2.5-10.5	2.5- 8.5	3.0- 8.0	10.5	7.0 2.0	5.0 2.0	3.0 1.0	ML	
				LO 1- 7	2.5- 9.0	2.5- 7.5	2.5- 7.0	9.0	7.0 3.0	5.0 2.0	3.0 1.0	LO	

Radar: ASG-14		ECM: F-104		Weapons Stations Diagram:	
ECCM:	0	IFF:	Yes		
Arcs:	180+	RWR:	—		
Search:	60 - 12	DDS:	—		
Track:	30 - 10	DJM:	—		
Lock-On:	6	AJM:	—		
Gun Type: 20mm M61 Vulcan		Configuration Points Limits: CL = 0 - 2 1/2 = 3 - 5 DT = 6+			
Roll to Hit:	0= 7, 1= 5, 2= 3				
Ammunition:	3.5				
Gunsight Mods:	HT+1, BT+2				
Radar Ranging:	RE				
ATA / AtG Rating: 6 / 8 *		Load Limit: 7,800			
Bomb System: Manual (-0)		Weapon Stations		Station Limits	
		1,5		1300	
		2,4		1500	
		3		2200	
				IRM, FT.	
				BB, RP, FT.	
				BB, Nuc. BB, MDR*, FT.	
				* Twin Aim 9 Launcher	
				* May use only AIM-9B through -9P IRMs.	
Notes and Variants: 1. Low Transonic Drag (LTD) and Rapid Accel Aircraft. 2. Good Supersonic Maneuverer (GSSM). 3. Rapid Power Response. 4. Before 1958 F-104As had downward ejecting seats. No ejections allowed unless aircraft is 2+ levels above terrain. 5. F-104C has optional bolt-on refueling probe. If fitted, max speed is reduced to 12.0 in HI band and 11.5 in VH+ bands.		Variant: F-104B/D Trainer - Crew= Pilot, Observer. Delete Internal gun. Internal Fuel= 230. D is Ata refuel capable like C.			
		V.P.s: F-104A= 15,10,5,2 F-104A+= 18,12,6,2 F-104C= 16,10,6,2 F-104B/D= 16,10,6,2			

Notes and Variants:

1. Low Transonic Drag (LTD) and Rapid Accel Aircraft.
2. Good Supersonic Maneuverer (GSSM).
3. Rapid Power Response.
4. Before 1958 F-104As had downward ejecting seats. No ejections allowed unless aircraft is 2+ levels above terrain.
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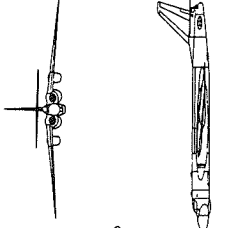
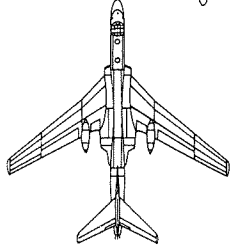
Variant: F-104A+ Super-Starfighter (25 built, USAF only)- As F-104A but with bigger engine. A/B pwr. = 4.0, 3.5, 3.5. Mil= 2.5, 2.5, 2.0. Ceilings = 63, 58, 50. Increase A/B fuel use to 6.0.

A-37B Dragonfly															Air Power				
Crew: Pilot, Observer.										Maneuver Costs: HFP Decel									
Power Chart (Accel) ••										Lag/Displ. Rolls: 1.0 1.5									
Power	CL	1/2	DT	Fuel						Vertical Rolls: 0.0 1.0									
Aft. Bur.	—	—	—	—						Turn Drag Chart (Decel)									
Military	2.0	1.5	1.0	1.0						CL	1/2	DT							
Normal	0.0	0.0	0.0	0.5						TT	0.0	0.0	1.0						
Idle	FP	0.5	0.5	0.5	0.0					HT	1.0	1.0	2.0						
Sp.Br.	FP	0.5	0.5	1.0	—					BT	1.0	2.0	2.0						
										ET	NA	NA	NA						

TU-16 A/B/G Badger

Crew: 2 pilots, 2 gunners, wpns. off.

Power Chart		(Accel)	
Power	CL	1/2	DT
Aft. Bur.	—	—	—
Military	1.0	1.0	0.5
Normal	0.0	0.0	0.0
Idle FP	0.5	0.5	1.0
Sp.Br. FP	0.5	0.5	0.5



Cruise Speed:	5.0	Restr.Arcs:	—
Climb Speed:	3.5	BlindArcs:	—
Visibility:	10	Internal Fuel:	3750
Size Modifier:	-2	Ata Refuel:	No
Vulnerability:	+1	Ejection Seat:	Early

Air Power

Maneuver Costs:		HFP	Decel
Lag/Displ.	Rolls:	NA	NA
Vertical	Rolls:	NA	NA
Turn Drag Chart		(Decel)	
CL	1/2	DT	
TT	1.0	2.0	2.0
HT	2.0	3.0	3.0
BT	NA	NA	NA
ET	NA	NA	NA

Rolling maneuvers not allowed.

Minimum - Maximum Velocity Chart

Alt.	Conf.	CL	1/2	DT	Dive
Bnd.	Ceil.	44	38	32	Vel.
EH+ 46 +	—	—	—	—	—
VH 36-45	3.0-5.5	3.5-5.0	—	—	6.0
HI 26-35	3.0-5.5	3.5-5.0	3.5-5.0	—	6.5
MH 17-25	2.5-6.0	3.0-5.5	3.0-5.0	—	6.5
ML 8-16	2.0-6.0	2.5-5.5	2.5-5.0	—	6.5
LO 1-7	1.5-5.5	2.0-5.0	2.0-4.5	—	6.5

Climb Capability Chart

CL	1/2	DT	Alt.
AB Other	AB Other	AB Other	Bnd.
—	—	—	EH+
—	—	—	VH
—	0.25	—	HI
—	0.25	0.25	MH
—	0.5	—	ML
—	0.5	—	LO
—	1.0	—	—

Radar:	TU-16A	TU-16B/G
ECM:	1	1
Arcs:	180+	180+
Search:	Gr.Nav. (120)	Gr.Nav. (345)
Track:	Gr.Att. (90)	Gr.Att. (345)
Lock-On:	6 *	7 *

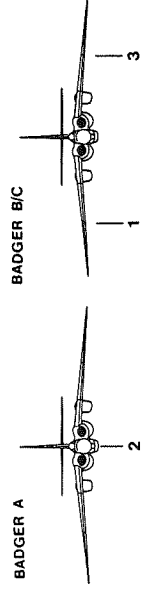
Guns:	Multiple Twin 23mm turrets
Roll to Hit:	0= 2, 1= 1, 2= 1
Ammunition:	12.0
Gunsight Mods:	—
Radar Ranging:	RE*
AtA / AtG Rating:	4 / NA

Bomb System: Ballistic (-1)

Notes and Variants:

1. DDS capacity = 60 chaff and 20 flare or 80 chaff.
2. Gun defense rules: The Badger is protected by gun turrets which can cover any arc around it. Therefore it is allowed to return fire against any 2 gun attacks made against it per turn. Only target size modifiers and tail radar ranging apply to the gunner's shots.
3. A Tail radar covers the 30- arc and allows a roll for radar ranging when firing at targets in it. (Lock-On=7)

Weapons Stations Diagram:



Configuration Points Limits:	CL = 0 - 10
	1/2 = 11 - 18
Load Limit:	20,000
	DT = 19+

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,3	10,000	BB, WR, FT, ARM, ASM.**
-----	--------	-------------------------

2*	19,800	BB (Low drag) only.
----	--------	---------------------

* Internal Bomb Bay: Load options =

- a) none 2,200 lb. bombs.
- b) eighteen 1,100 lb. bombs.
- c) twentyfour 550 lb. bombs.

** Only Badger-B/Gs may use ASMs and ARMs. Badger-B may only use AS-1 Kennel ASMs. Badger-G may use AS-5 Kelt ASMs and ARMs.

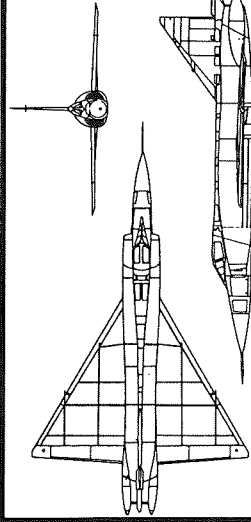
V.P.S: A= 30,20,10,6 B/G= 34,24,16,8

F-102A Delta Dagger

Crew: Pilot only

Power Chart (Accel) *				
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.5	2.0	2.0	7.0
Military	1.0	1.0	1.0	2.0
Normal	0.0	0.0	0.0	1.0
Idle	FP	0.5	0.5	0.0
Sp.Br. FP	0.5	0.5	1.0	—

Smoker in Military Power



Cruise Speed: 5.5 Restr.Arcs: —
 Climb Speed: 4.5 BlindArcs: 60-
 Visibility: 7 Internal Fuel: 340
 Size Modifier: 0 Ata Refuel: No
 Vulnerability: -1 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP Decel
 Lag/Displ. Rolls: 1.0 1.5
 Vertical Rolls: 0.0 0.5

Turn Drag Chart (Decel)
 CL 1/2 DT

TT	0.0	0.0	1.0
HT	1.0	1.0	2.0
BT	2.0	2.0	3.0
ET	3.0	NA	NA

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +		30-7.5	35-6.0	35-6.0	10.0
VH 36-45		30-8.0	30-6.5	35-6.0	10.0
HI 26-35		2.5-8.0	30-6.5	30-6.0	9.5
MH 17-25		2.5-8.0	2.5-6.5	2.5-6.0	9.0
ML 8-16		2.0-7.5	2.5-7.0	2.5-6.5	8.0
LO 1-7		1.5-7.0	2.0-7.0	2.0-6.5	7.5

Climb Capability Chart

CL	1/2	DT	Alt. Bnd.
AB	Other	AB	Other
1.0	0.5	1.0	0.5
2.0	0.5	1.0	0.5
2.0	0.5	1.0	0.5
2.0	1.0	2.0	0.5
3.0	1.0	2.0	1.0
3.0	1.0	2.0	1.0

Radar: Hughes MG-3

ECCM: 0

Arcs: 180+

Search: 90 - 10

Track: 40 - 8

Lock-On: 7

ECM: F-102A

IFF: Yes

RWR: —

DDS: —

DJM: —

AJM: —

Gun Type:

Roll to Hit: NONE

Ammunition: —

Gunsight Mods: —

Radar Ranging: —

AtA / AtG Rating: —

Technology:

IRSTS - A (1963+)

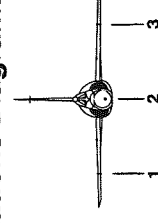
C. C. Rocket Attack

Bomb System: NA

Notes and Variants:

1. May only use AIM-4 and AIM-26 type missiles.
2. IRSTS technology not available before 1963.
3. Low Transonic Drag (LTD).
4. Poor Supersonic Maneuverer (PSM).
5. High Bleed Rate.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 3

1/2 = 4 - 6

DT = 7 +

Load Limit: 4,000

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,3 1500 FT only.

2* 1000 IRM, RHM, Nuc. RK.

* Internal Weapons Bay: The weapons bay is limited to the following load options;

- a) Up to six AIM-4 IRMs and RHMs plus 2 factors of air to air rockets.
- b) Up to three AIM-4s and one AIM-26 plus 1 factor of air to air rockets.
- c) Two AIM-26 plus 1 factor of air to air rockets.

V.P.s: F-102= 20, 14, 6, 2

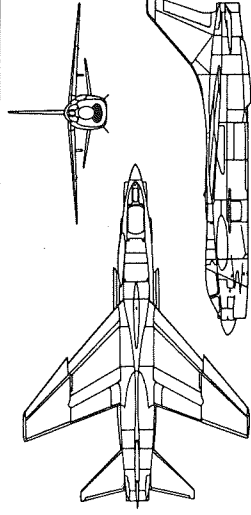
F-8E/J Crusader

Crew: Pilot only

Power Chart (Accel) •

Power	CL	1/2	DT	Fuel
Aft. Bur.	2.5	2.0	2.0	8.0
Military	1.0	1.0	1.0	2.0
Normal	0.0	0.0	0.0	1.0
Idle	FP	0.5	0.5	0.0
Sp.Br.FP	0.5	0.5	1.0	—

Cruise Speed: 5.5 Restr.Arcs: 60-
Climb Speed: 4.5 BlindArcs: 30-
Visibility: 6 Internal Fuel: 435
Size Modifier: 0 Ata Refuel: Yes
Vulnerability: 0 Ejection Seat: Std.



Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 | 1.0
Vertical Rolls: 0.0 | 0.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	1.0	1.0	1.0
HT	2.0	2.0	2.0
BT	3.0	3.0	4.0
ET	4.0	NA	NA

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.	CL	1/2	DT	Alt. Bnd.
EH+	46 +	4.0 - 11.0	4.0 - 9.5	—	12.0	1.0	0.5	1.0	EH+
VH	36 - 45	3.5 - 11.0	3.5 - 9.5	4.0 - 8.5	12.0	1.0	0.5	1.0	VH
HI	26 - 35	3.0 - 10.0	3.0 - 9.0	3.5 - 8.0	11.0	2.0	1.0	1.0	HI
MH	17 - 25	2.5 - 9.0	2.5 - 8.5	3.0 - 7.5	10.0	3.0	1.0	2.0	MH
ML	8 - 16	2.0 - 8.0	2.0 - 7.5	2.5 - 7.0	9.0	3.0	1.5	2.0	ML
LO	1 - 7	1.5 - 7.5	2.0 - 7.5	2.0 - 6.5	8.0	3.0	1.5	3.0	LO

Climb Capability Chart

	CL	1/2	DT	Alt. Bnd.
AB Other	1.0	0.5	—	—
AB Other	1.0	0.5	1.0	0.5
AB Other	2.0	1.0	1.0	0.5
AB Other	3.0	1.0	2.0	0.5
AB Other	3.0	1.5	2.0	1.0
AB Other	3.0	1.5	3.0	1.0

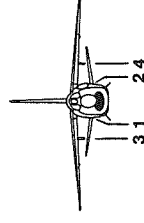
Radar: APQ-94 APQ-124

ECCM: 0 0
Arcs: 180+ 180+
Search: 120 - 20 150 - 30
Track: 90 - 15 90 - 30
Lock-On: 6 6

ECM: F-8E F-8J

IFF: Yes Yes
RWR: A A
DDS: — —
DJM: — A3
AJM: — —

Weapons Stations Diagram:



Gun Type: Four 20mm Mk.12

Roll to Hit: 0 = 6, 1 = 4, 2 = 3

Ammunition: E=4.0 J=2.5

Gunsight Mods: HT+1, BT+2

Radar Ranging: RE

ATA / AtG Rating: 5 / 6 *

Bomb System: Manual (-0)

Technology:

IRSTS - A

Configuration Points Limits: CL = 0 - 2

1/2 = 3 - 6

Load Limit: 5,500

DT = 7+

Weapon Stations	Station Limits	Allowed Loads
1,2	700	IRM, RHM, RP, MDR, DR. *
3,4	2700	BB, RP, RG, WR.

Notes and Variants:

1. Rapid Accel Aircraft.
2. F-8E RWR not added until 1966. ECM was upgraded to same as "J" in 1969; reduce cannon ammo to 2.5.

Variant: F-8E(FN) French Navy Navy Crusader - as F-8E, except may use Matra-550 IRMs and Matra-530 IRM and RHMs on stations 1 and 2; and may use AS-30 RGs on stations 3 and 4.

* Only AIM-9 IRMs allowed.

* Only AIM-9C RHMs allowed.

* Only LAU-33 RPs allowed on stations 1 and 2.

* Only AGM-12 RGs allowed on stations 3 and 4.

Note: F-8J may carry FTs on stations 3 and 4.

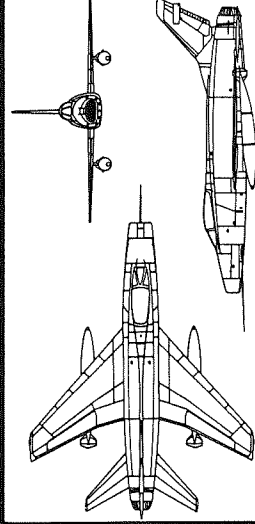
V.P.s: E/J=24,16,8,4 E(FN)=25,17,9,4

F-100 C/D/F Super Sabre (Hun)

Crew: Pilot only

Power Chart (Accel)					
Power	CL	1/2	DT	Fuel	
Aft. Bur.	2.0	1.5	1.5	6.0	
Military	1.0	1.0	1.0	2.0	
Normal	0.0	0.0	0.0	1.0	
Idle	FP	0.5	0.5	0.0	
Sp.Br. FP	0.5	1.0	1.0	—	

Smoker in Military Power



Cruise Speed: 5.5
Climb Speed: 4.5
Visibility: 6
Size Modifier: 0
Vulnerability: 0

Restr. Arcs: —
Blind Arcs: 30-
Internal Fuel: 385
Ata Refuel: Yes
Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 | 1.0
Vertical Rolls: 0.0 | 0.0

Turn Drag Chart (Decel)
CL 1/2 DT

TT	1.0	1.0	1.0
HT	2.0/1.0	2.0	2.0
BT	3.0/2.0	3.0/2.0	4.0/3.0
ET	4.0	NA	NA

Slatted Wings: if speed > 4.0
use lower decel number.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46+		48	44	40	
VH 36-45		4.0-8.0	—	—	10.0
HI 26-35		3.5-9.0	4.0-8.0	4.0-7.5	10.0
MH 17-25		3.0-8.5	3.5-8.0	4.0-7.0	10.0
ML 8-16		2.5-8.5	3.0-7.5	3.5-6.5	9.0
LO 1-7		2.0-8.0	2.5-7.5	3.0-6.5	8.5
		2.0-7.5	2.0-7.0	2.5-6.0	8.0

Climb Capability Chart

Alt. Bnd.	CL	1/2	DT	Alt.
EH+	AB	Other	AB	Other
EH+	1.0	0.5	—	—
VH	2.0	0.5	1.0	0.5
HI	2.0	1.0	1.0	0.5
MH	3.0	1.0	2.0	1.0
ML	3.0	1.0	2.0	1.0
LO	3.0	1.0	2.0	1.0

Radar: Radar Gunsight

ECCM: 0

Arcs: —

Search: —

Track: —

Lock-On: 6

Gun Type: Four 20mm M39

Roll to Hit: 0=6, 1=4, 2=3

Ammunition: 4.0

Gunsight Mods: HT+1, BT+2

Radar Ranging: RE

ATA / AtG Rating: 5 / 7 *

Bomb System: Manual (-0)

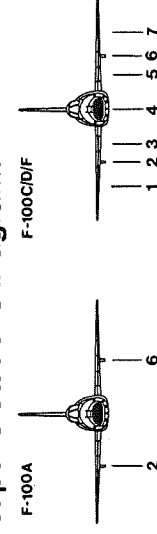
Notes and Variants:

- May use AIM-9 IRMs, AGM-12 RGs, AGM-45 ARMs.
- F-100D RWR not available before 1968.

Variant: F-100A (early Super Sabre) - Internal fuel= 240, no Ata refuel, Cielings= 51, 47, 41, allowed loads=BB, FT, and only on stations 2 and 6, no other stations fitted.

Variant: F-100F (Wild Weasel version)- Crew= Pilot, observer, internal guns= two 20mm, roll to hit= 5,3,2 resp., ATA / AtG= 4 / 4* resp., Cielings= 45, 40, 36.

Weapons Stations Diagram:



Configuration Points Limits: CL= 0 - 4

C= 6,000 1/2= 5 - 10

Load Limit: D= 7,500 DT= 11+

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,7 750 BB, RP, EP*.

2,6 2700 BB, RP, DR, TR,

FT, IRM, RG*.

3,5 1500 BB, RP, DR, TR, FT,

IRM, EP*, ARM* *

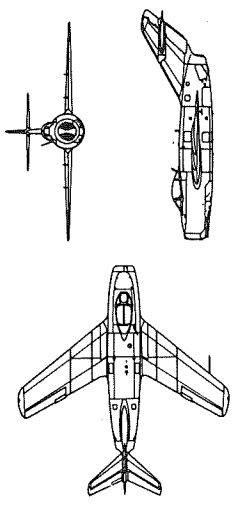
4 2000 BB, WR.

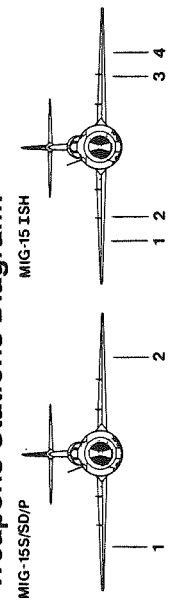
F-100D station limits: 1,6= 1000; 2,5= 3000.

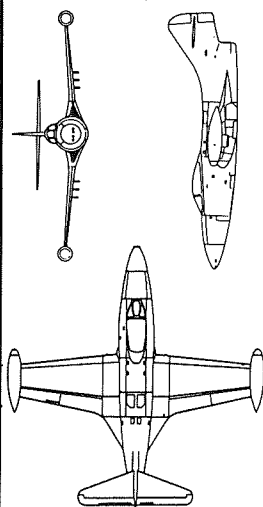
* Allowed on F-100D/F only.

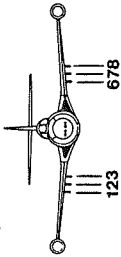
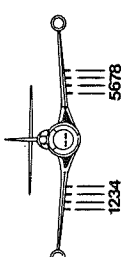
** Allowed on F-100F only.

V.P.s: A=12, 8, 4, 2 C=15, 10, 5, 2
D=16, 10, 5, 2 F=18, 12, 6, 3

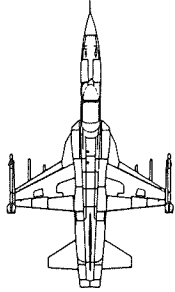
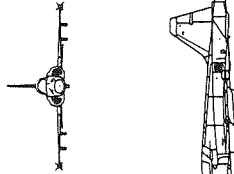
<i>MiG-15bis</i> <i>Fagot</i>				<i>Air Power</i>					
Crew: Pilot only				Maneuver Costs: HFP Decel					
Power Chart		(Accel) *		Lag/Displ. Rolls:		1.0 1.5			
Power	CL	1/2	DT Fuel	Vertical Rolls:		0.0 0.5			
Aft. Bur.	—	—	—	Turn Drag Chart (Decel)					
Military	1.5	1.0	1.0	CL	1/2	DT			
Normal	0.0	0.0	0.0	0.0	1.0	1.0	1.0		
Idle FP	0.5	0.5	0.5	0.0	1.0	1.0	1.0		
Sp.Br. FP	0.5	0.5	1.0	2.0	3.0	3.0	3.0		
				NA	NA	NA	NA		
									
Cruise Speed: 5.0 Restr.Arcs: — Climb Speed: 3.5 BlindArcs: 30- Visibility: 4 Internal Fuel: 125 Size Modifier: +1 Ata Refuel: No Vulnerability: +1 Ejection Seat: Early									
Minimum - Maximum Velocity Chart					Climb Capability Chart				
Alt. Bnd.	Conf. Ceil.	CL	1/2 48	DT 44	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
EH+ 46 +		3.0-5.5	3.0-5.0	—	6.0	— 0.5	— 0.5	—	EH+
VH 36-45		2.5-6.0	2.5-5.0	2.5-5.0	6.0	— 1.0	— 0.5	—	VH
HI 26-35		2.0-6.0	2.0-5.5	2.5-5.0	6.5	— 1.0	— 1.0	—	HI
MH 17-25		1.5-6.0	2.0-5.5	2.0-5.0	6.5	— 1.5	— 1.0	—	MH
ML 8-16		1.5-6.5	1.5-6.0	1.5-5.5	7.0	— 1.5	— 1.0	—	ML
LO 1-7		1.0-6.5	1.5-6.0	1.5-5.5	7.0	— 1.5	— 1.5	—	LO

Radar: Scan Fix (MiG-15P Var.) ECMM: 0 Arcs: Limited Search: 10 - 6 Track: 6 - 6 Lock-On: 5		ECM: MIG-15 IFF: — RWR: — DDS: — DJM: — AJM: —		Weapons Stations Diagram: 		Configuration Points Limits: CL = 0 - 1 1/2 = 2 - 4 DT = 5+	
Gun Type: Two 23mm + one 37mm Roll to Hit: 0 = 4, 1 = 2, 2 = 1 Ammunition: 3.0 Gunsight Mods: HT+2, BT+3 Radar Ranging: (MiG-15P) RE AtA / AtG Rating: 5 / 4 *		Technology: NONE		Load Limit: 1,600		Weapon Station Limits Allowed Loads	
Bomb System: Manual (-0)		MIG-15bis/P 1,4 550 BB, RK, RP, FT.		MIG-15ISH 1,4 550 BB, RK, RP, FT. 2,3 * 550 BB, RK, RP.		* Each may carry two BB class weapons.	
Notes and Variants: 1. High Transonic Drag (HTD). 2. Low Roll Rate if speed > 4.5. 3. +1 to gun attacks if speed > = High Transonic for instability. 4. MiG-15bis has no radar and no radar ranging.		Variant: MiG-15P Night Fighter - Internal guns= just two 23mm; change AtA / AtG to 4 / 3 *. Use radar data and radar ranging given above. All else as MiG-15bis.		What if Variant: MiG-15ISH Gr. Attack version - Add stations 2 and 3; all else as MiG-15bis. Only one prototype originally built.		V.P.s: MIG-15bis = 8, 5, 3, 1 MIG-15P/ISH = 9, 6, 3, 1	

<i>F9F-2/5 Panther</i>				<i>Air Power</i>				
Crew: Pilot only				Maneuver Costs: HFP Decel				
Power Chart (Accel) *		Lag/Displ. Rolls: 1.0 1.5		Vertical Rolls: 0.0 0.5				
Power	CL	1/2	DT Fuel	Turn Drag Chart (Decel)				
Aft. Bur.	—	—	—	CL	1/2	DT		
Military	1.0	1.0	1.0	TT	0.0/0.0	0.0/1.0	0.0/1.0	
Normal	0.0	0.0	0.0	HT	1.0/1.0	1.0/2.0	1.0/2.0	
Idle FP	0.5	0.5	0.5	BT	1.0/2.0	2.0/2.0	2.0/2.0	
Sp.Br.FP	0.5	0.5	0.5	ET	NA	NA	NA	
				Decel is for F9F-2 and F9F-5 respectively.				
 Cruise Speed: 4.5 Restr.Arcs: — Climb Speed: 3.5 BlindArcs: 30- Visibility: 5 Internal Fuel: 300 Size Modifier: 0 Ata Refuel: No Vulnerability: +1 Ejection Seat: Early				Climb Capability Chart				
				CL		DT		Alt.
				AB	Other	AB	Other	Bnd.
				1/2		1/2		
				EH+	46 +	—	—	—
VH	36-45	2.0-5.0	2.5-5.0	—	—	—	VH	
HI	26-35	2.0-5.0	2.0-5.0	—	0.5	—	HI	
MH	17-25	1.5-5.5	1.5-5.0	—	0.5	—	MH	
ML	8-16	1.0-5.5	1.5-5.5	—	1.0	—	ML	
LO	1-7	1.0-6.0	1.5-5.5	—	1.0	—	LO	
Minimum - Maximum Velocity Chart				Climb Capability Chart				
Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.	CL	DT	
EH+	46 +	—	40	35	—	AB	Other	
VH	36-45	—	—	—	—	—	—	
HI	26-35	2.0-5.0	2.5-5.0	—	6.0	—	—	
MH	17-25	2.0-5.0	2.0-5.0	2.5-4.5	6.5	—	—	
ML	8-16	1.5-5.5	1.5-5.0	20-4.5	6.5	—	—	
LO	1-7	1.0-5.5	1.5-5.5	2.0-5.0	6.5	—	—	
		1.0-6.0	1.5-5.5	1.5-5.0	6.5	—	—	

Weapons Stations Diagram: <div>Early F9F-2Late F9F-2 and F9F-5</div>		Configuration Points Limits: CL = 0 - 2 F9F-2= 2,000 1/2 = 3 - 6 Load Limit: F9F-5= 3,000 DT = 7+	
Weapon Stations		Station Limits	Allowed Loads
F9F-2			
1,2,3		250	BB, RK.
6,7,8		250	BB, RK.
4,5		1000	BB, RK.
F9F-5			
1,2,3		500	BB, RK.
6,7,8		500	BB, RK.
4,5		1000	BB, RK, FT.
V.P.s:F9F-2/2P=7,4,2,1 F9F-5/5P= 8,5,3,1			

Radar: NONE		ECM: F9F-2/5	
ECM: _____		IFF: Yes	
Arcs: _____		RWR: _____	
Search: _____		DDS: _____	
Track: _____		DJM: _____	
Lock-On: _____		AJM: _____	
Technology:			
NONE			
Gun Type: Four 20mm Mk.12			
Roll to Hit: 0= 6, 1= 4, 2= 3			
Ammunition: 6.0			
Gunsight Mods: HT+1, BT+2			
Radar Ranging: _____			
AtA / AtG Rating: 5 / 6 *			
Bomb System: Manual (-0)			
Notes and Variants:			
1. High Transonic Drag (HTD).			
2. F9F-5 version internal fuel= 320.			
Variant: F9F-2P and F9F-5P Photo-Recon versions - Delete internal guns (unarmed). Nose filled with cameras. Recon options= Oblique camera, overhead camera. All other data as respective fighter type.			

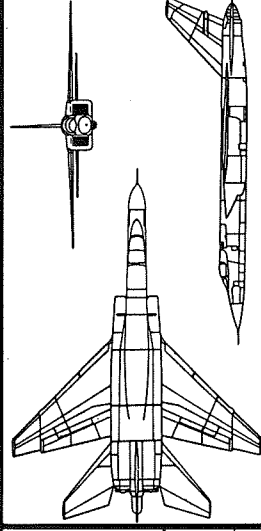
F-5A/C Freedom Fighter					 					Air Power				
Crew: Pilot only										Maneuver Costs: HFP Decel				
Power Chart (Accel)										Lag/Displ. Rolls: 1.0 1.0				
Power	CL	1/2	DT	Fuel						Vertical Rolls: 0.0 0.0				
Aft. Bur.	2.5	2.0	1.5	3.0						Turn Drag Chart (Decel)				
Military	1.0	1.0	1.0	1.0						CL	1/2	DT		
Normal	0.0	0.0	0.0	0.5						TT	1.0	1.0	2.0	
Idle FP	0.5	0.5	1.0	0.0	Cruise Speed: 5.5 Restr.Arcs: 60-					HT	2.0	2.0	3.0	
Sp.Br. FP	0.5	0.5	1.0	0.0	Climb Speed: 4.5 BlindArcs: 30-					BT	3.0	4.0	4.0	
					Visibility: 4 Internal Fuel: 185					ET	NA	NA	NA	
					Size Modifier: +1 Ata Refuel: (C- Yes)									
					Vulnerability: -1 Ejection Seat: Std.									
Minimum - Maximum Velocity Chart										Climb Capability Chart				
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0	1.0	1.0	0.5	1.0	0.5	HI		
MH 17-25	2.5-8.0	3.0-7.0	3.0-6.0	—	9.0	2.0	1.0	1.5	1.0	1.0	0.5	MH		
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.0	—	8.5	3.0	1.0	2.0	1.0	1.5	0.5	ML		
LO 1-7	1.5-7.0	2.0-6.5	2.5-6.0	—	7.5	3.0	2.0	2.0	1.0	2.0	1.0	LO		
Minimum - Maximum Velocity Chart								Climb Capability Chart						
Alt.	Conf.	CL	1/2	DT	Dive Vel.	CL		1/2		DT		Alt.		
Bnd.	Ceil.		42	34		AB	Other	AB	Other	AB	Other	Bnd.		
EH+ 46 +	4.0-9.0	—	—	—	10.0	1.0	0.5	—	—	—	—	EH+		
VH 36-45	3.5-9.0	4.0-8.0	—	—	10.0	1.0	0.5	1.0	0.5	—	—	VH		
HI 26-35	3.0-8.5	3.5-7.5	4.0-6.5	—	10.0	2.0								

RA-5C
Vigilante
Crew: Pilot, Navigator

Power Chart (Accel) ..				
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.0	1.5	1.5	12.0
Military	1.0	1.0	1.0	4.0
Normal	0.0	0.0	0.0	2.0
Idle FP	0.5	0.5	0.5	0.0
Sp.Br.FP	0.5	0.5	0.5	—

Power Chart (Accel) ..				
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.0	1.5	1.5	12.0
Military	1.0	1.0	1.0	4.0
Normal	0.0	0.0	0.0	2.0
Idle FP	0.5	0.5	0.5	0.0
Sp.Br.FP	0.5	0.5	0.5	—

Smoker in Military Power



Maneuver Costs:	HFP	Decel
Lag/Displ. Rolls:	1.0	2.0
Vertical Rolls:	0.0	1.0

Turn Drag Chart (Decel)	CL	1/2	DT
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Turn Drag Chart	(Decel)
CL	1/2 DT

Turn Drag Chart	(Decel)
CL	1/2 DT

Turn Drag Chart	(Decel)
CL	1/2 DT

Cruise Speed:	5.5	Restr. Arcs:	90-
Climb Speed:	4.5	Blind Arcs:	60-
Visibility:	8	Internal Fuel:	1170
Size Modifier:	0	Ata Refuel:	No
Vulnerability:	0	Ejection Seat:	Std.

Velocity Chart

Alt. Conf. Bnd. Ceil.	CL 62	1/2 58	DT 48	Dive Vel.
EH+ 46 +	4.0-12.5	4.5-10.5	5.0-10.0	14.0
VH 36-45	3.5-13.5	4.0-11.5	4.0-10.5	14.0
HI 26-35	3.0-11.5	3.5-10.0	3.5-9.0	12.0
MH 17-25	2.5-9.5	3.0-8.5	3.0-8.0	10.0
ML 8-16	2.0-7.5	2.5-7.0	2.5-6.5	8.0
LO 1-7	2.0-7.0	2.5-6.5	2.5-6.0	7.5

Climb Capability Chart

	CL		1/2		DT		Alt. Bnd.
	AB	Other	AB	Other	AB	Other	
20	0.5		1.0	0.5	1.0	0.5	EH+
20	0.5		1.0	0.5	1.0	0.5	VH
30	1.0		2.0	0.5	1.0	0.5	HI
30	1.0		2.0	1.0	2.0	0.5	MH
40	2.0		3.0	1.0	2.0	1.0	ML
40	2.0		3.0	1.0	2.0	1.0	LO

Radar: AN/ASB-12

ECCM: 0

Arcs: 180+

Search: Gr. Nav (420)

Track: Gr. Attack (90)

Lock-On: 7*

Gun Type:	NONE
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Roll to Hit:

Ammunition: —

Gunsight Mods: —

Radar Ranging: —

AtA / AtG Rating: —

Bomb System: Ballistic (-1)

Notes and Variants:

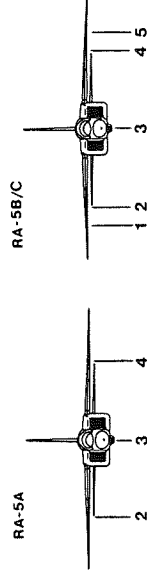
1. RA-5C ECM upgrade: RWR to B, DJM to B3 in 1967.
2. RA-5C ECM upgrade: DJM to B4 in 1971.
3. RA-5C Recon Options= Oblique camera, overhead camera, IR camera, Side Looking Radar, Electronic emissions recording system.

4. Rapid Accel Aircraft. Rapid Power Response.

5: Good Supersonic Maneuverer (GSSM).

Variants: A3J-1/A3J-2 early Bomber versions (A5-A/A-5B)- As RA-5C minus recon options and ECM. A3J-1 int. fuel= 1025.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 2
1/2 = 3 - 10
DT = 11+

Load Limit: 12,000

Load Limit: 12.000
DT = 11+

Weapon	Station	Allowed
Stations	Limits	Loads

1,5 3200 BB, RP, RG, WR, FT.

2.4 3200 BB, RP, RG, WR, FT.

3 * Centerline Weapons Tube.

* Weapons tube may carry one Nuc. BB plus two fuel cells, or just 3 fuel cells. RA-5C fuel data includes 3 centerline cells. A3J-1 and -2 fuel data includes 2 and 3 cells respectively. A3J-2 did not carry Nuc. BBs.

Note: May only use AGM-12 type RG weapons.

V.P.s: A3J= 32.22.12.6 RA-5C=40 30.20.10

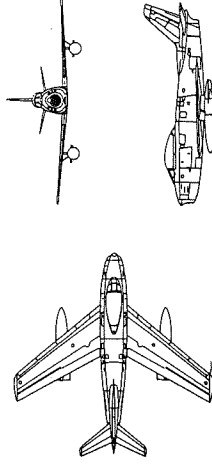
<i>F7U-3/3M Cutlass</i>				<i>Air Power</i>			
Crew: Pilot only				Maneuver Costs: HFP Decel			
Power Chart (Accel) • •				Lag/Displ. Rolls: 1.0 1.5			
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 0.5			
Aft. Bur.	1.5	1.5	1.0 4.0	Turn Drag Chart (Decel)			
Military	1.0	1.0	1.0 2.0				
Normal	0.0	0.0	0.0 1.0				
Idle FP	0.5	0.5	0.5 0.0				
Sp.Br. FP	0.5	0.5	0.5 —				
Smoker in Military Power				CL	1/2	DT	
				TT	1.0	1.0	2.0
				HT	2.0	2.0	3.0
				BT	3.0	3.0	4.0
				ET	4.0	4.0	NA
				Cruise Speed: 5.0	Restr. Arcs: 60-		
				Climb Speed: 4.0	Blind Arcs: 30-		
				Visibility: 6	Internal Fuel: 365		
				Size Modifier: 0	Ata Refuel: No		
				Vulnerability: +1	Ejection Seat: Early		
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt. Bnd.	Conf. Ceil.	CL	1/2 40	Dive Vel.	DT 35	CL AB Other	Alt. Bnd.
EH+ 46 +		—	—	—	—	—	EH+
VH 36-45	3.0-6.0	—	3.5-6.0	7.0	—	—	VH
HI 26-35	2.5-6.0	—	3.0-6.0	7.0	—	—	HI
MH 17-25	2.0-6.5	—	2.5-6.0	7.0	3.5-5.5	1.0 0.5	MH
ML 8-16	1.5-6.5	—	2.0-6.5	7.5	2.5-5.5	1.0 0.5	ML
LO 1-7	1.5-7.0	—	2.0-6.5	7.5	2.0-6.0	1.0 0.5	LO
		—	2.0-6.5	7.5	2.0-6.0	1.0 0.5	LO

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F-86F Sabre

Crew: Pilot only

Power Chart (Accel) *	
Power	Fuel
Aft. Bur.	CL 1/2 DT
Military	1.0 1.0 1.0 1.0
Normal	0.0 0.0 0.0 0.5
Idle	FP 0.5 0.5 1.0 0.0
Sp.Br. FP	0.5 0.5 1.0 —



Cruise Speed: 5.0 Restr.Arcs: —
 Climb Speed: 3.5 BlindArcs: 30-
 Visibility: 5 Internal Fuel: 145
 Size Modifier: 0 Ata Refuel: No
 Vulnerability: 0 Ejection Seat: Early

Air Power

Maneuver Costs: HFP Decel
 Lag/Displ. Rolls: 1.0 1.0
 Vertical Rolls: 0.0 0.0

Turn Drag Chart (Decel)	
CL	1/2 DT
TT	0.0 1.0 1.0
HT	1.0 1.0 1.0
BT	2.0/1.0 3.0/2.0 3.0/2.0
ET	NA NA NA

Slatted Wings: If speed > 3.5, use lower decel number.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +		48	45	42	
VH 36-45	30-5.5	—	—	—	6.5
HI 26-35	3.0-6.0	3.0-5.0	3.0-5.0	3.0-5.0	6.5
MH 17-25	2.5-6.0	3.0-5.5	3.0-5.0	3.0-5.0	7.0
ML 8-16	2.0-6.5	2.5-5.5	2.5-5.0	2.5-5.0	7.0
LO 1-7	1.5-6.5	2.0-6.0	2.5-5.5	2.5-5.5	7.5
	1.5-7.0	1.5-6.0	2.0-5.5	2.0-5.5	7.5

Climb Capability Chart

Alt. Bnd.	1/2	DT	Other
CL	AB	Other	AB
EH+	—	—	—
VH	—	—	—
HI	—	—	—
MH	—	—	—
ML	—	—	—
LO	—	—	—

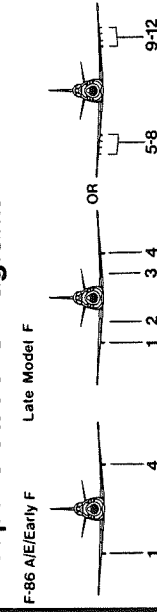
Radar: Radar Gunsight

ECM: 0
 Arcs: —
 Search: —
 Track: —
 Lock-On: 6

ECM: F-86F

IFF: Yes
 RWR: —
 DDS: —
 DJM: —
 AJM: —

Weapons Stations Diagram:



Gun Type: Six .50 Cal M.G.

Roll to Hit: 0=6, 1=3, 2=0
 Ammunition: 7.0
 Gunsight Mods: HT+1, BT+2
 Radar Ranging: RE
 AtA / AtG Rating: 4 / 4 **

Technology:

NONE

Bomb System: Manual (-0)

Notes and Variants:

1. High Transonic Drag (HTD).
2. F-86F models only, may use AIM-9B IRMs after 1957.

Variants: F-86A/E and early F Sabres - Delete IFF and weapon stations 2,3, and 5 to 12.

F-86A/E only- Delete radar gunsight. Reduce LO band max speeds by 0.5; reduce ceilings by 2. LO and ML CCC = 1.0 for all configurations.

F-86A only - (+1) modifier to gun shots if speed => High Transonic in HI, VH, or EH+ Bands due to instability.

Configuration Points Limits:

Early A/E/F= 2,000 CL = 0 - 2
 Load Limit: Late F= 4,000 1/2 = 3 - 6
 DT = 7+

Weapon Stations Limits Allowed Loads

1,4 1000 BB, FT.
 2,3 1000 BB, FT, IRM.
 5 to 12* 150 RK.

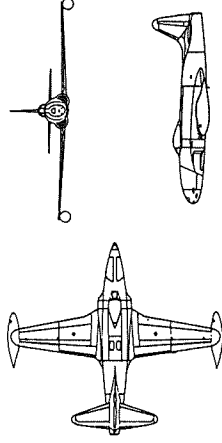
* Two RK allowed per station.

Variant: F-86F with modified "6-3" wing - Normal Transonic Drag. Delete slatted wings and reduce HI, VH and EH+ Alt. Band Min speeds by 0.5.

V.P.s: F-86A/E= 8,5,3,1 Early F= 9,6,3,1
 F-86F and F with 6-3 wing=10,7,3,1

<i>F-80C</i> <i>Shooting Star</i>				<i>Air Power</i>			
Crew: Pilot only				Maneuver Costs: HFP Decel			
Power Chart (Accel) •				Lag/Displ. Rolls:		1.0	1.5
Power	CL	1/2	DT Fuel	Vertical Rolls:		0.0	0.5
Aft. Bur.	—	—	—	Turn Drag Chart (Decel)			
Military	1.0	1.0	1.0	CL	1/2	DT	
Normal	0.0	0.0	0.0	TT	0.0	0.0	0.0
Idle FP	0.5	0.5	0.5	HT	1.0	1.0	1.0
Sp.Br.FP	0.5	0.5	0.5	BT	1.0	1.0	2.0
Smoker in Military Power				ET	NA	NA	NA
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt. Bnd.	Conf.	CL	1/2	CL	1/2	DT	Alt. Bnd.
EH+ 46+	—	—	40	AB Other	AB Other	Other	EH+
VH 36-45	2.5-4.0	—	—	—	—	—	VH
HI 26-35	2.0-4.5	2.5-4.0	—	—	0.5	—	HI
MH 17-25	2.0-5.0	2.5-4.5	2.5-4.0	—	0.5	0.5	MH
ML 8-16	1.5-5.5	2.0-4.5	2.5-4.5	—	0.5	0.5	ML
LO 1-7	1.5-5.5	2.0-5.0	2.0-4.5	—	0.5	0.5	LO
		1.5-5.5	2.0-5.0	—	1.0	—	

Cruise Speed: 4.0 Restr.Arcs: —
 Climb Speed: 3.0 BlindArcs: 30-
 Visibility: 5 Internal Fuel: 135
 Size Modifier: 0 Ata Refuel: No
 Vulnerability: +1 Ejection Seat: Early



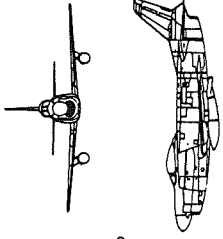
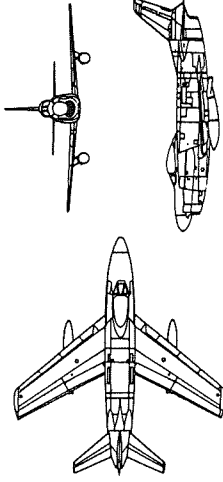
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F-86D/L
Sabre-Dog
Crew: Pilot only

Crew: Pilot only

Power Chart		(Accel) *	
Power	CL	1/2	DT Fuel
Aft. Bur.	1.5	1.0	1.0 3.0
Military	1.0	1.0	1.0 1.0
Normal	0.0	0.0	0.0 0.5
Idle	FP	0.5	1.0 0.0
Sp.Br.FP	0.5	0.5	1.0 —

Smoker in Military Power



Cruise Speed:	5.5	Restr.Arcs:	—
Climb Speed:	3.5	BlindArcs:	30-
Visibility:	5	Internal Fuel:	205
Size Modifier:	0	Ata Refuel:	No
Vulnerability:	0	Ejection Seat:	Early

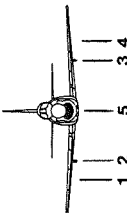
Air Power

Maneuver Costs:	HFP	Decel
Lag/Displ. Rolls:	1.0	1.0
Vertical Rolls:	0.0	0.0

	Turn Drag Chart			(Decel)
	CL	1/2	DT	
TT	1.0	1.0	1.0	
HT	1.0	2.0/1.0	2.0/1.0	
BT	3.0/2.0	3.0/2.0	3.0/2.0	
ET	NA	NA	NA	

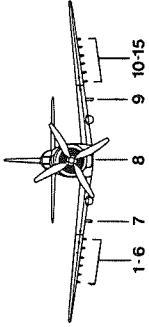
Slatted wings: if speed > 3.5, use lower Decel number.

Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt. Bnd.	Conf. Ceil.	CL 50	1/2 47	DT 44	Dive Vel.		
EH+	46 +	3.0-6.0	3.0-5.5	—	6.5	CL AB	1/2 AB
VH	36-45	3.0-6.0	3.0-5.5	3.0-5.0	6.5	Other	Other
HI	26-35	2.5-6.0	2.5-6.0	3.0-5.5	7.0		
MH	17-25	2.0-6.5	2.5-6.0	2.5-6.0	7.0		
ML	8-16	1.5-6.5	2.0-6.5	2.5-6.0	7.5		
LO	1-7	1.5-7.0	2.0-6.5	2.0-6.0	7.5		

Radar: ECCM: 0 Arcs: 180+ Search: 70 -10 Track: 40 - 8 Lock-On: 6 (D), 7 (L)		APG-36	ECM: IFF: Yes RWR: — DDS: — DJM: — AJM: —	F-86D/L	Weapons Stations Diagram: 
Gun Type: NONE Roll to Hit: — Ammunition: — Gunsight Mods: HT+1, BT+2 Radar Ranging: RE ATA / AtG Rating: —		Technology: C.C. Rocket Attack			
Bomb System: Manual (-0)					
Notes and Variants: 1. F-86D/L have no cannon. They have 2 factors of air to air rockets in retractable belly tray (sta. 5). 2. May use AIM-9B IRMs after 1956. 3. F-86D only is High Transonic Drag (HTD). 4. F-86L always uses lower turn Decel due to larger wing.					
Configuration Points Limits: CL = 0 - 2 1/2 = 3 - 6 DT = 7+			Load Limit: 4,000		
Weapon Stations		Station Limits	Allowed Loads		
1,4 2,3		1000 1000	BB, FT. BB, FT, IRM.		
5		Internal Rocket tray 2 Factors of Air to Air rockets.			
V.P.s: F-86D=11, 8, 3, 1 F-86L=13, 9, 3, 2					

<div><div>F-89 D/H/J</div><div>Scorpion</div></div>					<div><div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div><div><div><div></div><div></div></div><div><div></div><div></div></div></div></div></div> <div><div><div></div><div></div></div><div><div></div><div></div></div></div>					<div>Air Power</div> <div><div><div>Maneuver Costs:</div><div>HFP</div><div>Decel</div></div><div>Lag/Displ.. Rolls:</div><div>1.0</div><div>1.5</div></div> <div><div>Vertical Rolls:</div><div>0.0</div><div>1.0</div></div>					
<div><div>Crew: Pilot, Radar Officer</div></div>					<div><div>Turn Drag Chart</div><div>(Decel)</div><div>CL1/2DT</div></div>										
<div><div>Power Chart</div><div>(Accel)</div><div>••</div><div>PowerCL1/2DTFuel</div></div>					<div><div>TT</div><div>0.0</div><div>0.0</div><div>1.0</div><div>1.0</div></div>										
<div><div>Aft. Bur.*</div><div>1.0</div><div>1.0</div><div>1.0</div><div>6.0</div></div>					<div><div>HT</div><div>1.0</div><div>1.0</div><div>2.0</div><div>2.0</div></div>										
<div><div>Military</div><div>1.0</div><div>1.0</div><div>0.5</div><div>3.0</div></div>					<div><div>BT</div><div>2.0</div><div>2.0</div><div>2.0</div><div>2.0</div></div>										
<div><div>Normal</div><div>0.0</div><div>0.0</div><div>0.0</div><div>1.0</div></div>					<div><div>ET</div><div>NA</div><div>NA</div><div>NA</div><div>NA</div></div>										
<div><div>Idle FP</div><div>0.5</div><div>0.5</div><div>1.0</div><div>0.0</div></div>					<div><div>Internal Fuel quantity includes</div></div>										
<div><div>Sp.Br. FP</div><div>0.5</div><div>1.0</div><div>1.0</div><div>—</div></div>					<div><div>that in aircraft Tip Tanks.</div></div>										
<div><div>* Reduce maximum speeds by</div><div>0.5 if aircraft not in A/B Power.</div></div>					<div><div>Climb Capability Chart</div></div>										
<div><div>Minimum - Maximum Velocity Chart</div></div>					<div><div>Climb Capability Chart</div></div>										
<div><div>Alt.</div><div>Conf.</div><div>Bnd.</div></div>		<div><div>CL</div><div>49</div></div>		<div><div>1/2</div><div>45</div></div>		<div><div>Dive</div><div>Vel.</div></div>		<div><div>CL</div><div>AB</div><div>Other</div></div>		<div><div>1/2</div><div>AB</div><div>Other</div></div>		<div><div>DT</div><div>AB</div><div>Other</div></div>		<div><div>Alt.</div><div>Bnd</div></div>	
<div><div>EH+</div><div>46+</div></div>		<div><div>3.0-5.0</div></div>		<div><div>—</div></div>		<div><div>6.0</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>—</div><div>—</div></div>		<div><div>—</div><div>—</div></div>		<div><div>EH+</div><div>Bnd</div></div>	
<div><div>VH</div><div>36-45</div></div>		<div><div>3.0-5.5</div></div>		<div><div>3.0-4.5</div></div>		<div><div>6.0</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>VH</div><div>Bnd</div></div>	
<div><div>HI</div><div>26-35</div></div>		<div><div>2.5-6.0</div></div>		<div><div>3.0-5.0</div></div>		<div><div>6.5</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>0.5</div><div>0.25</div></div>		<div><div>HI</div><div>Bnd</div></div>	
<div><div>MH</div><div>17-25</div></div>		<div><div>2.5-6.0</div></div>		<div><div>2.5-5.0</div></div>		<div><div>6.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>MH</div><div>Bnd</div></div>	
<div><div>ML</div><div>8-16</div></div>		<div><div>2.0-6.5</div></div>		<div><div>2.0-5.5</div></div>		<div><div>7.0</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>ML</div><div>Bnd</div></div>	
<div><div>LO</div><div>1-7</div></div>		<div><div>1.5-6.5</div></div>		<div><div>2.0-5.5</div></div>		<div><div>7.0</div></div>		<div><div>1.5</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>1.0</div><div>0.5</div></div>		<div><div>LO</div><div>Bnd</div></div>	

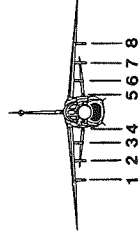
<i>A-1H/J Skyraider</i>				<i>Air Power</i>			
Crew: Pilot only				Maneuver Costs: HFP Decel			
Power Chart (Accel) ☉				Lag/Displ. Rolls: 1.0 2.0			
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 1.0			
Full Thr.	1.5	1.0	1.0 0.5	Turn Drag Chart (Decel)			
Half Thr.	0.5	0.5	0.5 0.2				
Normal	0.0	0.0	0.0 0.1				
Idle FP	0.5	0.5	0.5 0.0				
Sp.Br.FP	0.5	1.0	1.0 —				
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt. Conf.	CL	1/2	DT	CL	1/2	DT	Alt.
Bnd. Ceil.	30	24	13	AB Other	AB Other	Other	Bnd.
EH+ 46 +	—	—	—	—	—	—	EH+
VH 36-45	—	—	—	—	—	—	VH
HI 26-35	1.5-3.0	—	—	—	—	—	HI
MH 17-25	1.5-3.0	1.5-2.5	1.5-2.0	—	0.5	—	MH
ML 8-16	1.0-3.0	1.0-2.5	1.5-2.5	—	0.5	—	ML
LO 1-7	1.0-3.0	1.0-3.0	1.0-2.5	—	1.0	—	LO

Radar: NONE		ECM: A-1H/J		Weapons Stations Diagram:																
ECCM: _____	IFF: Yes																			
Arcs: _____	RWR: _____																			
Search: _____	DDS: _____																			
Track: _____	DJM: _____																			
Lock-On: _____	AJM: _____																			
Gun Type: Four 20mm Mk.12		Configuration Points Limits: CL = 0 - 6																		
Roll to Hit: 0 = 5, 1 = 4, 2 = 3		1/2 = 7 - 12																		
Ammunition: 6.0		DT = 13+																		
Gunsight Mods: HT+1, BT+2		<table><thead><tr><th>Weapon Stations</th><th>Station Limits</th><th>Allowed Loads</th></tr></thead><tbody><tr><td>1 - 6*</td><td>500</td><td>BB, RP, RK. *</td></tr><tr><td>10 - 15*</td><td>500</td><td>BB, RP, RK. *</td></tr><tr><td>7,9</td><td>1200</td><td>BB, RP, RK, FT.</td></tr><tr><td>8</td><td>2200</td><td>BB, FT.</td></tr></tbody></table>				Weapon Stations	Station Limits	Allowed Loads	1 - 6*	500	BB, RP, RK. *	10 - 15*	500	BB, RP, RK. *	7,9	1200	BB, RP, RK, FT.	8	2200	BB, FT.
Weapon Stations	Station Limits					Allowed Loads														
1 - 6*	500					BB, RP, RK. *														
10 - 15*	500					BB, RP, RK. *														
7,9	1200	BB, RP, RK, FT.																		
8	2200	BB, FT.																		
Radar Ranging: _____																				
AtA / AtG Rating: 5 / 6 *																				
Bomb System: Manual (-0)																				
Notes and Variants:																				
1. The earlier designation of the A-1H/J was AD-6/7.																				
2. The A-1 is fitted with a rocket extraction device to aid the pilot in bailing out (-1 modifier). The airplane is not ejection seat equipped.																				
Variant: Korean War Era Skyraider (AD-4) - As A-1H/J except delete rocket extraction device. Delete RP and FT from allowed loads. Vulnerability= +1.																				
V.P.s: A-1H/J= 8, 6, 4, 2 AD-4= 7, 5, 3, 2																				

A-7A/B Corsair II				Air Power			
Crew: Pilot only				Maneuver Costs: HFP Decel			
Power Chart (Accel) •				Lag/Displ. Rolls: 1.0 1.0			
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 0.0			
Aft. Bur.	—	—	—	Turn Drag Chart (Decel)			
Military	1.0	1.0	1.0 2.0	CL	1/2	DT	
Normal	0.0	0.0	0.0 1.0	TT	1.0	1.0	1.0
Idle FP	0.5	1.0	1.0 0.0	HT	2.0	2.0	2.0
Sp.Br.FP	1.0	1.0	1.0 —	BT	3.0	4.0	4.0
Smoker in Military Power				ET	NA	NA	NA
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt. Conf.	CL	1/2	Dive	CL	1/2	DT	Alt.
Bnd. Ceil.	40	32	26	AB Other	AB Other	AB Other	Bnd.
EH+ 46 +	—	—	—	—	—	—	EH+
VH 36-45	30-50	—	—	—	—	—	VH
HI 26-35	30-50	—	—	—	—	—	HI
MH 17-25	25-50	3.0-4.5	3.5-4.5	—	0.5	—	MH
ML 8-16	20-55	2.5-5.0	3.0-4.5	—	0.5	—	ML
LO 1-7	1.5-5.5	2.0-5.0	2.5-5.0	—	1.0	—	LO
		2.0-5.5	2.5-5.0	—	1.0	—	

Cruise Speed: 4.5 Restr.Arcs: 60-
Climb Speed: 3.5 BlindArcs: 30-
Visibility: 6 Internal Fuel: 480
Size Modifier: 0 Ata Refuel: Yes
Vulnerability: 0 Ejection Seat: Std.

Weapons Stations Diagram:				Configuration Points Limits: CL = 0 - 6 A-7A= 10,000 1/2 = 7 - 12 Load Limit: A-7B= 15,000 DT = 13+			
Weapon Stations				Station Limits			
Allowed Loads				Weapon Stations			
1,8				3500			
2,7				3500			
3,6				2500			
4,5				250			
V.P.s: A/B= 18,12,6,3 C/P= 20,14,7,4							



Radar: APQ-116
ECCM: 0
Arcs: 180+
Search: Gr. Nav. (90)
Track: Gr. Attack (30)
Lock-On: 6 *
Gun Type: Two 20mm Mk. 12
Roll to Hit: 0= 5, 1= 3, 2= 1
Ammunition: 8.0
Gunsight Mods: TT+1, HT+2, BT+3
Radar Ranging: —
ATA / AtG Rating: 4 / 4 *
Bomb System: Ballistic (-1)
Notes and Variants:
1. High Transonic Drag (HTD).
2. May use AIM-9 IRM, AGM-12 RG and AGM-45 ARMs.
Variant: A-7C Interim Navy model - As A-7B except use radar, bomb system, ECM, internal gun and technology of A-7E (see A-7D/E data card).
Variant: A-7P Portuguese export model - As A7B except use radar and bomb system of A-7E. Delete DDS and DJM from ECM.

ECM:
IFF: Yes
RWR: A
DDS: A
DJM: A3
AJM: —
Technology:
NONE

A-3 Skywarrior / B-66 Destroyer

Crew: Pilot, Navigator, EW Officers

Power Chart (Accel) ..

Power CL 1/2 DT Fuel

Aft. Bur. — — — —

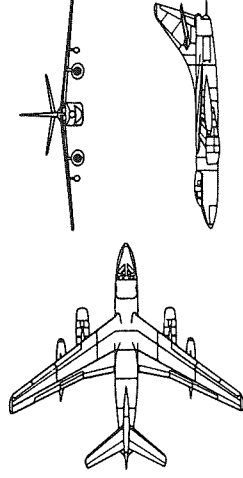
Military 1.0 1.0 0.5 4.0

Normal 0.0 0.0 0.0 2.0

Idle FP 0.5 0.5 1.0 0.0

Sp.Br. FP 0.5 1.0 1.0 —

Smoker in Military Power



Cruise Speed: 5.0 Restr. Arcs: —
Climb Speed: 3.5 Blind Arcs: 60-
Visibility: 8 Internal Fuel: 1450
Size Modifier: -1 Aft Refuel: Yes
Vulnerability: -1 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: NA | NA
Vertical Rolls: 0.0 | 1.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	1.0	2.0	2.0
HT	2.0	3.0	3.0
BT	NA	NA	NA
ET	NA	NA	NA

Limited to one Vertical Roll per game-turn maximum.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +	—	—	—	—	—
VH 36-45	3.0-5.5	—	—	—	6.0
HI 26-35	2.5-5.5	—	—	3.0-5.0	6.5
MH 17-25	2.0-6.0	—	—	2.5-5.5	6.5
ML 8-16	2.0-6.0	—	—	2.5-5.5	6.5
LO 1-7	1.5-6.0	—	—	2.0-5.0	6.5

Climb Capability Chart

Alt. Bnd.	CL	1/2	DT	Other
EH+	—	—	—	—
VH	—	—	—	—
HI	—	0.5	—	0.25
MH	—	0.5	—	0.5
ML	—	1.0	—	0.5
LO	—	1.0	—	1.0

Radar: ASB-7 APS-63

ECCM: 1 1

Arcs: 180+ 180+

Search: Gr.Nav (150) Gr.Nav (180)

Track: Gr.Att (90) Gr.Att. (120)

Lock-On: 7 * 7 *

Guns: Twin 20mm Tail Turret

Roll to Hit: 0 = 3, 1 = 2, 2 = 1

Ammunition: 6.0

Gunsight Mods: NA

Radar Ranging: See Notes RE

ATA / AtG Rating: 4 / NA

Bomb System: Ballistic (-1)

Notes and Variants:

1. High Transonic Drag (HTD).

2. A-3 and EA-3 variants have no ejection seats.

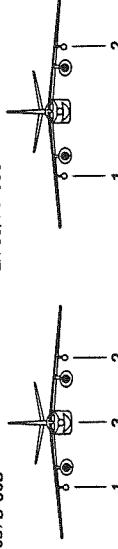
3. Tail Turret may be deleted for improved ECM suite.

If done, add DDS-A to A-3, add DJM-B3 to both and IR jammer to B-66 (+2 to IRM attacks from 60- arcs).

4. Tail Turret Rules: Turret may fire up to twice in response to gun attacks in 60- arcs but only if attacker locked-on by tail radar. No modifiers apply to tail turret shots.

Weapons Stations Diagram:

A-3B/B-66B EA-3B/RB-66C



Configuration Points Limits: CL = 0 - 6
1/2 = 7 - 9
DT = 10+

Load Limit: 15,000

Weapon Stations	Station Limits	Allowed Loads
1, 2	3000	BB, FT, EP.
3 *	9000	BB, Nuc. BB.

* Internal Bomb Bay: Load options =

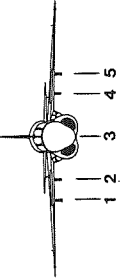
a) four 2,000 lb. BB. b) six 1,000 lb. BB.

c) twelve 500 lb. BB. d) two Nuclear BB.

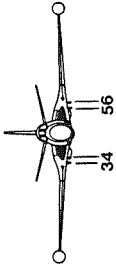
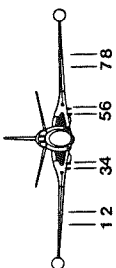
Variants: EA-3B and RB-66 Electronic Warfare versions - Crew; add two EW officers. Delete tail guns. Delete Bomb Bay. ECM= RWR-C, DDS-A, DJM-B4, AJM-B4, and two BJM-B3. Also, RB-66 has IR jammer see note 3.

V.P.s: A3/B66= 24,16,8,4 EA3/RB66= 34,22,12,4

A-6A/E Intruder				Air Power			
Crew: Pilot, Weapons Officer				Maneuver Costs: HFP Decel			
Power Chart (Accel) **				Lag/Displ. Rolls: 1.0 1.5			
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 0.5			
Military-A	1.0	1.0	1.0 3.0	Turn Drag Chart (Decel)			
Military-E	1.5	1.0	1.0 3.0				
Normal	0.0	0.0	0.0 1.0				
Idle FP	0.5	1.0	1.0 0.0				
Sp.Br.FP	0.5	1.0	1.0 —				
Smoker in Military Power				Turn Drag Chart (Decel)			
				CL	1/2	DT	
				TT	1.0	1.0	2.0
				HT	2.0	2.0	3.0
				BT	3.0	4.0	4.0
				ET	NA	NA	NA
Cruise Speed: 4.0				Restr. Arcs: 60L			
Climb Speed: 3.5				Blind Arcs: 30-			
Visibility: 7				Internal Fuel: 780			
Size Modifier: 0				Ata Refuel: Yes			
Vulnerability: 0				Ejection Seat: Std.			
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt.	Conf.	CL	1/2	CL	1/2	DT	Alt.
Bnd.	Ceil.	40 / 45	36 / 40	AB	Other	AB	Bnd.
EH+ 46 +	—	—	—	—	—	—	EH+
VH 36-45	3.0-5.5	3.0-5.0	—	—	0.5	—	VH
HI 26-35	2.5-6.0	3.0-5.0	—	—	1.0	—	HI
MH 17-25	2.0-6.0	2.5-5.5	—	—	1.0	—	MH
ML 8-16	1.5-6.0	2.5-5.5	—	—	1.0	—	ML
LO 1-7	1.5-6.5	2.0-6.0	—	—	1.5	—	LO

Weapons Stations Diagram:			
			
Configuration Points Limits: CL = 0 - 6 A-6A= 15,000 1/2 = 7 - 14 Load Limit: A-6E= 17,200 DT = 15+			
Weapon Stations	Station Limits	Allowed Loads	
A-6A 1,5	3600	BB, RP, RG, WR, GP, EP, FT, IRM.*	
2,4	3600	BB, RP, RG, WR, GP, EP, FT.	
3	3600	BB, RP, WR, EP, FT.	
A-6E Additional allowed Loads: Stations 1,2,4,5: BG, BS, ARM, DP.* Station 3: BG, DP.			
* May use AIM-9B IRMs and AGM-45 ARMs.			
V.P.s: A-6A= 24,16,8,4 A-6B= 26,17,9,4 A-6E= 28,18,9,5 TRAM= 30,20,10,5			
Radar: APQ-92 APQ-148 ECCM: 0 1 Arcs: 180+ 180+ Search: Gr.Nav (150) Gr.Nav (180) Track: Gr.Att. (120) Gr.Att. (150) Lock-On: 7* 8*			
ECM: A-6A A-6E IFF: Yes Yes RWR: A B DDS: A3 B3 DJM: A3 B4 AJM: — —			
Gun Type: NONE Roll to Hit: — Ammunition: — Gunsight Mods: — Radar Ranging: TT+1, HT+2, BT+3 ATA / AtG Rating: —			
Technology: A-6A Terrain Following-A A-6E Terrain Following-B			
Bomb System: A-6A= Ballistic (-1) A-6E= Computed (-2)			
Notes and Variants: 1. High Transonic Drag (HTD). 2. High Roll Rate. 3. No ECM except IFF prior to 1965. Variant: A-6B Iron Hand version (1968) - As A-6A except RWR = B and may use AGM-45 and AGM-78 ARMs on sta. 1,2,4,5. Variant: A-6E TRAM version (1978) - As A-6E but add Laser Designator - C, Laser Spot Tracker and TV/IR Optics to Technology. Add ASM to allowed loads on sta. 1,2,4,5. May use AGM-45, 78, and 88 ARMs and AGM-84 Harpoon ASMs.			

<i>F2H-3/4 Banshee</i>					<i>Air Power</i>				
Crew: Pilot only					Maneuver Costs: HFP Decel				
Power Chart		(Accel) ..			Lag/Displ. Rolls:		1.0 1.5		
Power	CL	1/2	DT	Fuel	Vertical Rolls:		0.0 0.5		
Aft. Bur.	—	—	—	—	Turn Drag Chart (Decel)				
Military	1.0	1.0	1.0	2.0	CL	1/2	DT		
Normal	0.0	0.0	0.0	1.0	TT	1.0	1.0		
Idle	FP	0.5	0.5	0.0	HT	2.0	2.0		
Sp.Br.	FP	0.5	0.5	1.0	BT	2.0	3.0		
Smoker in Military Power					ET	NA	NA		
Cruise Speed: 4.5					Restr.Arcs: 180L				
Climb Speed: 3.0					BlindArcs: 30-				
Visibility: 6					Internal Fuel: 470				
Size Modifier: 0					Ata Refuel: Yes				
Vulnerability: 0					Ejection Seat: Early				
Minimum - Maximum Velocity Chart					Climb Capability Chart				
Alt.	Conf.	CL	1/2	DT	Dive	CL	1/2	DT	Alt.
Bnd.	Ceil.	46	42	38	Vel.	AB	Other	AB	Other
EH+ 46 +	3.0-4.5	—	—	—	6.0	—	—	—	—
VH 36-45	2.5-5.0	3.0-4.5	3.0-4.5	3.0-4.5	6.0	—	0.5	—	0.5
HI 26-35	2.0-5.0	2.5-5.0	2.5-5.0	2.5-4.5	6.5	—	0.5	—	0.5
MH 17-25	2.0-5.5	2.0-5.0	2.0-5.0	2.5-5.0	6.5	—	1.0	—	0.5
ML 8-16	1.5-5.5	2.0-5.0	2.0-5.0	2.0-5.0	7.0	—	1.0	—	1.0
LO 1-7	1.5-5.5	1.5-5.0	2.0-5.0	2.0-5.0	7.0	—	1.0	—	1.0

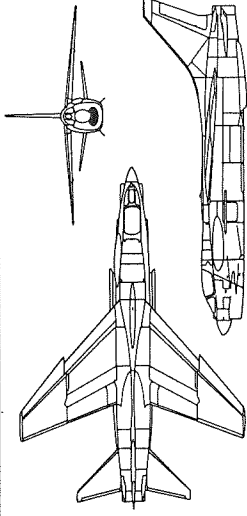
<div>Weapons Stations Diagram:</div> <div><div><div>F2H-2</div></div><div><div>F2H-2B/3/4</div></div></div>			
<div>Configuration Points Limits: CL = 0 - 4</div> <div>F2H-2= 1,000 1/2 = 5 - 8</div> <div>Load Limit: -2B/3/4= 2,000 DT= 9+</div>			
<div>Weapon Stations</div> <div>Station Limits</div> <div>Allowed Loads</div>			
1,2,7,8		250	
3,6		250	
4,5 *		500	
* If 500lb. weapons are carried on stations 4 and 5, then 3 and 6 are unusable due to close spacing.			
V.P.s: F2H-2/2P= 8,5,3,1 F2H-2B= 9,5,3,1		F2H-3= 11,7,4,2 F2H-4= 12,8,4,2	

<div>Radar: APQ-41 APG-37</div> <div>ECCM: 0 0</div> <div>Arcs: 180+ 180+</div> <div>Search: 32 - 8 70 - 10</div> <div>Track: 24 - 6 40 - 8</div> <div>Lock-On: 5 6</div>		<div>ECM:</div> <div>IFF: F2H Yes</div> <div>RWR: —</div> <div>DDS: —</div> <div>DJM: —</div> <div>AJM: —</div>	
<div>Gun Type: Four 20mm Mk.12</div> <div>Roll to Hit: 0= 6, 1= 4, 2= 3</div> <div>Ammunition: 6.0</div> <div>Gunsight Mods: HT+1, BT+2</div> <div>Radar Ranging: RE</div> <div>AtA / AtG Rating: 5 / 6 *</div>		<div>Technology:</div> <div>NONE</div>	
<div>Bomb System: Manual (-0)</div>			
<div>Notes and Variants: 1. High Transonic Drag (HTD).</div> <div>2. Ata refuel capability added after Korean War (1954).</div> <div>3. May use AIM-9B IRMs after 1957.</div> <div>4. F2H-4 - Add 0.5 to all Maximum allowed speeds.</div> <div>5. Radar data is for F2H-3 and F2H-4 respectively.</div> <div>Variant: F2H-2/2B Early Banshee - Delete radar, no radar ranging. Delete Ata refuel. Internal fuel = 410. Reduce cieling by 2. Reduce MH CCC to 0.5, and LO CCC to 1.0 max.</div> <div>Variant: F2H-2P Photo-Recon Banshee - Delete guns; camera filled nose. Recon options= Oblique camera, overhead camera.</div>			

F-8C/D
Crusader

Crew: Pilot only

Power Chart (Accel) *				
Power	CL	1/2	DT	Fuel
Aft. Bur.	2.5	2.5	2.0	7.0
Military	1.0	1.0	1.0	2.0
Normal	0.0	0.0	0.0	1.0
Idle	FP	0.5	0.5	0.0
Sp.Br.FP	0.5	0.5	0.5	—



Air Power

Maneuver Costs:	HFP	Decel
Lag/Displ. Rolls:	1.0	1.0
Vertical Rolls:	0.0	0.0

	Turn Drag Chart (Decel)	
	CL	1/2 DT
TT	1.0	1.0
HT	1.0	2.0
BT	3.0	3.0
ET	3.0	4.0

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+	46 +	3.5-11.0	4.0-10.0	4.0-9.0	12.0
VH	36-45	3.0-11.0	3.0-10.0	3.0-9.0	12.0
HI	26-35	2.5-10.0	2.5-10.0	2.5-9.0	11.0
MH	17-25	2.0-9.0	2.0-9.0	2.0-8.0	10.0
ML	8-16	2.0-8.0	2.0-8.0	2.0-7.5	9.5
LO	1-7	1.5-7.5	2.0-7.5	2.0-7.5	8.5

Climb Capability Chart

CL		1/2		DT		Alt.
AB	Other	AB	Other	AB	Other	Bnd.
1.0	0.5	1.0	0.5	1.0	0.5	EH+
1.0	0.5	1.0	0.5	1.0	0.5	VH
2.0	1.0	2.0	1.0	2.0	1.0	HI
3.0	1.0	3.0	1.0	2.0	1.0	MH
3.0	1.5	3.0	1.0	3.0	1.0	ML
4.0	2.0	3.0	1.0	3.0	1.0	LO

Radar: APS-67 APQ-83

ECCM:	0	0
Arcs:	180+	180+
Search:	40 - 8	80 - 10
Track:	24 - 6	40 - 10
Lock-On:	6	6

ECM: F-8C/D

IFF:	Yes
RWR:	—
DDS:	—
DJM:	—
AJM:	—

Gun Type: Four 20mm Mk.12

Roll to Hit: $0=6, 1=4, 2=3$

Ammunition: 4.0

Gunsight Mods: HT+1 BT+2

Badar Banding: BE

AtA / AtG Rating: 5/6 *

Bomb System: Manual (-0)

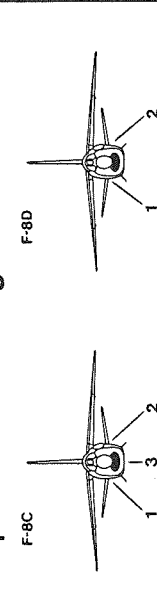
Bomb System: Manual (-0)

Notes and Variants:

1. Rapid Acel Aircraft.
2. ECM Upgrade in 1966; add RWR - A.
3. ECM Upgrade in 1969; add DJM - A3; reduce ammo to 2.5.
4. F-8D fuel= 435; small fuel cell replaces F-8C rocket pack.
5. Radar data is for F-8C and F-8D respectively.

Variant: RF-8A Photo-Recon version - Delete internal guns and weapons stations. Increase fuel to 480. No ECM upgrades. Nose filled with cameras; Recon Options= Oblique camera, overhead day and night camera. All else as F-8C.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0

$$1/2 = 1 - 4$$

Load Limit: 1,400
DT = 5+

1000

Weapon Stations	Station Limits	Allowed Loads
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16
17	17	17
18	18	18
19	19	19
20	20	20
21	21	21
22	22	22
23	23	23
24	24	24
25	25	25
26	26	26
27	27	27
28	28	28
29	29	29
30	30	30
31	31	31
32	32	32
33	33	33
34	34	34
35	35	35
36	36	36
37	37	37
38	38	38
39	39	39
40	40	40
41	41	41
42	42	42
43	43	43
44	44	44
45	45	45
46	46	46
47	47	47
48	48	48
49	49	49
50	50	50
51	51	51
52	52	52
53	53	53
54	54	54
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89	89	89
90	90	90
91	91	91
92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

F-8C	350	IRM, RP*.
1,2		Retractable Rocket Pack with
3		3 factors of air to air rockets.
F-8D	700	IRM, RHM, RP*.
1,2		

- * Only LAU-33 type RPs allowed.
- * Only AIM-9C RHM's allowed.
- * Only AIM-9 type IRMs allowed.

V.P.s: F-8C=20.14.6.2 F-8D=22.15.7.3

<i>A-4C/E Skyhawk</i>				<i>Air Power</i>					
Crew: Pilot only				Maneuver Costs: HFP Decel					
Power Chart (Accel) •				Lag/Displ. Rolls: 1.0 1.0					
Power	CL	1/2	DT Fuel	Vertical Rolls: 0.0 0.0					
Aft. Bur.	—	—	—	Turn Drag Chart (Decel)					
Military	2.0	1.5	1.0 1.5	CL	1/2	DT			
Normal	0.0	0.0	0.0 1.0	TT	0.0	1.0	1.0		
Idle FP	0.5	0.5	1.0 0.0	HT	1.0	2.0	2.0		
Sp.Br.FP	0.5	1.0	1.0 —	BT	3.0/2.0	4.0/3.0	4.0/3.0		
Smoker in Military Power				ET	NA	NA	NA		
				Slatted Wings; if speed >= 3.5 use lower Decel number.					
Minimum - Maximum Velocity Chart				Climb Capability Chart					
Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
EH+ 46 +		3.5-5.0	—	—	6.0	—	—	—	EH+ EH+
VH 36-45		3.0-5.5	3.5-5.0	—	6.0	—	0.5	—	VH VH
HI 26-35		2.5-5.5	3.0-5.0	3.0-4.5	6.5	—	0.5	0.5	HI HI
MH 17-25		2.0-6.0	2.0-5.5	2.5-5.0	6.5	—	0.5	0.5	MH MH
ML 8-16		1.5-6.0	2.0-5.5	2.0-5.0	7.0	—	1.0	0.5	ML ML
LO 1-7		1.5-6.5	1.5-5.5	2.0-5.0	7.0	—	1.0	1.0	LO LO

Radar: APG-53		Weapons Stations Diagram:	
ECM:	0	A-4C A-4E	
Arcs:	180+		
Search:	Gr.Nav (60)		
Track:	—		
Lock-On:	—		
Gun Type: Two 20mm Mk.12		Configuration Points Limits: CL = 0 - 6	
Roll to Hit:	0= 5, 1= 3, 2= 1	A-4C= 7,400 1/2 = 7 - 12	
Ammunition:	3.0	Load Limit: A-4E= 8,200 DT = 13+	
Gunsight Mods:	TT+1, HT+2, BT+3		
Radar Ranging:	—		
ATA / AtG Rating:	4 / 4 *		
Bomb System: Manual (-0)		Weapon Station Limits Allowed Loads	
Notes and Variants:		1,5 * 600 BB, RP, RG, TR, IP, ARM.	
1. A-4C ECM upgrade; add RWR-A in 1965, add DDS-A and DJM-A3 in 1966.		2,4 * 2200 BB, BS, RP, RG, IP, WR, GP, FT, ARM.	
2. A-4E ECM upgrade; change RWR to B, DDS to B, and DJM to B3 in 1969.		3 * 3100 BB, BS, RP, RG, IP, WR, GP, FT.	
3. High Transonic Drag (HTD).			
4. High Roll Rate.			
5. A-4C may not use BS weapons. Only some A-4Cs wired for ARMs (die roll 4-). Some A-4Cs wired for AIM-9B IRMs on stations 2,4 (die roll 4-).			
		V.P.s: A-4C= 11,7,4,1 A-4E=13,9,4,2	

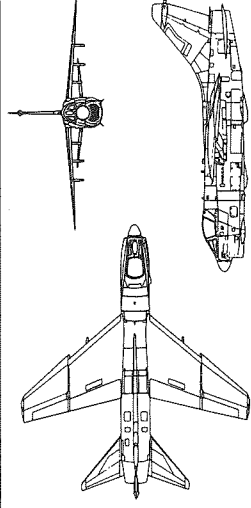
A-7D/E Corsair II

Crew: Pilot only

Power Chart (Accel) *

Power	CL	1/2	DT	Fuel
Aft. Bur.	—	—	—	—
Military	1.5	1.0	1.0	2.0
Normal	0.0	0.0	0.0	1.0
Idle FP	0.5	1.0	1.0	0.0
Sp.Br. FP	1.0	1.0	1.0	—

Smoker in Military Power



Cruise Speed: 4.5 Restr.Arcs: 60-
Climb Speed: 4.0 BlindArcs: 30-
Visibility: 6 Internal Fuel: 500
Size Modifier: 0 Ata Refuel: Yes
Vulnerability: +1 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP Decel
Lag/Displ. Rolls: 1.0 1.0
Vertical Rolls: 0.0 0.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	1.0	1.0	2.0/1.0
HT	2.0/1.0	2.0/1.0	3.0/2.0
BT	4.0/3.0	4.0/3.0	5.0/4.0
ET	NA	NA	NA

Automatic maneuver flaps; if speed > 3.5 use lower Decel.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +	—	—	—	—	—
VH 36-45	3.0-6.0	—	—	—	7.0
HI 26-35	2.5-6.5	—	—	3.0-5.0	7.0
MH 17-25	2.0-6.5	—	2.5-6.0	2.5-5.0	7.0
ML 8-16	1.5-6.0	—	2.0-5.5	2.0-5.0	7.5
LO 1-7	1.5-6.0	—	1.5-5.5	2.0-5.0	7.5

Climb Capability Chart

Alt. Bnd.	CL	1/2	DT
EH+ 46 +	—	—	—
VH 36-45	—	—	—
HI 26-35	—	0.5	—
MH 17-25	—	1.0	0.5
ML 8-16	—	1.0	0.5
LO 1-7	—	1.0	1.0

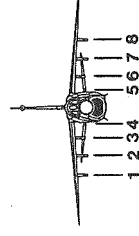
Radar: APQ-126

ECCM: 0
Arcs: 180+
Search: Gr. Nav. (120)
Track: Gr. Attack (30)
Lock-On: 7 *

ECM: A-7D A-7E

IFF: Yes Yes
RWR: B B
DDS: B B
DJM: — B4
AJM: — —

Weapons Stations Diagram:



Gun Type: 20mm M61 Vulcan

Roll to Hit: 0=6, 1=3, 2=1
Ammunition: 5.0
Gunsight Mods: HT+2, BT+3
Radar Ranging: —
AtA / AtG Rating: 6 / 8 *

Technology:

A-7D
Terrain Following - A
Laser Spot Tracker
A-7E
Terrain Following - A

Configuration Points Limits:

CL = 0 - 6
1/2 = 7 - 14
DT = 15+

Bomb System: Computed (-2)

Weapon Stations Limits

Weapon Stations	Station Limits	Allowed Loads
1,8	3500	BB, BG, RP, RG, WR, EP, DP, IRM, ARM, FT.
2,7	3500	BB, BG, BS, RP, RG, RS, WR, EP, DP, GP, PP, ARM.
3,6	2500	BB, BG, BS, RP, RG, RS, WR, EP, DP, PP, OP, ARM, FT.
4,5	250	IRM only.

Notes and Variants:

1. High Transonic Drag (HTD).
2. Maneuver flaps function at speeds < 4.0 and serve to reduce minimum speed. At speeds >3.5 or when maneuver flaps not available; increase all minimum speeds by 0.5.
3. A-7D: no maneuver flaps or laser tracker until 1975.
4. A-7E: no maneuver flaps until 1980.
5. A-7D may not use ARMs. RWR=C after 1980.
6. A-7E upgraded in 1985 - May use AGM-88 ARMs. ECM changes; RWR= C, DJM= C4.

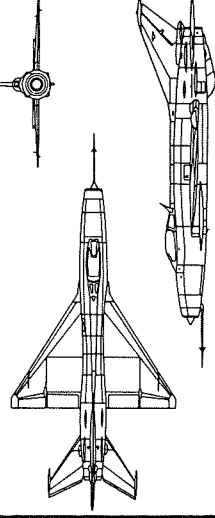
Notes: Only AIM-9 IRMs and AGM-45 ARMs allowed normally.

V.P.s: A-7D/E= 24, 16, 8, 4.

MiG-21F/PF Fishbed - C/D

Crew: Pilot only

Power Chart		(Accel)		•	
Power	CL	1/2	DT	Fuel	
Aft. Bur.	3.0	3.0	2.5	5.0	
Military	2.0	2.0	1.5	2.0	
Normal	0.0	0.0	0.0	1.0	
Idle FP	0.5	0.5	0.5	0.0	
Sp.Br.FP	0.5	0.5	1.0	—	



Cruise Speed: 6.0 Restr.Arcs:180L,60-
Climb Speed: 4.5 BlindArcs: 30-
Visibility: 5 Internal Fuel: 200
Size Modifier: 0 Ata Refuel: No
Vulnerability: -2 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP Decel
Lag/Displ. Rolls: 1.0 1.0
Vertical Rolls: 0.0 0.0

Turn Drag Chart

	CL	1/2	DT
TT	1.0	1.0	1.0
HT	2.0	2.0	2.0
BT	3.0	4.0	4.0
ET	4.0	NA	NA

Minimum - Maximum Velocity Chart

Alt.	Conf.	CL	1/2	DT	Dive
Bnd.	Ceil.	58	56	54	Vel.
EH+ 46 +	3.5-11.0	3.5-10.0	4.0- 9.0	12.0	12.0
VH 36-45	3.0-12.0	3.0-11.0	3.5-10.0	12.0	12.0
HI 26-35	2.5-10.0	3.0- 9.0	3.0- 8.0	11.0	11.0
MH 17-25	2.0- 9.0	2.5- 8.0	2.5- 7.5	10.0	10.0
ML 8-16	2.0- 7.5	2.0- 7.5	2.5- 7.0	8.0	8.0
LO 1- 7	1.5- 6.5	2.0- 6.5	2.0- 6.5	7.0	7.0

Climb Capability Chart

CL		1/2		DT		Alt.
AB	Other	AB	Other	AB	Other	Bnd
1.0	0.5	1.0	0.5	1.0	0.5	EH+
1.0	0.5	1.0	0.5	1.0	0.5	VH
2.0	1.0	2.0	0.5	1.5	0.5	HI
2.0	1.0	2.0	1.0	1.5	0.5	MH
3.0	1.5	3.0	1.0	2.0	1.0	ML
4.0	2.0	3.0	1.0	2.0	1.0	LO

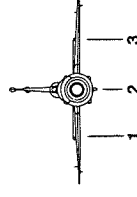
Radar: High Fix	SpIn-Scan
ECCM: 0	0
Arcs: Limited	180+
Search: —	30 - 6
Track: 10 - 6	18 - 6
Lock-On: 5	7
Gun Type: F= One 30mm NR30	
Roll to Hit: 0=3, 1=2, 2=1	
Ammunition: 2.0	
Gunsight Mods: HT+2, BT+3	
Radar Ranging: RE	
AtA / AtG Rating: 3 / 2	
Bomb System: Manual (-0)	

Notes and Variants:

1. MiG-21PF internal fuel = 225.
Radar data for F and PF respectively.
2. MiG-21PF and FL have no internal gun. Gun data for MiG-21F only. PF and FL may use GP-9 gunpack on station 2.
3. All versions have thick front canopy; +1 to sighting die rolls for targets in 180+ arcs.

Variant: Improved MiG-21PF; Internal fuel =220. Add Combat Flaps; if selected on, they extend automatically if speed < 5.0, and retract if speed > = 5.0. Combat flaps reduce all minimum speeds by 0.5 but increase turn decel by 1.0.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 2
1/2 = 3 - 4
DT = 5+

Load Limit: 2,200

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,3 550 BB, RP, RK, DR, BRM, IRM.*

2 1100 FT, GP (PF/FL only).

* MiG-21F may only use AA-2 IRMs; PF and FL may use AA-2 IRMs and AA-1 BRMs.

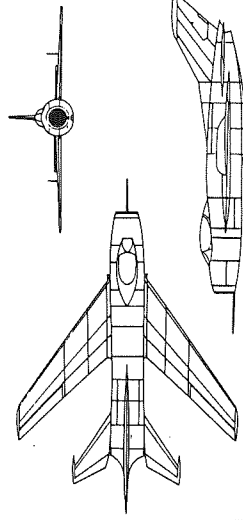
Variant: MiG-21FL Indian Air Force (Type 77) - As basic or improved PF except internal fuel always 220 and stations 1,3 may carry FT.

V.P.s: F=16,10,5,2 PF/FL=18,12,6,3

MiG-19 SF/PF Farmer C/D

Crew: Pilot only

Power Chart (Accel) ..	
Power	CL 1/2 DT Fuel
Aft. Bur.	3.5 3.0 2.5 5.0
Military	2.5 2.0 2.0 2.0
Normal	0.0 0.0 0.0 1.0
Idle FP	0.5 0.5 0.5 0.0
Sp.Br. FP	0.5 1.0 1.0 —



Cruise Speed: 5.5 Restr.Arcs: 60-
Climb Speed: 4.5 BlindArcs: 30-
Visibility: 5 Internal Fuel: 180
Size Modifier: 0 Ata Refuel: No
Vulnerability: +1 Ejection Seat: Early

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 1.0
Vertical Rolls: 0.0 0.5

Turn Drag Chart (Decel)
CL 1/2 DT

TT	1.0	1.0	1.0
HT	2.0	2.0	2.0
BT*	3.0	3.0	3.0
ET*	3.0	4.0	NA

* Unstable at high altitudes and high turn rates; see note 4.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
EH+ 46 +		3.5-8.0	4.0-7.5	4.5-7.0	10.0	1.0 0.5	1.0 0.5	1.0 0.5	EH+
VH 36-45		3.0-8.5	3.5-8.0	4.0-7.0	10.0	1.0 0.5	1.0 0.5	1.0 0.5	VH
HI 26-35		3.0-9.0	3.0-8.0	3.0-7.5	10.0	2.0 1.0	1.0 0.5	1.0 0.5	HI
MH 17-25		2.5-8.5	3.0-8.0	3.0-7.0	9.0	3.0 1.0	2.0 1.0	1.0 0.5	MH
ML 8-16		2.5-7.5	2.5-7.0	2.5-6.5	8.5	4.0 2.0	3.0 1.0	2.0 1.0	ML
LO 1-7		2.0-7.0	2.5-6.5	2.5-6.0	8.0	5.0 2.0	4.0 1.0	3.0 1.0	LO

Climb Capability Chart

Radar: Scan Odd (PF only)

ECCM: 0

Arcs: Limited

Search: 18 - 6

Track: 6 - 6

Lock-On: 7

ECM: MiG-19 SF/PF

IFF: Yes

RWR: A

DDS: —

DJM: —

AJM: —

Technology:

NONE

Gun Type: Three 30mm NR30

Roll to Hit: 0=6, 1=4, 2=1

Ammunition: 2.5

Gunsight Mods: HT+2, BT+3

Radar Ranging: PF=RE

AtA / AtG Rating: 6 / 8

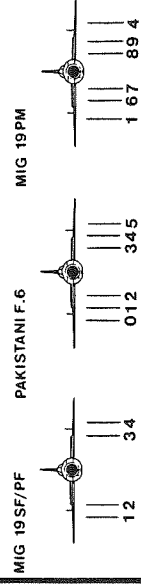
Bomb System: Manual (-0)

Notes and Variants:

1. MiG-19SF Farmer- C has no radar or radar ranging.
2. MiG-19PF Farmer- D has only two 30mm NR30 guns; Roll to Hit = 3, 5, 1 respectively and ATA / AtG = 5 / 6.
3. Both may only use AA-2 IRMs.
4. If doing BT or ET turns at HI+ bands, roll the die once for each facing change after the first. On a "1", the aircraft suffers a maneuvering departure.

Variant: MiG-19PM Farmer- E; as Farmer- D except delete internal guns and delete stations 2,3. Add stations 6,7,8,9. The Farmer- E may only use AA-1 type missiles.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 2
1/2 = 3 - 6
DT = 7+

Load Limit: 3,700

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

MiG-19SF/PF

1,4 1300

2,3 550

BB, RP, RK, FT, IRM.
BB, RP, RK, DR.

MiG-19PM

6,7,8,9 200

BRM, RHM.

Pakistani F.6

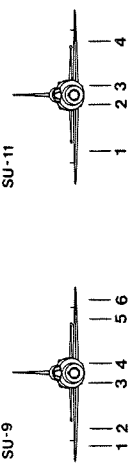
0,5 200

IRM only.

Note: Chinese copies of Farmer C/D/E are called F.6, F.6A, and F.6B. Pakistan uses F.6s modified to carry AIM-9 as well as AA-2 IRMs on new stations 0 and 5.

V.P.s: SF/PF/PM=16,10,6,3 Pak.F.6=17,12,7,3

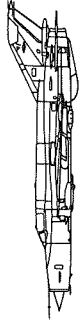
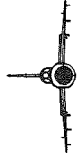
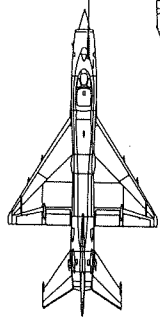
SU-9/11 Fishpot B/C					Air Power				
Crew: Pilot only					Maneuver Costs: HFP Decel Lag/Displ. Rolls: 1.0 1.0 Vertical Rolls: 0.0 0.0				
Power Chart (Accel) •					Turn Drag Chart (Decel)				
Power	CL	1/2	DT	Fuel	CL	1/2	DT		
Aft. Bur.	3.5	3.0	3.0	10.0	TT	1.0/2.0	1.0/2.0	2.0/2.0	
Military	1.5	1.5	1.5	3.0	HT	3.0/3.0	3.0/3.0	3.0/4.0	
Normal	0.0	0.0	0.0	1.0	BT	4.0/5.0	4.0/5.0	5.0/6.0	
Idle FP	0.5	0.5	0.5	0.0	ET	NA	NA	NA	
Sp.Br.FP	0.5	0.5	0.5	—	Decel is for SU-9 / SU-11 respectively.				
Smoker in Military Power					Climb Capability Chart				
Alt.	Conf.	CL	1/2	Dive	CL	1/2	DT	Alt.	
Bnd.	Ceil.	60	56	Vel.	AB	Other	AB	Other	Bnd.
EH+ 46 +	4.0 - 11.0	4.5 - 9.0	4.5 - 8.5	13.0	2.0	1.0	2.0	1.0	EH+
VH 36 - 45	3.5 - 12.0	3.5 - 10.0	3.5 - 8.5	13.0	2.0	1.0	2.0	1.0	VH
HI 26 - 35	3.0 - 10.5	3.0 - 9.0	3.0 - 8.0	12.0	3.0	1.0	2.0	1.0	HI
MH 17 - 25	2.5 - 9.0	2.5 - 8.5	3.0 - 7.5	11.0	4.0	2.0	3.0	1.0	MH
ML 8 - 16	2.0 - 8.0	2.5 - 8.0	2.5 - 7.0	9.0	4.0	2.0	3.0	2.0	ML
LO 1 - 7	2.0 - 7.0	2.0 - 6.5	2.5 - 6.0	8.0	5.0	2.0	4.0	2.0	LO

Radar: Spin Scan / Skip Spin			ECM:		Weapons Stations Diagram:					
ECCM:	0	0	IFF:	-11						
Arcs:	180+	180+	RWR:	Yes						
Search:	30 - 6	54 - 12	DDS:	A						
Track:	18 - 6	48 - 10	DJM:	—						
Lock-On:	7	7	AJM:	—						
Gun Type:			Technology:		Configuration Points Limits:					
Roll to Hit:	NONE	—	NONE		SU-9 = 3,000 1/2 = 3 - 6					
Ammunition:	—	—			Load Limit: SU-11 = 3,800 DT = 7+					
Gunsight Mods:	—	—								
Radar Ranging:	—	—								
AtA / AtG Rating:	—	—								
Bomb System: NA										
Notes and Variants:					Weapon Station Allowed					
<div>1. Radar data is for SU-9 then SU-11 respectively.</div> <div>2. SU-9 may only use AA-1 type missiles.</div> <div>3. SU-11 may use AA-2 IRMs, and AA-3 IRMs, RHMs.</div> <div>4. SU-11 may not use AA-3 missiles on stations 2 and 3.</div>					Stations Limits Loads					
					SU-9					
					1,2,5,6		200		BRM, RHM.	
					3,4		1100		FT only.	
					SU-11					
1,4		600		IRM, RHM.						
2,3		1100		IRM, FT.						

MiG-21MF Fishbed - J

Crew: Pilot only

Power Chart		(Accel) *	
Power	CL	1/2	DT Fuel
Aft. Bur.	3.5	2.5	2.5 6.0
Military	1.5	1.0	1.0 2.0
Normal	0.0	0.0	0.0 1.0
Idle FP	0.5	0.5	1.0 0.0
Sp.Br. FP	0.5	1.0	1.0 —



Cruise Speed: 6.0 Restr.Arcs: 180L, 60-
Climb Speed: 4.5 BlindArcs: 30-
Visibility: 5 Internal Fuel: 220
Size Modifier: 0 Ata Refuel: No
Vulnerability: -2 Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 1.0
Vertical Rolls: 0.0 0.0

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	1.0	1.0	1.0
HT	2.0	2.0	3.0
BT	4.0	4.0	4.0
ET	4.0	5.0	NA

Combat Flaps; see note 3.

Minimum - Maximum Velocity Chart

Alt. Bnd.	Conf. Ceil.	CL	1/2	DT	Dive Vel.
EH+ 46 +		56	50	44	12.0
VH 36-45	4.0-11.0		4.5-10.0	—	12.0
HI 26-35	3.5-12.0		4.0-11.0	5.0-9.0	12.0
MH 17-25	3.0-10.5		3.5-9.0	4.0-8.0	12.0
ML 8-16	2.5-9.0		3.0-8.0	3.0-7.0	10.0
LO 1-7	2.0-8.5		2.5-7.5	2.5-6.5	9.0
	2.0-8.0		2.0-7.0	2.5-6.0	8.5

Climb Capability Chart

	CL	1/2	DT	Alt. Bnd.
	AB	Other	AB	Other
EH+	1.0	0.5	1.0	0.5
VH	1.0	0.5	1.0	0.5
HI	2.0	0.5	1.0	0.5
MH	3.0	1.0	2.0	1.0
ML	4.0	1.0	3.0	1.0
LO	4.0	2.0	3.0	1.0

Radar: Jaybird

ECCM: 0

Arcs: 180+

Search: 48 - 12

Track: 30 - 8

Lock-On: 7

Gun Type: GSH Twin 23mm

Roll to Hit: 0= 7, 1= 4, 2= 2

Ammunition: 2.0

Gunsight Mods: HT+2, BT+3

Radar Ranging: RE

AtA / AtG Rating: 5 / 5

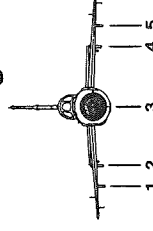
Bomb System: Manual (-0)

Notes and Variants:

1. Thick front canopy; +1 to sighting die rolls for targets in 180+ arcs.
2. ECM Upgrades: RWR = B in 1975, add DDS - A in 1985.
3. Combat Flaps when selected; extend automatically if speed < 5.0 and retract when speed > = 5.0. When extended, reduce all min. speeds by 0.5 but increase turn decel by 1.0.

Variant: MiG-21 PFMA early Fishbed-J; Delete internal gun.
A/B power= 3.0, 2.5, 2.0. A/B fuel= 5.0. May use GP-9 gunpack in place of station 3. No ECM upgrades. All else as MF.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0-4
1/2 = 5-6
DT = 7+

Load Limit: 4,400

Weapon Stations	Station Limits	Allowed Loads
1,5	550	BB, RP, RK, EP, FT, MDR, IRM, RHM. *
2,4	1100	BB, RP, RK, FT, DR, MDR, IRM. *
3	1100	EP, PP, FT.

* May only use AA-2 and AA-8 IRMs, AA-2C RHM. MDR may only hold two AA-8 IRMs.

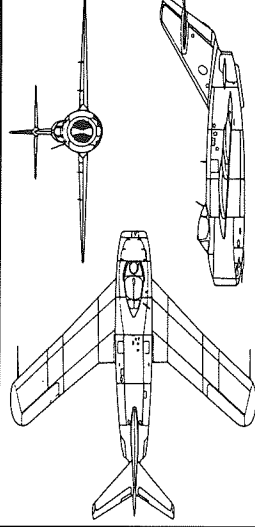
Variant: MiG-21MF and PFMA export versions.
As basic model except radar Spin Scan- B, ECCM = 0, Arcs = 180+, Search= 35 - 8, Track= 24 - 8, lock -On = 7. V.P.s = 22,15,7,4, and 20, 14, 6, 2.

V.P.s: MF=24,16,8,4 PFMA=22,15,7,4

MiG-17 F/PF Fresco C/D

Crew: Pilot only

Power Chart (Accel) *			
Power	CL	1/2	DT Fuel
Aft. Bur.	2.5	2.0	2.0 3.0
Military	1.5	1.5	1.0 1.0
Normal	0.0	0.0	0.0 0.5
Idle FP	0.5	0.5	1.0 0.0
Sp.Br. FP	0.5	0.5	1.0 —



Cruise Speed: 4.5 Restr. Arcs: 180L
 Climb Speed: 3.5 Blind Arcs: 30-
 Visibility: 4 Internal Fuel: 130
 Size Modifier: +1 AtA Refuel: No
 Vulnerability: +1 Ejection Seat: Early

Air Power

Maneuver Costs: HFP Decel
 Lag/Displ. Rolls: 1.0 1.5
 Vertical Rolls: 0.0 0.5

Turn Drag Chart (Decel)

	CL	1/2	DT
TT	0.0	0.0	1.0
HT	1.0	1.0	1.0
BT	2.0	2.0	3.0
ET	3.0	3.0	NA

Minimum - Maximum Velocity Chart

Alt.	Conf.	CL	1/2	DT	Dive Vel.	Climb Capability Chart		Alt.
Bnd.	Ceil.			46		CL	1/2	Bnd.
EH+	46 +	3.0-6.0	3.0-5.5	3.5-5.0	6.5	AB	Other	EH+
VH	36-45	2.5-6.0	3.0-5.5	3.0-5.0	6.5	1.0	0.5	VH
HI	26-35	2.0-6.0	2.5-6.0	2.5-5.5	7.0	1.0	0.5	HI
MH	17-25	1.5-6.5	2.0-6.0	2.0-5.5	7.0	1.5	0.5	MH
ML	8-16	1.0-7.0	1.5-6.5	1.5-5.5	7.5	2.0	1.0	ML
LO	1-7	1.0-6.5	1.5-6.0	1.5-5.5	7.5	2.0	1.0	LO

Climb Capability Chart

Radar: PF only = Scan Odd

ECM: 0

Arcs: Limited

Search: 18 - 6

Track: 6 - 6

Lock-On: 6

ECM: MiG-17

IFF: Yes

RWR: —

DDS: —

DJM: —

AJM: —

Technology:

NONE

Gun Type: Three 23mm NR

Roll to Hit: 0= 5, 1= 3, 2= 2

Ammunition: 3.0

Gunsight Mods: HT+2, BT+3

Radar Ranging: PF only= RE

AtA / AtG Rating: 5 / 5

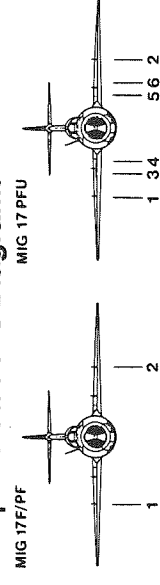
Bomb System: Manual (-0)

Notes and Variants:

1. High Transonic Drag (HTD).
2. Low Roll Rate if speed >= 4.0.
3. No Lag/Displacement rolls if speed >= 5.0.
4. Some F/PF are wired for IRMs (die roll 4-).
5. MiG-17F has no radar.

Variant: MiG-17PFU Fresco E - Delete internal guns. Radar as for PF. May only use AA-1 type missiles. Reduce CL max speeds by 0.5. Cielings = 52, 48, 45. Never exported.

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 2

1/2 = 3 - 4

Load Limit: 2,500 DT = 5+

Weapon Stations	Station Limits	Allowed Loads
1,2	700	BB, RK, RP, FT, IRM (die roll 4-). *

* May use AA-2 IRMs only.

MiG-17 PFU

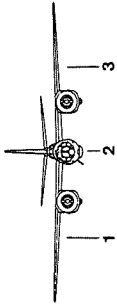
3,4,5,6 200 BRM, RHM. **

** May use AA-1 type missiles only.

Variant: Chinese F.4, F.5 MiG-17 copies - F.4 as MiG-17F except guns = two 23mm + one 37mm, Roll to hit: 0= 4, 1= 2, 2= 1; AtA/AtG = 5 / 4. F.5 as MiG-17PF in all respects.

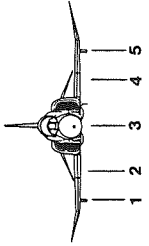
V.P.s: MiG-17F= 11,7,3,1 PF/PFU= 12,8,4,2

<i>IL-28 Beagle</i>				<i>Air Power</i>			
Crew: Pilot, bombardier, gunner				Maneuver Costs: HFP Decel			
Power Chart (Accel) ••				Lag/Displ. Rolls: NA NA			
Power	CL	1/2	DT Fuel	Vertical Rolls: NA NA			
Aft. Bur.	—	—	—	Turn Drag Chart (Decel)			
Military	1.0	1.0	0.5 2.0	CL	1/2	DT	
Normal	0.0	0.0	0.0 1.0	TT	0.0	1.0	1.0
Idle FP	0.5	0.5	0.5 0.0	HT	1.0	2.0	2.0
Sp.Br FP	0.5	0.5	0.5 —	BT	NA	NA	NA
				ET	NA	NA	NA
Cruise Speed: 4.5 Restr.Arcs: —				Rolling Maneuvers not allowed.			
Climb Speed: 3.5 BlindArcs: —							
Visibility: 8 Internal Fuel: 565							
Size Modifier: -1 Ata Refuel: No							
Vulnerability: -2 Ejection Seat: Early							
Minimum - Maximum Velocity Chart				Climb Capability Chart			
Alt.	Conf.	CL	1/2	CL	1/2	DT	Alt.
Bnd.	Ceil.	40	36	AB	Other	AB	Other
EH+ 46 +	—	—	—	—	—	—	EH+
VH 36-45	3.0-5.0	—	3.0-4.5	—	—	—	VH
HI 26-35	2.5-5.0	—	3.0-5.0	—	0.5	—	HI
MH 17-25	2.5-5.5	—	2.5-5.5	—	0.5	—	MH
ML 8-16	2.0-5.0	—	2.5-5.0	—	0.5	—	ML
LO 1-7	2.0-4.5	—	2.0-4.5	—	1.0	—	LO

<div>Weapons Stations Diagram:</div> <div></div>		<div>Configuration Points Limits:</div> <div>CL = 0 - 4 1/2 = 5 - 8 DT = 9+</div>	
<div>Load Limit:</div> <div>6,600</div>			
<div>Weapon Stations</div>	<div>Station Limits</div>	<div>Allowed Loads</div>	
1,3	1800	BB, RP, FT.	
2 *	4400	BB (Low drag) only.	
<div>* Internal Bomb Bay: Load options =</div> <div>a) one 2,200 lb. bomb. b) four 1,100 lb. bombs. c) eight 550 lb. bombs. d) twelve 250 lb. bombs.</div>			
<div>Note: Wing-tips may be fitted with optional fuel tanks; Wt.= 600, load= 1, fuel= 28 each.</div>			
<div>V.P.s: IL-28= 12, 8, 4, 2</div>			

<div>Radar:</div> <div>ECCM:</div> <div>Arcs:</div> <div>Search:</div> <div>Track:</div> <div>Lock-On:</div>	<div>PSB - N</div> <div>0</div> <div>180+</div> <div>Gr. Nav. (90)</div> <div>Gr. Attack (45)</div> <div>6 *</div>	<div>ECM:</div> <div>IFF:</div> <div>RWR:</div> <div>DDS:</div> <div>DJM:</div> <div>AJM:</div>	<div>IL-28</div> <div>Yes</div> <div>A</div> <div>—</div> <div>—</div> <div>—</div>
<div>Gun</div> <div>Types:</div> <div>Roll to Hit:</div> <div>Ammunition:</div> <div>Gunsight Mods:</div> <div>Radar Ranging:</div> <div>AtA / AtG Rating:</div>	<div>Two 23mm in nose + Twin 23mm tail guns</div> <div>0= 3, 1= 2, 2= 1</div> <div>6.0 each</div> <div>TT+1, HT+2</div> <div>—</div> <div>4 / 3</div>	<div>Technology:</div> <div>NONE</div> <div>Bomb system= Ballistic (-1) if doing level bomb- ing from four or more alt. levels above target.</div>	
<div>Bomb System: Manual (-0)</div>			
<div>Notes and Variants:</div> <div>1. Low Roll Rate. 2. High Transonic Drag (HTD). 3. Tail gunner has no ejection seat; manual bail-out only. 4. RWR ECM not available before 1960. 5. Tail Gun Rules: Tail guns may return fire into bomber's 60- arcs in response to gun attacks only. Tail guns use no modifiers except target size and they may only fire twice per turn.</div>			

F-4B/C Phantom II					Air Power				
Crew: Pilot, Radar Officer					Maneuver Costs: HFP Decel				
Power Chart (Accel) ••					Lag/Displ. Rolls: 1.0 1.0				
Power CL 1/2 DT Fuel					Vertical Rolls: 0.0 0.0				
Aft. Bur. 3.0 2.5 2.0 10.0					Turn Drag Chart (Decel)				
Military 1.5 1.0 1.0 3.0					CL 1/2 DT				
Normal 0.0 0.0 0.0 2.0					TT 1.0 1.0 2.0				
Idle FP 0.5 1.0 1.0 0.0					HT 2.0 3.0 3.0				
Sp.Br. FP 0.5 1.0 1.0 —					BT 4.0 4.0 5.0				
Smoker in Military Power					ET 5.0 NA NA				
Minimum - Maximum Velocity Chart					Climb Capability Chart				
Alt. Bnd.	Conf. Ceil.	CL	1/2 50	DT 40	Dive Vel.	CL AB Other	1/2 AB Other	DT AB Other	Alt. Bnd.
EH+ 46 +		4.5-13.0	5.0-10.5	—	14.0	1.0 0.5	1.0 0.5	— —	EH+
VH 36-45		3.5-13.5	4.0-11.0	4.5-8.5	14.0	2.0 1.0	1.0 0.5	1.0 0.5	VH
HI 26-35		3.0-12.0	3.0-10.0	3.5-8.0	13.0	3.0 1.0	2.0 1.0	1.0 0.5	HI
MH 17-25		2.5-10.0	3.0-9.0	3.5-7.0	12.0	4.0 1.5	3.0 1.0	1.0 0.5	MH
ML 8-16		2.0-9.0	2.5-8.0	3.0-6.5	10.0	5.0 2.0	3.0 1.0	2.0 1.0	ML
LO 1-7		2.0-8.0	2.0-7.0	3.0-6.0	8.5	6.0 2.0	4.0 1.0	2.0 1.0	LO

Radar: APQ-72 APQ-100 ECCM: 1 1 Arcs: 180+ 180+ Search: 70-10 80-10 Track: 60-10 60-10 Lock-On: 7 7		ECM: F-4B F-4C IFF: Yes Yes RWR: A A DDS: A A DJM: A3 — AJM: — —		Weapons Stations Diagram: 	
Gun Type: NONE Roll to Hit: — Ammunition: — Gunsight Mods: HT+1, BT+2 Radar Ranging: — AtA / AtG Rating: —		Technology: IRSTS - A		Configuration Points Limits: CL = 0 - 8 1/2 = 9 - 14 DT = 15+	
Bomb System: Manual (-0)		Weapon Stations Limits		Station Allowed Loads	
Notes and Variants: 1. Radar Data for F-4B and F-4C respectively. 2. ECM notes: No RWR before 1966. F-4B DDS not until 1967, F-4C DDS not until 1971. 3. ECM Upgrade: RWR= B in 1971, DDS= B in 1975. 4. May use AIM-9 IRMs, AIM-7 RHM's, and AGM-12 RGs. 5. Rapid Power Response. Variant: RF-4B/C Recon Version - Radar is for Gr. Nav. (150) only, no Gr. Attack or lock-on modes. Delete RHM's, add 0.5 to all maximum speeds. Recon Options = Oblique camera, overhead camera, IR camera, and Side Looking Radar.		1,5 2700 BB, RP, WR, EP, FT. 2,4* 3000 BB, RP, RG, GP, EP, WR, IRM, RHM.		3 4500 BB, RP, WR, GP, FT. 6,7 500 RHM, EP. 8,9 500 RHM only.	
		* Stations 2, 4 may carry two AIM-9 IRMs in addition to other non-missile stores.		V.P.s: F-4B/C=25,18,9,4 RF-4=26,18,10,4	

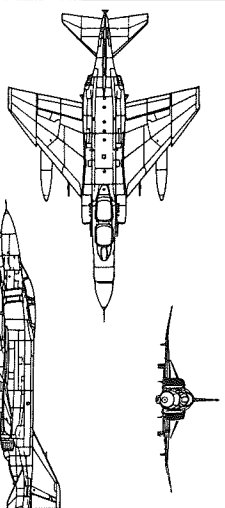
F-4E/J Phantom II

Crew: Pilot, Radar Officer

Power Chart (Accel) ..

Power	CL	1/2	DT	Fuel
Aft. Bur.	3.0	2.5	2.0	12.0
Military	1.5	1.0	1.0	4.0
Normal	0.0	0.0	0.0	2.0
Idle	FP 0.5	1.0	1.0	0.0
Sp.Br. FP	0.5	1.0	1.0	—

Smoker in Military Power



Cruise Speed: 5.5
Climb Speed: 4.5
Visibility: 7
Size Modifier: 0
Vulnerability: 0

Restr. Arcs: 60-
Blind Arcs: 30-
Internal Fuel: 600
Aft Refuel: Yes
Ejection Seat: Std.

Air Power

Maneuver Costs: HFP | Decel
Lag/Displ. Rolls: 1.0 | 1.0
Vertical Rolls: 0.0 | 0.0

Turn Drag Chart (Decel)

CL	1/2	DT
TT	1.0	2.0
HT	2.0	3.0
BT	4.0	5.0
ET	5.0	NA

Minimum - Maximum Velocity Chart

Alt. Cont.	CL	1/2	DT	Dive
Bnd. Ceil.	60 / 62	50 / 48	40 / 40	Vel.
EH+ 46+	4.5-13.0	5.0-11.0	—	14.0
VH 36-45	3.5-14.0	4.0-12.0	4.5-9.0	15.0
HI 26-35	3.0-12.0	3.0-10.0	3.5-8.0	14.0
MH 17-25	2.5-10.0	3.0-9.0	3.0-7.5	12.0
ML 8-16	2.0-9.0	2.5-8.0	3.0-7.0	10.0
LO 1-7	2.0-8.5	2.0-7.5	2.5-6.5	9.0

Climb Capability Chart

CL	1/2	DT	Alt. Bnd.
AB Other	AB Other	AB Other	
1.0	0.5	1.0	EH+
2.0	1.0	1.5	VH
4.0	1.0	3.0	HI
4.0	1.5	3.0	MH
5.0	2.0	3.0	ML
6.0	2.0	4.0	LO

Weapons Stations Diagram:



Configuration Points Limits: CL = 0 - 8
1/2 = 9 - 14
DT = 15+

Load Limit: 16,000

Weapon Stations	Station Limits	Allowed Loads
-----------------	----------------	---------------

1,5 2700 BB, BG, RP, WR, EP, DP, FT.
2,4 * 3000 BB, BG, BS, RG, RP, LP, EP, GP, DP, WR, IRM, RHM.

3 4500 BB, BG, RP, GP, WR, FT.
6,7 500 RHM, EP, LP.
8,9 500 RHM only.

* Stations 2, 4 may carry two AIM-9 IRMs in addition to other non-missile stores.

V.P.s: F-4E=30,20,10,5 F-4J=28,20,10,5

Radar: APQ-120 AWG-10

ECCM: 2 2
Arcs: 180+ 180+
Search: 100-20 120-20
Track: 80-20 80-20
Lock-On: 7 7

ECM: F-4E F-4J
IFF: Yes Yes
RWR: A A
DDS: A A
DJM: — A3
AJM: — —





























Technology:

Gun: E=20mm M61 Vulcan
Roll to Hit: 0=7, 1=5, 2=3
Ammunition: 3.0
Gunsight Mods: HT+1, BT+2
Radar Ranging: RE
ATA / AtG Rating: 6 / 8 *

Bomb System: See Tech.
F-4J Bomb System = Manual (-0)

Notes and Variants:

1. Radar Data for F-4E and F-4J respectively.
2. F-4J has no internal gun; only the E model does.
3. F-4J gunsight mods. = TT+1, HT+2, BT+3.
4. F-4J internal fuel = 610.
5. Rapid Power Response.
6. ECM upgrade: RWR= B in 1971, DDS= B in 1975.
Note: E model did not have DDS - A until 1971.
7. May use AIM-9 IRMs and AIM-7 RHMs.
8. F-4J may not use LP, DP, or BS type stores.

MIG 15 	MIG 15 	MIG 15 	MIG 15 	IL 28 	IL 28 	IL 28 
MIG 15 	MIG 15 	MIG 15 	MIG 15 	IL 28 	IL 28 	IL 28 
MIG 17 	MIG 17 	MIG 17 	MIG 17 	MIG 19 	MIG 19 	MIG 19 
MIG 17 	MIG 17 	MIG 17 	MIG 17 	MIG 19 	MIG 19 	MIG 19 

S	S	S	★	★	★	★
S	S	S	★	★	★	★

STRATUS 16	STRATUS 18	LOW CEIL. 2	LOW CEIL. 3	LOW CEIL. 5	SMOKE MARK	SMOKE MARK
STRATUS 23	STRATUS 28	LOW CEIL. 7	LOW CEIL. 9	LOW CEIL. 11	LO HAZE	ML HAZE





The Speed of Heat: Front

PLOT FIRE 1	PLOT FIRE 1	PLOT FIRE 1	POL 4-24	POL 4-24	BARR FIRE 1	BARR FIRE 1
LOCO 2-18	TRAIN 2-18	TRAIN 2-18	6-24	6-24	BARR FIRE 1	BARR FIRE 1

1	2	3	4	5	6	7
8	9	10	11	12	13	14

15	RADAR A SEARCH	RADAR B SEARCH	RADAR C SEARCH	RADAR D SEARCH	RADAR E SEARCH	RADAR F SEARCH
16	RADAR A CONTACT	RADAR B CONTACT	RADAR C CONTACT	RADAR D CONTACT	RADAR E CONTACT	RADAR F CONTACT

HIT	HIT	HIT	HIT	HIT	HIT	BOMBS
HIT	HIT	HIT	HIT	HIT	HIT	BOMBS

F 80 	F 80 	F 80 	F 80 	F 84 	F 84 	F 84 	F 84 
F 86 	F 86 	F 86 	F 86 	F 86 	F 86 	F 86 	F 86 
F 89 	F 89 	F 89 	F 89 	F 100 	F 100 	F 100 	F 100 
F 101 	F 101 	F 102 	F 102 	F 106 	F 106 	F 111 	F 111 
F 4 	F 4 	F 4 	F 4 	F 4 	F 4 	F 4 	F 4 
F 5 	F 5 	F 5 	F 5 	A 6 	A 6 	A 6 	A 6 
F 8 	F 8 	F 8 	F 8 	F 8 	F 8 	A 5 	A 5 
B 52 	B 52 	B 52 	B 57 	B 57 	B 57 	A3 / B66 	A3 / B66 

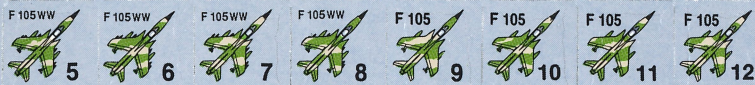
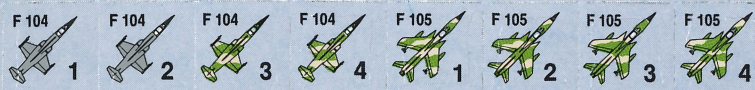
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T 12	T 12	T 12	⊠ 6	⊠ 6	⊠ 6	⊠ 6	HH-53 1
T 12	T 12	T 12	⊠ 6	⊠ 6	⊠ 6	⊠ 6	HH-53 2

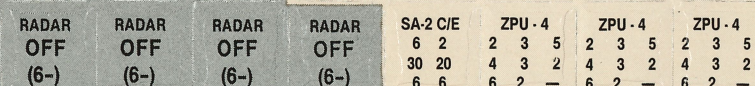
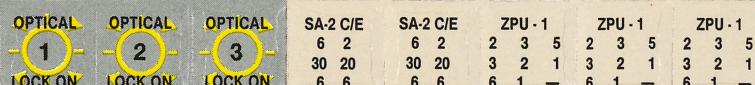
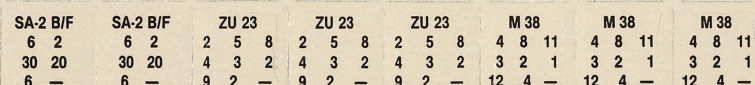
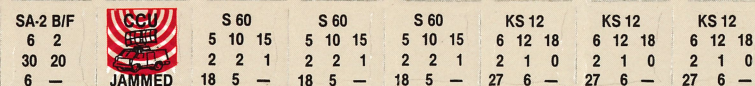
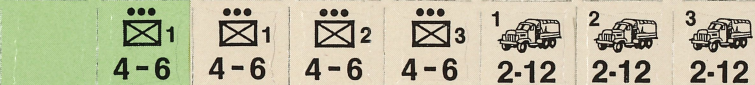
12	12	12	A	B	C	D	E
12	12	12	F	G	H	I	J

KS-12 H 4-18	KS-12 H 4-18	KS-12 H 4-18	S-60 M 3-12	S-60 M 3-12	S-60 M 3-12	CCU 3-12	SA2 B/F LF 4-18
M 38 M 3-12	M 38 M 3-12	M 38 M 3-12	ZU-23 L 3-12	ZU-23 L 3-12	ZU-23 L 3-12	SA2 B/F LF 4-18	SA2 B/F LF 4-18

ZPU-1 L 3-12	ZPU-1 L 3-12	ZPU-1 L 3-12	SA-2 C/E LF 4-18	SA-2 C/E LF 4-18	TTR 1 LOCK ON	TTR 2 LOCK ON	TTR 3 LOCK ON
ZPU-4 L 3-12	ZPU-4 L 3-12	ZPU-4 L 3-12	SA-2 C/E LF 4-18	SA-2 C/E LF 4-18	RADAR JAMMED	RADAR JAMMED	RADAR JAMMED



The Speed of Heat. Back



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