Documentation for
<u>Strike Jets Demo</u>

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Be sure to check out Blue Cow's other latest offer! ***Mech Zone***... a game in which you program robots to become combat champions of a futuristic battle arena. You can select from an array of high-tech weaponry the items that best fit your battle program. Should you use lasers for quick shots with high accuracy or rely on missiles for an extra heavy punch? Or maybe take on a light weapons load in favor of extra fuel and armor? The choices are yours, and you must create the battle program that will use these weapons effectively. For an added challenge, you can have pesky humans run around the battlefield and lob grenades at lethargic robots, making swift movement essential! Mech Zone is a combination strategy and action game that will hone your programming skills to "lethal" effectiveness!

1 Background: *Strike Jets* is a computer simulation of jet air-to-air and air-to-ground combat in the years 1975 to 2005. Each side is comprised of up to 40 aircraft, and, in some scenarios, as many as 20 ground-based anti-aircraft units. The computer is capable of playing either or both sides, if desired. One side is referred to as the attacker, and is displayed black-on-white, and the other as the defender, who is white-on-black. It makes no difference whether a force is the attacker or defender except in ground attack scenarios (usually called "strikes") where the defender owns the strike target and the attacker is attempting to destroy it.

1.1 Technicals: Strike Jets will run under 2, 4, 16, and 256-color modes (2-color mode is black & white) and is fully System 7 compatible. When running under 256 colors, Strike Jets requires 1000K of RAM. In black & white (2-color) mode, however, Strike Jets uses only about 510K. When running under Multifinder or System 7, you may reduce Strike Jets' memory partition below 1000K if you plan to run it under fewer than 256 colors. In addition, Strike Jets requires system 6.0.3 or later to run in black & white. In order to use color graphics, Strike Jets requires 32-bit Quickdraw (which is provided in ROM on late-model Macintoshes or by system 7 or alternately by the 32-bit QuickDraw INIT).

1.2 Beginning the Game: Select "Load Game" or "New Game" from the File Menu. "Load Game" will cause the program to ask you which saved game/scenario to play. Choose "New Game" if you would prefer to devise your own scenario (see section 2 - note, however, that this demo version will only allow you to view the setup process. It will not allow you to play the game you create).

1.3 Scale: The game is played on a square "grid". Each square represents an area 1/3 mile across, and more than one aircraft may occupy the same square. Each altitude level represents 1/3 mile (approx. 1,500 feet) as well. Each game turn represents 7.5 seconds of "real" time.

1.4 Facing & Movement: All aircraft have a particular facing which can be any of eight values. See figure 1. It requires one "movement point" (MP) to move one square orthogonally (0°, 90°, 180°, or 270°) in a turn, and 1.4 MP to move one square diagonally. One MP equals 150 MPH of aircraft speed. Thus, an aircraft moving at 600 MPH will have 4 MP and could move 4 squares (orthogonally) in a game turn. It costs 1 MP per altitude level climbed or dived. You'll get a feel for this as you play.

1.5 Nose Attitude: Aircraft also have a vertical "facing" called *nose attitude*. Possible values are: vertical climb, climb, level, dive, and vertical dive. It works in a similar way to horizontal facing except that it is a measure of the aircraft's orientation in the vertical plane. For example, in order to get an enemy aircraft in your radar
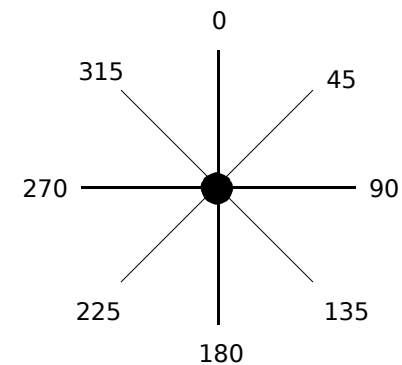
cone (see 10.2.1) or fire cannon at it (see 9.3) you

Figure 1 - The "Compass"

must be pointed at the enemy both horizontally (with your facing) *and* vertically (with your nose attitude). See 3.2 for details.

1.6 Ranges: Range has two components, horizontal and vertical. These are added together to determine *total* range. Thus a target that is 10 squares away horizontally and 5 altitude levels above or below, is considered to be at range 15. References to "horizontal range" do not include the vertical component.

1.7 Identification Numbers: Aircraft have identification numbers assigned to them in the range of 0 to 39. They are not numbered sequentially in order to keep I.D. numbers from providing implicit information about the number of enemy aircraft in the scenario (sometimes you'll want to set up limited-intelligence scenarios where the numbers of aircraft involved are randomly generated).

2 Scenario Setup : There are five basic types of scenarios, and these fall into two groups: "Generated", and "Designed". Note that you can view the process by which the full-version of Strike Jets sets

up the scenarios below by choosing "New Game" from the "File" menu. However, this demo won't allow you to play the game you create.

2.1 **Generated**: These scenarios are quick and easy to put together using a fairly small set of parameters. Essentially, you enter the force nationalities and number of aircraft and the computer sets up the rest. The four different types of "Generated" scenarios are: Ground Strike, Surprise Strike, Dogfight, and Radar Intercept. Strikes are air-to-ground bombing missions that may include air-to-air fighters if desired. Ground Strike has the defending fighters (if any) positioned over the target area, in position to shoot down attackers. Surprise Strike has the defenders caught by surprise and scrambling into the air at the last minute. Dogfight is purely air-to-air combat initiated at close range, and Radar Intercept is air-to-air combat starting at long range. The series of setup windows you will encounter are:

2.1.1 **Nations & Force Sizes**: Here you will select the force nationalities for both sides. The particular types of aircraft that are included in the battle and their pilots' skill levels are dependent on the nationalities selected, and are automatically determined by the computer from a database of the current air forces of the world. You will also specify the number of aircraft to be included on each side along with a random factor, if desired. This enables you to set up "limited intelligence" battles where you don't know exactly how many enemy aircraft are present until you find them. **NOTE**: if you select "Player Specified" instead of a nation for either or both sides, you will specify the actual aircraft types and numbers yourself in a later series of windows, and do not have to provide the number of aircraft for that side at this point.

2.1.2 **General**: This window asks for the names of the forces. You can use any names you like. You will also select the general location of the battle and whether each side has a radar controller (see section 10.2.6). At this point, if you are playing a Dogfight or Radar Intercept scenario, and did not select "Player Specified" for either side in the "Nations & Numbers" window, then you have completed the setup phase and the battle will begin. Otherwise, read on.

2.1.3 **Strike**: If you selected a Strike scenario and did not select "Player Specified" in the Nations & Numbers dialog for the attacking side, then you will be asked whether or not the attacker should have fighter cover (if chosen, approximately 1/3 of the attacking aircraft will be fighter-types armed for air-to-air combat) and what the range for the bombers' air-to-ground armament is. The default value for range is 4, which represents bombs. Larger numbers can be entered to simulate air-to-surface missiles (see 13.3). The air-to-ground weapons of all attacking aircraft will have this entered range.

2.1.4 **Add Planes**: If you selected "Player Specified" for either side in the "Nations & Force Sizes" window, then you will be asked to enter the particular aircraft types for the side(s). Click on the "Add Planes" button and you will be presented with a window chock full of aircraft type names. Choose one by double-clicking on its name. You will then be presented with a window asking you for several pieces of information: the number of aircraft of the chosen type, the pilot skill (see 12.4), the missile types and numbers and (only for the attacker in Strike scenarios) bomb armament and range. Click on "OK" when you're finished. You will then see the first window again and may enter more aircraft by selecting "Add Planes" again and repeating the process. Click on "No More" to end.

2.1.5 **Ground Units**: If you are playing a Strike scenario, you will then be presented with a window asking you for ground unit information. You must enter a minimum and maximum for the number of ground units that will ring the strike target. You must also select the particular technologies of SAM (missile) and AAA (gun) units. In addition, choose the target value (this controls the points awarded for bomb hits), and the accuracy needed (this controls how easy the target is to hit). See section 13 for more details. Usually about 30% of the ground units will be SAM units.

2.1.6 **Player Type**: Choose which side(s) should be played by the computer (if any) and the appropriate skill level. "Beginner" computer pilots will not attempt any high-G turns, looping maneuvers, or vertical flight. They will ***always*** show their flight paths on the screen so you will know what they plan to do just before they do it. Beginner pilots will also fire missiles less often. "Standard" level pilots will not attempt loops or other vertical flight. It is advisable to play against Beginner computer pilots in your first few games, until you get the hang of the game system. By the way, the computer does not "cheat" so you can trick it just like you would a human player (e.g. sneak attacks from the blind side, etc.)

2.2 **Designed**: Setting up these scenarios is a much more detailed process and is intended for those experienced players who want to set up a scenario "just right", with aircraft in exact positions, etc. In effect, you will provide ***all*** of the information necessary to set up the battle. The process is roughly similar to setting up an "Generated" scenario and choosing "Player Defined" for both force composition. However, when entering data for particular aircraft you will be required to enter more information including exact X and Y (Cartesian) coordinates for all aircraft locations. The X coordinates increase from left to right, and the Y coordinates increase from bottom to top. The only new window you'll see is if you have selected an "Air to Ground" scenario, in which case you will be asked to enter the X and Y coordinates of the strike target location.

2.3 **Save Game**: Now that you've worked so hard to set up your scenario, you are given the option to save it to disk before play begins. This way you'll be able to replay scenarios or create scenarios and give them to your friends.

3 Arcs and Cones

3.1 **Arcs**: Throughout these rules you will notice references to "arcs". These refer to zones of airspace in the horizontal plane (the geometrical kind of "plane") with respect to the facing of an aircraft. See figure 2. Usually you'll be concerned about what arcs enemy aircraft lie in relative to your aircraft. For example, an enemy jet in your rear 90° arc can "tail" you (see 4.1).
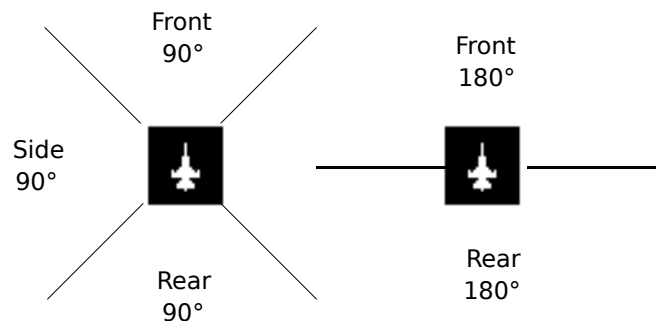

Figure 2 - Arcs

3.2 **Cones**: Because the action takes place in three-dimensional space (unlike your 2-D computer screen) ***Strike Jets*** uses the concept of "cones". A cone is an arc in the horizontal plane intersected with an area in the vertical plane. For an enemy to be inside this "cone", it must be inside both the horizontal arc and the vertical area. Being inside the vertical area is dependent on the relationship between the horizontal range to the target, **H**, and the difference in altitude, **A**. The chart below lists the conditions necessary for a target to be within the vertical area of the cone, along with lists of numbers in brackets. These numbers correspond the to the numbered and shaded vertical areas in Figure 3.

Spotter's nose attitude	90° cone	180° cone
Vertical Climb	target above or co-alt, and H ≤ A [1]	target above or co-alt [1,2]
Climb	target above or co-alt [1,2]	target above or H ≥ A [1,2,3]
Level	H ≥ A [2,3]	automatic [1-4]
Dive	target below or co-alt [3,4]	target below or H ≥ A [2,3,4]
Vertical Dive	target below or co-alt, and H ≤ A [4]	target below or co-alt [3,4]

1

Vertical Climb

4

Vertical Dive

2

3

Level

1

2
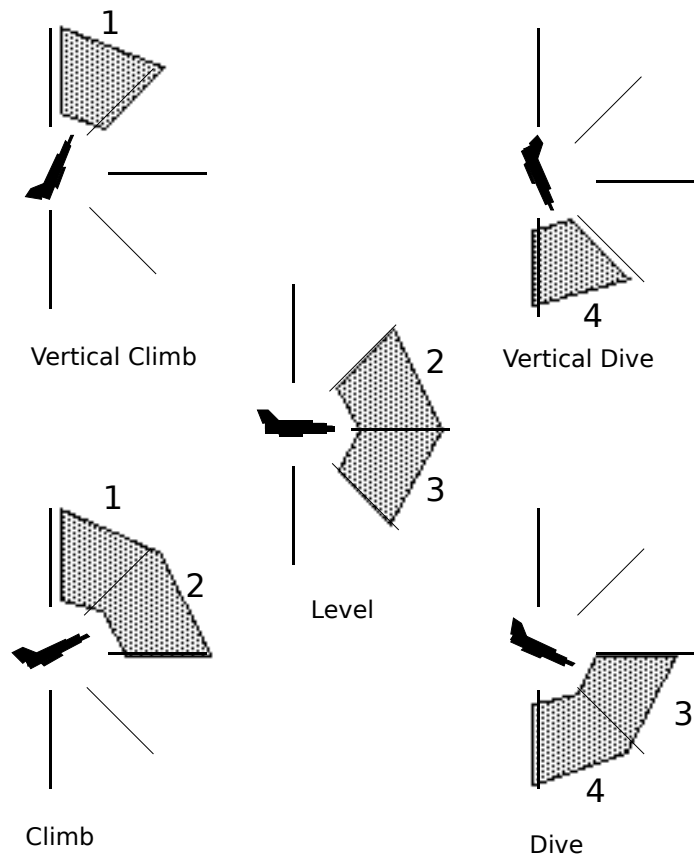
Climb

3

4

Dive

Figure 3 - Vertical Areas covered by a 90° cone
(side view) See chart in 3.2

4 Game Sequence: *Strike Jets* operates on the premise of
planning individual actions for all aircraft **first**, and then executing
those planned actions simultaneously for all aircraft. Sequence:

- **Plan aircraft moves**
  - **Disadvantaged Phase**
    - **all of one side's disadvantaged aircraft plan moves**
    - **all of other side's disadvantaged aircraft plan moves**
  - **Advantaged Phase**
    - **all of one side's advantaged aircraft plan moves**
    - **all of other side's advantaged aircraft plan moves**
- **Action Phase**

4.1 **Plan moves**: There are two different phases for the ***planning***
of aircraft actions: the disadvantaged phase and the advantaged
phase. The reason for breaking the planning into two phases is to

properly simulate "tailing" and the disadvantages of predictable
flight (by inexperienced pilots or aircraft guiding radar-homing
missiles). The disadvantaged phase occurs first. Visually contacted
disadvantaged aircrafts' flight paths will be drawn on the screen
when advantaged aircraft are planning actions. Thus, the aircraft
that move in the advantaged phase are able to ***see*** where the
disadvantaged aircraft are going to move, and this can be a
tremendous edge in a dogfight. A grey flight path indicates level
flight. A white path indicates climbing, and a black path indicates
diving. The exact number of altitude levels that the disadvantaged
aircraft has planned to climb or dive may be seen in the Bandit
menu or by mouse clicking on the aircraft's silhouette (see 6.4).
Note that the flight paths of all friendly aircraft that have planned
moves will be shown to the ***owning*** player regardless of what phase
they planned in (to help with coordination). Aircraft falling into any
of the categories below will plan actions in the ***disadvantaged***
phase:

- Low pilot skill (4 or less). This is a % chance, greater with
  lower skill. Having low skill does not ***always*** place a pilot in
  the disadvantaged phase.

- Currently guiding a semi-active radar-homing missile to a
  target.

- Does not have a visual contact to any enemy.

- Being tailed (having an enemy that is not disadvantaged due
  to any of the above three cases in its rear 90° arc, who has it
  in ***his*** front 90° cone, and is within range 10). This is also a
  %, lessened by the pilot skill of the tailed pilot and increased
  by the skill of the tailing pilot.

Aircraft that do not fall into one of the above categories will plan
actions in the advantaged phase. Keep in mind that, although
aircraft may ***plan*** actions in different phases, all of these actions will
be executed ***simultaneously*** during the action phase.

4.2 **Message dialog**: As soon as a side is selected to move, a "message" list will pop up on the screen. It may contain information regarding jammed radars, stalled aircraft, and more. On the first turn of the game, it will contain a list of your force composition. Messages will later note when the *first* radar and/or visual contacts are made with the enemy (this will happen only once - see 10.4). Often, there will be no messages in the window. At the bottom of the window are two control buttons. Selecting "give orders" is the normal choice and will allow you to give orders to your aircraft (see sections 7 and 8). Selecting "straight & level" will immediately order all of your aircraft to fly straight and level for this turn, which can be a useful time-saver.

4.3 **Action Phase**: All of the planned actions and associated computations are now executed. You don't need to do anything here - just watch and see if anything happens. A "beep" will signal the end of the phase. See section 9 for full details.

5 Main Screen

5.1 **Closeup View**: On the left-hand side of the game window is the close-up view. Depending on your menu selections, it contains either the visual or radar display of the planning aircraft (identified by the square around its silhouette in the visual display). Switching between the radar and visual displays is accomplished by selecting the proper item in the Control menu, or by option-clicking with the mouse inside the closeup view.

5.1.1 **Visual Display**: When viewing the visual display, you may click the mouse on any object and you will see the available information on it (the same information can be found in the Friendly and Bandit menus for aircraft). You may switch between viewing aircraft silhouettes, their I.D. numbers, or relative altitudes either by the appropriate items in the Control menu or by shift-clicking with the mouse inside the closeup view. Note that the greyed-out silhouettes you might see are those aircraft that are not spotted visually by the planning aircraft but are seen by a friendly aircraft. "?" symbols are for those enemies that have only been detected by radar or IRST.

5.1.2 **Radar Display**: When in radar view, you will see a black arc on the screen. This represents the radar arc of the planning aircraft. Shift-clicking will toggle the radar scaling as will selecting the proper item on the Control menu (see 6.2). The I.D. numbers of aircraft contacted by the radar will be displayed, with lock-ons appearing in solid white.

5.2 **Comprehensive View**: This is located in the upper-right hand corner of the game window. All enemy aircraft that your side is aware of and all friendly aircraft are displayed as dots, provided they are within horizontal range 39 (the maximum possible spotting range). The small rectangle inside this display encloses the area that is magnified and displayed in the closeup view to the left. You can mouse-drag this little viewing rectangle around the comprehensive view, and the closeup view will scroll around accordingly. The arrow keys will also work for this.

5.2.1 **Quick Info**: You will see some textual information to the right of the comprehensive view. It shows the planning aircraft's I.D. number, type, speed, "envelope" speed (see 8.2.2), movement points (before making altitude changes), altitude, and weapons stores in the form cannon/heat-seekers/radar-homers. Mouse clicking in this text information will re-center the little drag-able rectangle inside the comprehensive view, and thus will center the closeup view on the planning aircraft.

5.2.2 **Full Status Button**: Click here to get a display of the complete data for the planning aircraft, including fuel gauge, damage level (if any) and X,Y location coordinates.

6 Menus

6.1 **File**

- **New Game**: Cancels the current game (with no score tally) and returns you to the startup window.

- **Save Game At Turn End**: If this item is "check marked", then at the end of the game turn you will be asked for a file name and your game will be saved to disk. If desired, you may leave the check mark next to this item permanently and your game will automatically be saved at the end of every turn (you will be asked for the file name only once).

- **Quit**: Ends the current game, bringing up the score tally (see section 16) where you'll be given a chance to play a new game.

6.2 **Control**

- **Show Radar Display**: Toggles between showing the radar display and showing the visual display inside the closeup view. This item will be grayed out for aircraft that do not possess a switched-on radar. Option-clicking in the closeup view has the same effect as selecting this menu item.

- **Scale Radar Display**: Toggles between scaling and not scaling the radar display. When the radar display is scaled, the most distant radar contact is displayed at the maximum radius from center screen. Otherwise it is displayed at a distance proportional to the maximum range of the aircraft's radar. Since many radar contacts are made far within the maximum range of the radar, it can be easier to view targets when the display is scaled. Shift-clicking inside the closeup view (when showing the radar) has the same effect as selecting this menu item.

- **Display Aircraft I.D. Numbers**: Shows aircraft identification numbers when in visual display. Shift-clicking inside the display will switch between this mode, normal silhouette mode, and relative altitude display mode.

- **Display Relative Altitudes**: Instead of showing the aircraft silhouettes, the altitudes of the aircraft relative to the planning aircraft are shown.

- **Display All Missiles**: When this item is checked, all missiles that your side has detected will be shown in the visual display. Otherwise, only those missiles fired by or at the planning aircraft will be shown.

- **Outgoing Missiles**: Brings up a window showing all missiles launched by the planning aircraft that are still airborne. Listed are the missiles' type, target, game turns spent in flight, and a *R* symbol for those missiles requiring radar guidance.

- **Name Pilot**: Add a personal moniker to your super ace!

- **Release Bombs (bearing and range to strike target)**: Brings up a window allowing the planning aircraft to drop bombs on any ground targets within range (facing is unimportant) or to jettison its bombs.

- **Bug Out (direction, bingo fuel %)**: When selected, the planning aircraft will attempt to retreat to home base on its own at the end of the action phase (meaning that it is instantly taken out of the game and out of your hair). The enemy player must grant permission for this to occur, although when playing against the computer permission is automatically granted - so don't cheat! The direction is the course bearing to your friendly airbase and the fuel percentage is the minimum fuel required to have a 100% chance of reaching the base safely. Go below this

"bingo" fuel limit only at your own risk, because you might run out of fuel on the trip home! You may notice that if you fly toward your base (i.e. along the course heading) the bingo number will decrease. The greater your distance to base the greater your "bingo" fuel value will be. This distance is determined by the "battle location" set in the "General" window at the start of the game. All aircraft automatically bug out when all of the other side's aircraft are eliminated, except for surviving attackers in a strike mission.

- **Watch Instant Replay**: A short animation of the last turn's maneuvers will be shown in the visual display. This can be extremely helpful in giving you a mental picture of what's going on and where everyone is moving. Explosions, crashes, and cannon shots will all be shown (and heard!).

- **Sounds**: Select the level of sound you prefer. "Safe sounds" is intended for two-player games. When selected, the program will only play those sounds that won't give away important information to your opponent, who is presumably not looking at the screen, but within earshot. For example, missile launch sounds are not played.

6.3 Friendly

- **All Others Hold Steady**: Sets all aircraft other than the planning aircraft to fly straight and level until they are selected to be "ready" again. This can be a useful time-saver for those aircraft you want to fly in a straight line for a long time. Aircraft that are "holding steady" are shown in italics below. **NOTE**: any aircraft that notices an incoming missile will automatically switch back to "ready" status if it is "holding steady". This will give you a chance to take appropriate evasive action.

- **All Others Ready**: Resets all aircraft that were set to "hold steady" back to normal status.

- **Friendly Aircraft Data**: Selecting the aircraft entries below the dotted line will toggle that particular aircraft

between being "ready" and "holding steady" (shown in italics) as described above. The symbols in the menu items are:

#: I.D. number (from 0 to 39).

sp: speed in miles per hour (+ carryover speed, see 8.3)

face: facing.

Δalt: difference in altitude between this aircraft and the planning aircraft (positive means friendly aircraft is higher).

+/- number: altitude levels that the friendly aircraft has just planned to climb (+) or dive (-) in this game turn. Thus, if you see a display that reads "Δalt:-2+3", it means that the aircraft is currently 2 altitude levels below you but is planning to climb three levels (and will be one level above you next turn if you fly level).

{nose attitude}: if present, this is an abbreviation for the current (i.e. *before* any planned altitude changes take effect) nose attitude (see 1.5) of the aircraft . If no abbreviation is present then the aircraft is flying "level".

rng: *horizontal* range in squares to the friendly aircraft (add to the absolute value of the Δa for the full range).

bear: the bearing in degrees to the friendly aircraft, where 0° is toward the top of the screen, counting clockwise. See figure 1.

[1-7]: skill of pilot, 7 is best.

6.4 **Bandit**: Selecting an entry from this menu will center the visual display on the selected bandit. In addition, the menu items themselves provide data for all enemy aircraft that have been detected by *any* friendly aircraft (using radar, visual, or IRST) or by radar controller. It is otherwise similar to the "Friendly" menu except that full information is provided only for those enemies that are either contacted visually by *any* friendly aircraft or contacted by the radar of the *planning* aircraft and the planning aircraft has at least two crewman (i.e. a radar officer to track targets while the pilot is busy flying the aircraft). Aircraft with one crewman will still get some information to radar contacts, just less of it. Even less information is provided for enemies contacted only by radar warning devices (see 6.4.2). **IMPORTANT NOTE**: You may mouse click on the aircraft silhouettes (both friendly and enemy) in the visual display and the relevant information will pop up on the screen. This is often more convenient than pulling down the menus.

6.4.1 **Contact Information**: Often you will see a combination of the letters r, R, X, V, and I at then end of the bandit entry. These

indicate the kind of contact the planning aircraft has with this bandit. Here's what the symbols mean:

X: radar lock-on	V: visual contact
R: radar contact	I: IRST contact
r: radar warning contact (see 6.4.2)	

If there are no letters, then the *planning* aircraft has no contact with the bandit, but some *other* friendly aircraft or radar controller does (and has radioed).

6.4.2 **Radar Warning**: When an enemy aircraft has either a radar contact or a lock-on to the planning aircraft, an "r" will appear in the Bandit menu as described above (in 6.4.1). This means that the planning aircraft's sensors have detected hostile radar emissions from that enemy aircraft and have roughly detected (to the nearest 90°) the direction from which they're coming.

6.5 **Threat**: This menu will flash when there is a threat posed to the planning aircraft. It indicates whether or not an enemy has a radar lock-on to the planning aircraft, and the horizontal ranges and bearings of missiles targeted on the planning aircraft. A "Δnumber" indicates that the missile is either <number> of altitude levels above you (if positive) or below you otherwise. Note that only missiles within range 15 will be shown on the menu (otherwise they're too far away to be spotted). Also, no missiles will show up in the threat menu until an enemy aircraft has been detected by one of your aircraft (not by controllers), or a SAM has been launched, or a friendly aircraft has already been attacked by a missile or aircraft cannon fire. Basically this means that the *first enemy shot will catch your guys off-guard if they haven't detected the enemy yet*. Selecting one of the missile items from this menu will center the visual display on the missile.

7 **Systems Panel**: This is the first stage of planning an aircraft's actions. A modeless dialog window will appear in the lower right hand corner. See figure 4. On it you will find various controls for your

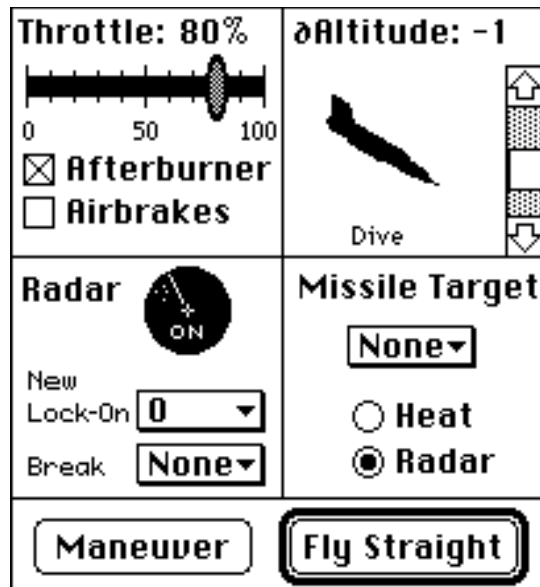aircraft. The rectangles with little downward triangles are pop-up menus.

Figure 4 - Systems Panel

Note that some of the controls may not appear for certain aircraft. For example, aircraft without an afterburner will not see the afterburner control. When you are finished entering data you can choose to "fly straight" by clicking on the appropriate button in the lower right, or click on "maneuver" which will allow you to do some fancier flying. NOTE: fly straight does not necessarily mean to fly *level*. The ∂altitude you entered *is* used, and the aircraft's altitude will be changed accordingly in the action phase. Here are descriptions of the various controls:

7.1 **∂Altitude**: Use the scrollbar to enter the change in altitude you wish for the planning aircraft. You will notice that each altitude change has an associated nose attitude, which describes how the planning aircraft's nose will be pointing during the action phase and at the start of the next game turn (i.e. "vertical climb" means you'll be pointing basically straight up). If you are currently in a vertical dive you will not be allowed to choose a ∂altitude value that will place you in a vertical climb and vice-versa. Note that altitude level 0 (treetop level) is permissible, however no maneuvering is allowed when an aircraft begins a game turn at altitude zero. Remember that each altitude level you change costs one MP (the same as 150 MPH).

7.2 **Throttle**: Jet engine throttle setting.

7.3 **Afterburner**: The Afterburner is "on" when the check box is marked with an "x". Afterburners greatly enhance aircraft acceleration, but consume large amounts of fuel. Use with care, and never when your main throttle is less than 100% (since your regular engine power is much more fuel efficient).

7.4 **Airbrakes**: Sets the planning aircraft's airbrakes to be deployed in the ensuing action phase. The airbrakes will be automatically reset to OFF on the next game-turn.

7.5 **Missile Target**: (Popup menu) If either the Heat (heat-seeking missile) or Radar (radar-homing missile) radio button is *flashing*, then you are able to fire that type of missile. Select the flashing radio button and click on the popup rectangle. This will bring up a pop-up menu of the I.D. numbers of possible targets for the type of missile chosen by the radio button, along with their current relative facings (see figure 6).   Make a selection on the pop-up menu and it will be entered into the text box. When you finish with this dialog (by selecting either the "maneuver" or "fly straight" button below) your aircraft will fire the missile. If "All Sounds" are selected, you will hear a "whoosh" sound to signify this. Note that the missile will not begin to move until the action phase.

7.6 **Radar**: Click the little radar scope to turn the planning aircraft's radar on or off. Remember that turning on your radar can alert the enemy to your general position so it may be advisable to leave your radar off at times.

7.7 **Lock-On**: (Popup menu) Plan to attempt a radar lock-on to a particular aircraft during the action phase. Keep in mind that the aircraft that appear on this popup menu are the aircraft in your radar cone that you have spotted visually or *contacted* by radar but are *not* currently locked on to.

7.8 **Break Lock**: (Popup menu) Only for aircraft with multi-lockon radar or without track-while-scan (TWS). It is useful for non-TWS aircraft who want to return to making radar contacts (see 10.2) and for multi-lockon aircraft who want to acquire a new lock-on (using the Lock-on control) and want to specify which current lock-on to break. If you are attempting a lock-on and do not specify a break lock, and you already have your maximum

number of lock-ons (usually just 1) then one will be chosen at random and broken.

8 Maneuver

8 Maneuver: If you chose "Maneuver" from the Systems panel, a new modeless dialog window will appear in its place, with various movement controls. See figure 5. Here you will **plan** the movement for your aircraft (remember: all actions are executed in the action phase). The projected flight path of your aircraft is drawn on the screen as you plan moves, with a little arrow head to indicate facing.

8.1 **Basics** : Aircraft in **Strike Jets** move using a system of movement points (MP). Each aircraft, each turn, is assigned a number of MP equal to its speed added to its "carryover" from last turn (see 8.3) and then divided by 150 MPH. Subtracted from this is the number of altitude levels set to climb or dive on the Systems panel. Thus, the MP's remaining constitute the horizontal component of the aircraft's movement that will be used for maneuvers. It costs 1 MP to move one square orthogonally, and 1.4 MP to move diagonally.

8.2 **Turns** : Turning maneuvers are made (planned) in increments of 45°, in synch with the 8 points of the compass used for aircraft facing. All aircraft are able to make a single such 45° turn in a game turn. This does not cost any extra MP and may be executed at any point during the move plan. This is considered a "low-G turn" (relatively slow and unstressful). Aircraft have the option of attempting a second 45° turn in the same game turn, but there are restrictions. The **second** 45° turn, which combined with the first 45° turn comprises a "high-G turn", may only be executed at the very **end** of the move. Thus, the first 45° turn can be planned at any point in the move but the second only once the aircraft does not have enough MP's to move further forward (meaning that the aircraft must have less than 1 MP remaining if it's facing orthogonally or less than 1.4 MP if it's facing diagonally, before the second turn may be planned). **High-g turns may fail to be executed**. Each aircraft has a "Maneuver Percentage" which is the chance of a high-G turn succeeding. It depends on the aircraft type, current speed, current altitude, pilot skill, and the weight of external weapons carried. This % number is displayed at the bottom of the maneuver panel. If the high-G turn fails, then **only the first** 45° turn planned will actually be executed. Beware! High-G turns bleed off a lot of airspeed. Note that while a high-G turn usually consists of two 45° turns in the same direction, this is not a requirement.

8.2.1 **Blackout**: All successful high-G turns run a 1.5% risk of causing the pilot to black out (become unconscious) due to the heavy G-forces. Aircraft with blacked-out pilots will enter a medium grade dive until the pilot recovers (sometimes too late!)

8.2.2 **Envelope Speed**: Flying at the "envelope" speed (shown in the full data window - see 5.2.2 - and in the text next to the comprehensive view) gives you the highest turning performance. When you fly too slow or too fast you're less able to "pull-G's" and execute a tight turn.

8.3 **Carryover**: Due to the discrete nature of the grid system, an aircraft will often be unable to use up all of its MP. These MP are converted back into MPH and carried over to the next turn. That's what the "+" indicates in aircraft speed. If an aircraft has "600 (+75)" speed, then it has carried over 75 MPH (0.5 MP) from the last turn. For movement, aircraft are treated as though they are flying at the **sum** of actual speed and carryover speed. **NOTE**: this applies to **movement purposes only**.

Example: An aircraft is facing 0°. It's speed is "500 (+100)" which means that its actual speed is 500 MPH, but it has carried over 100 MPH from last turn. Thus, its effective speed is 600 MPH for purposes of movement. This equates to 4.0 MP (= 600 ÷ 150). It begins the move by turning 45° to the left, which costs zero MP. Since it now faces diagonally, and each square of diagonal movement costs 1.4 MP, this aircraft can fly 2 squares. This uses up 2.8 MP, leaving 1.2 remaining. Since this 1.2 cannot be used to fly another square diagonally (cost is 1.4 MP) the aircraft can't move any further diagonally. This leftover 1.2 MP is translated back to MPH (=180 MPH) and carried over to the next turn. Note that if the aircraft decided to make a 45° turn after moving the two squares diagonally (no MP cost) it would be considered a **high-g turn**.

8.4 **Maneuver Panel**: Note that the buttons in the panel will rotate according to the facing of the planning aircraft. Figure 5 shows how the panel will look when the aircraft is facing toward the "top" of the screen. Note also that the letters A-F in figure 5 are only labels and do not appear on the screen.

8.4.1 **Single Turn Buttons (labeled with A's)**: These curved arrow buttons plan single 45° low-G turns. When clicked,

your aircraft plans to make the turn and the buttons are grayed out. To make a second 45° turn (thus making a high-G turn) you must use the turning buttons in the middle row marked 'C' (see 8.4.3).
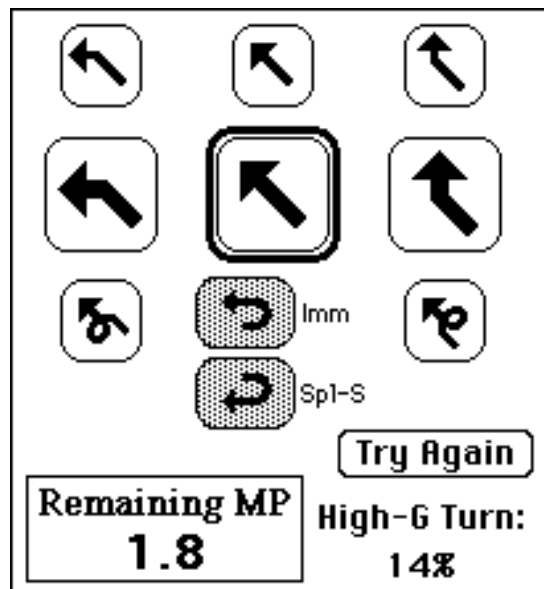

Figure 5 - Maneuver Panel

8.4.2 Single Straight Button (B): This straight arrow simply plans a move forward of one square.

8.4.3 Move and Turn Buttons (C's): These two long and curved arrows will cause your aircraft to move its remaining MP forward followed by attempting a 45° turn, and then end the maneuver phase. If you have not yet ordered a turn using the single-move turn buttons (see 8.4.1 above) then this turn is considered to be low-G. If you have already planned a turn using the single-turn buttons, then the new turn is a high-G turn and may or may not succeed. Using these turn buttons is the **only** way to execute a high-G turn.

8.4.4 Move Straight Button (D): This straight arrow (the largest button) simply moves all remaining MP forward and ends the maneuver planning. Pressing the 'return' key is the same as a click on this button.

8.4.5 Barrel Roll Buttons (E's): These can only be used once per game turn. They will cause your aircraft to move one square 45° to the right or left of facing, without changing facing. Barrel rolls may be freely combined with turns.

8.4.6 Half Loop Buttons (F's): The top button is for an "Immelmann" (a climbing half-loop) and the bottom for a "Split-S" (a diving half-loop). Both of these maneuvers reverse an aircraft's facing (180° change) by using vertical movement. These buttons are usually grayed out. In order to qualify to execute an Immelmann, an aircraft must spend two game turns in a vertical climb. On the second such turn it may execute the Immelmann. A Split-S works the same way except you must use vertical dive. **WARNING**: Immelmanns involve pointing your aircraft's nose straight up at the sky while simultaneously pulling what is effectively a high-G turn and thus bleed off a LOT of airspeed. Pilots will skill less than 4 will bleed off even more airspeed because they're not well trained in such maneuvers. A good rule of thumb is not to try an Immelmann unless you're flying a high-performance jet going at least 500 MPH. Daredevils can go for it at slower speeds and often get away with it but I won't weep for you if you crash and burn!

8.4.7 Try Again (G): Click here to cancel your move and try again. This enables you to correct mistakes and to test out new moves without fear of being "locked in" to them.

9 Action Phase: Once all aircraft have planned moves, the program will execute their orders. First, all movement and combat is computed. Then fuel usage and acceleration/deceleration are taken care of. This is followed by radar, visual, and infrared search (see section 10 for details of these). When interesting things happen, you will be notified by dialog windows that appear on the screen. If sounds are turned on, then a beep will signify that the Action phase has ended.

9.1 **Movement and Combat**: All aircraft and airborne missiles are moved simultaneously, one square at a time, on an "impulse" system. What this means is that a missile moving at 2000 MPH will execute 4 MP of movement for every 1 MP executed by an aircraft moving at 500 MPH. In other words, this missile will get to use 3 MP before the aircraft even gets to move at all! This simulates simultaneous movement. **NOTE**: for the sake of simplicity, all

altitude changes are made entirely and **before** any horizontal movement takes place. Thus, aircraft and missiles are treated as though they are at the "new" altitude throughout the Action phase. Keep this in mind when you notice that sometimes your outgoing missiles appear to have fallen "behind" the aircraft that launched them. This is because the missile was engaged in vertical flight to track its target.

9.2 **Missile Attack**: When you plan a missile launch from the Systems panel, your missile does not instantly strike the enemy. Rather, it is launched and automatically travels towards the enemy much like a fast aircraft would, during the action phase. When it reaches the altitude of the target and enters its square, it attacks. A dialog window displaying the results of the attack will be displayed. For simplicity, missiles always travel vertically to reach the target's altitude before moving horizontally.

9.3 **Cannon Attack**: Cannon are able to fire during the action phase, and will do so whenever a target is available. The area into which an aircraft may fire cannon depends upon the nose attitude of the firing aircraft. See the chart below. Each aircraft may fire cannon only **once** per action phase. All attacks will be shown in a dialog window. Accuracy depends on the angle of attack, cannon type, pilot skill (of firer **and** target), and aircraft speeds.

Nose Attitude	Target Square	Altitude Levels Relative to Firer
Vert. Climb	same	+1
Climb	directly ahead 1	same, +1
Level	directly ahead 1	-1, same, +1
Dive	directly ahead 1	-1, same
Vert. Dive	same	-1

9.4 **Fuel Usage**: This takes place automatically. The higher your throttle the more fuel you burn. Plus, afterburners use up fuel 3-4 times faster than full throttle without afterburners. Use your 'burners sparingly! If you run out of fuel, you crash.

9.5 **Acceleration/Deceleration**:

Accelerating factors:

- Losing altitude (diving)
- Throttle & Afterburner (higher thrust to weight ratio = more acceleration)

Decelerating factors:

- Gaining altitude (climbing)
- Air resistance (especially at supersonic speeds)
- Maneuvers (especially high-G turns and half-loops)
- Airbrakes

10 **Sensors & Detection**: Sensor detection of the enemy is computed automatically during the action phase.

10.1 **Visual**: All aircraft have a spotting range, which is the maximum range at which they can be seen by enemy pilots. This maximum range varies from 15 to 39 squares depending on the size of the aircraft. Also, all pilots are more likely to spot aircraft to their fronts than to their sides. Aircraft without teardrop canopies cannot spot aircraft behind them at all. Those with teardrop canopies can spot rearward targets only if such targets are at a higher altitude, but still not too easily. However, enemy aircraft that have been detected at least once before, by visual, radar, or infrared (by any friendly aircraft at any earlier point in the game) are visually spotted much more easily because the spotters know generally where to look. Aircraft with two or more crewmen will get two chances each turn to spot each enemy instead of one. "Upsun" aircraft cannot be spotted (see section 14).

10.2 **Radar**: There are two types of radar detection: contact and lock-on. Most aircraft are only allowed to have one lock-on at a time, but may have unlimited contacts. Lock-on is necessary to launch **all** radar-homing missiles and to guide semi-active radar-homing missiles. Radar contacts merely provide useful information on the contacted enemy aircraft. Target aircraft must be within the radar cone (see 10.2.1) in order to be contacted/locked-

onto. The larger and nearer the target is, the greater chance of successful contacting/locking-on. Once radar contact is established (and this may take several turns) it will be maintained as long as the target remains inside the radar cone. Radar lock-ons are also maintained, but may be defensively jammed and broken by electronic warfare equipment on the target aircraft. Stealth technology significantly reduces effective ranges of radars searching for it. Note also that larger aircraft can be detected at greater ranges than small aircraft.

10.2.1 **Radar Cone**: The radar "cone" of an aircraft is the three-dimensional region inside which enemy aircraft may be contacted and/or locked-on to by the radar. Most are 90° cones, but some are 180° or 360°. See sections 3 and 17.

10.2.2 **Track-While-Scan**: TWS allows a radar to maintain both contacts and lock-on at the same time. Radars that do not have TWS capability automatically lose all other radar contacts when they acquire a lock-on, thus they are able to **either** have unlimited radar contacts **or** a limited number of lock-ons (normally 1) but not both at the same time. As a convenience, TWS equipped aircraft will automatically attempt to lock-on to radar contacts even if you don't specify it in the systems panel (since there's no reason not to).

10.2.3 **Look-Down**: Radars that do not have "Look-down" capability cannot contact or lock onto targets that are at or below 2/3 of the owning aircraft's altitude. Range while "looking-down" is somewhat degraded even for radars that do have this capability.

10.2.4 **Multi-lockon**: A few aircraft in the game are able to remain locked-on to more than one enemy at a time. They can guide radar-homing missiles at all of these targets simultaneously.

10.2.5 **Active Jamming**: Active jamming aircraft have a jamming radius of 100 squares. All aircraft inside this radius have their own radar ranges degraded. The effective radar ranges of aircraft searching **into** this jammed area have their effective radar range reduced as well. Radar-homing missiles intercepting targets inside this area will also be slightly reduced in effectiveness. There is a drawback, however, in that the effect of jamming is usually to make the enemy's radar scope light up like a Christmas tree on fire, so it alerts them to one's presence and general location. Active jamming also affects SAM's (see 13.2.5).

10.2.6 **Radar Controllers**: Searching aircraft that possess a radar controller will always be presented with information on **all** the enemy aircraft (except stealth aircraft and aircraft screened by active jamming - see 10.2.5) regardless of whether the searching aircraft have gained contact with the enemy

themselves. This information is presumed to be radioed in from the controller, which is usually a large ground-based installation.

10.3 **Infrared Search and Track (IRST)**: Functions similarly to radar except that it does not "lock-on" and contact must be re-established every turn. Its range is normally 45 squares (less than half that against stealth targets), but 70 against **all** targets on afterburner. Contacts are shown in the "bandits" menu with an "I". The advantage of IRST is that it is a passive system and cannot be sensed by the target aircraft. Infrared contact allows an aircraft to fire heat-seeking missiles at targets even without visual or radar contact.

10.4 **First Contact**: The **_first time_** in the game that any of your aircraft detects an enemy aircraft, you will be notified in your message window at the beginning of the following turn. You will get one message for radar or IRST contact and another for visual.

11 Missiles

11.1 **Types**: There are four types of air-to-air missiles.

- Rear-Aspect Heat-Seeking: Older heat seekers that can only be fired at a target's rear 180° arc

- All-Aspect Heat-Seeking: Can be launched at any angle to target

- Semi-Active Radar-Homing: Must be guided to the target by a continuous radar lock-on which makes the firing aircraft somewhat vulnerable. If the radar lock-on is lost, the missile is lost.

- Active Radar-Homing: Need radar lock-on only to fire initially. Fire-and-forget.

11.2 **Launch Requirements:** Remember that your systems panel missile button(s) will flash when you are able to fire a missile.

11.2.1 **Heat Seekers**

- Target must be inside firing aircraft's front 90° cone (see section 3)
- Visual contact to target, *or* IRST contact, *or* firer has Heads-Up Display (HUD) and radar lock-on
- Missile is all-aspect, *or* firing aircraft is in horizontal rear 180° arc of target
- Target is within missile maximum range
- Target is not inside missile minimum range
- Missile is "agile" or "highly agile", *or* firing aircraft did not attempt a high-G maneuver last game-turn
- Target is not "upsun" (see section 14)

11.2.2 **Radar Homing**:

- Target must be inside firing aircraft's front 90° cone (see section 3)
- Firer has radar lock-on to target
- Target is within missile maximum range
- Target is not inside missile minimum range
- Missile is "agile" or "highly agile", *or* firing aircraft did not attempt a high-G maneuver last game-turn

11.3 Speed: The printed missile speeds are the maximum possible. They'll often fly noticeably slower at lower altitudes (30% slower at sea level). Also, on the first turn of flight, the missile's speed equals the average of the firing aircraft's speed and the normal speed of the missile. This represents the missile accelerating from the relatively slow speed of the firing aircraft.

11.4 Maximum Range: The printed maximum range for a missile is the maximum range at which it can be *launched*. Most missiles can actually *travel* farther than this value. Maximum launch range for heat seeking missiles is only 50% of the printed value when launched at a target's front 90° arc, and 75% when launched at a target's side 90° arc. Radar homing missiles will suffer a reduction of as much as 40% to their max ranges when aiming at small targets (because they have smaller radar cross-sections). Thus, the printed maximum range is the best possible value. So don't be surprised when you have to get closer to that little Alpha Jet than you thought you had to! In addition, stealth technology drastically reduces the effective range of radar-homers aimed against it.

11.5 Minimum Range: Similarly, when a missile is fired at the side 90° arc of a target, it's minimum range is *increased* by 50%.

When fired at the front 90° arc, the minimum range is doubled.

11.6 Angle of Attack: The effectiveness of a missile depends heavily upon the angle at which it intercepts the target. See figure 6, where the larger arrows represent greater effectiveness. The black arrows represent heat-seekers and the gray arrows represent radar-homers. The angle at which a missile intercepts its target will be displayed when the intercept takes place in the action phase.

11.7 Defense: All aircraft are assumed to carry and use defensive decoys (flares and chaff) against incoming missiles and this is built in to the missile combat resolution equations. But other than this - how does one avoid an incoming missile? It depends somewhat on whether it's a heat seeker or a radar missile (you often won't know) but here are some tips:

front

front side   front side

side   side

side rear   side rear

rear
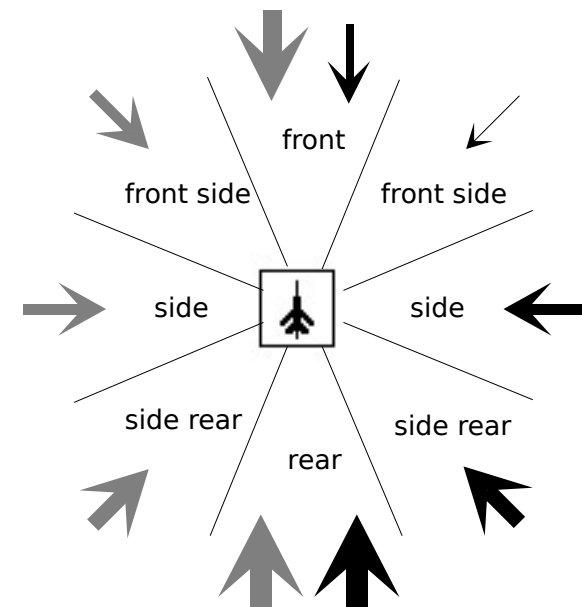
Size of arrow indicates missile effectiveness from
Heat seekers shown in black, radar homing in gray

Figure 6 - Missile Angle of Attack

- Present your best angle for defense to the missile, front side to heat seekers, and side (or possibly front side) to radar homers. These are the hardest angles for the missiles to attack from. Never let a missile attack you from the rear! Also, note that radar-homers are almost as deadly from head-on as they are from behind. Rear-aspect HSM's can only be *launched* at a target's rear 180° but that target can then turn around so the missile ends up attacking it from the front. The missile will *not* automatically lose tracking, but it is unlikely to hit such a target.

- Pull a high-G turn. This **REALLY** shakes off incoming missiles if it succeeds. It is especially effective against the less agile missiles such as most radar-homers.

- Turn OFF afterburner if attacked by a heat seeker. Afterburners are a huge heat source for HSM's to track. Lower your throttle as well, but look out if you're also planning to pull a high-G turn. You don't want to lose too much airspeed and stall or be unable to maneuver against the next missile. You might want to lose some altitude to gain speed. You'll know it's a HSM if your enemy isn't equipped with active homing radar missiles (only the superpowers are) and he doesn't currently have a lock-on to you.

- Don't let your speed bleed off too much. The more your speed falls below 450 MPH, the more vulnerable you are.

- Dive into "ground clutter". If you dive to altitude 3 or lower and the missile must dive to intercept you, or if you are at altitude zero then the missile (especially older radar-homers) may be confused by electromagnetic noise from the ground.

- Watch out for "quick shots", where an enemy aircraft is close enough so that he can fire a missile and it will intercept your aircraft in a *single* action phase. You will not get the chance to see the missile warning appear in your "Threat" menu since it strikes in the same turn as launched. This can be a nasty surprise, so take defensive measures in *anticipation* of such shots when necessary.

- Note that pilots with higher skill ratings are *much* more likely to evade missiles due to their better training and timing.

12.1 **Missile Loads**: All aircraft can carry at most one *type* of heat-seeking missile and one *type* of radar-homing missile. The numbers of each type that can be carried is dependent on the number and types of missile rails on the aircraft. See the header of section 17 for details.

12.2 **Target Identification**: All enemy aircraft will be known as "Bandit" until they have come close enough to be identified visually by friendly pilots. Bandits are drawn with an arrow that indicates facing but not aircraft type.

12.3 **Strike Weapon Range**: If you wish to arm strike aircraft with bombs, then specify a range of 4 for their weapons during setup. They may instead be armed with weapons that have a longer range - i.e. missiles (see 13.3). Note that facing is unimportant when bombing (a helpful abstraction) and all air-to-ground ordnance is referred to as "bombs" even though it might represent missile(s). Accuracy is degraded by high speeds (above 500 MPH) and altitude, but only if weapon range is less than or equal to 4, i.e. missiles are not affected.

12.4 **Pilot Skill**: This ranges from 1 (worst) to 7 (best). It has a major effect on a lot of things: which phase to plan moves in, ability to pull high-G turns, successful evasion of incoming missiles, cannon accuracy, stalled flight control, and bomb accuracy.

12.5 **Stalling and Spinning**: All jet aircraft have minimum speeds below which they lose wing lift and lose control. It is very important to keep your speed above this minimum! Stall speeds at sea level are roughly 150-200 MPH depending on the particular aircraft. Stall speeds increase with higher altitude and external weapon loading. When an aircraft stalls, it may not be given orders. It loses all contacts, both radar, infrared, and visual. It automatically sets throttle and afterburner to maximum. If the stall is controlled (it usually is) it will lose 1 altitude level and may change facing by 45°. If not, it will enter a spin, lose 3 altitude levels and change facing randomly. Once airspeed is above the stall speed, the stall/spin will end. Thus, stalls (especially spins) are truly dangerous to aircraft flying at low altitude because there's little time to pull out of it. NOTE: A two-pulse tone will sound, and

the airspeed indicator will flash during planning if an aircraft is close to its stall speed.

12.6 Load: You may notice that your aircraft accelerates better as time passes in the scenario. This is because it has burned off fuel and is therefore lighter. Jet aircraft burn fuel at such a prodigious rate that it is necessary to carry quite a bit on board, and this along with external weapons like missiles and bombs weigh down the aircraft, reducing performance. This effect is most notable on loaded bombers and aircraft such as the USAF F-15C and E which can carry a colossal amount of fuel.

12.7 Structural Failure: Aircraft that are damaged (i.e. hit but not shot down) must limit their maneuvering or face destruction. Any time a damaged aircraft attempts a high-G turn, or executes a loop or barrel roll, it risks coming apart at the seams. The risk is proportional to the damage. Try it and find out!

13 Air to Ground Combat

13.1 Strike Target: The bearing and range to the strike target are shown in the full data window (see 5.2.2). It looks like a little target in crosshairs in the visual display. Just get your strike aircraft within range (usually 4 for bombs), make sure you're above altitude zero, and select "Drop Bombs..." from the Control Menu while the Systems Panel is on the screen. Low altitude and slow speed (below 500 MPH) improve accuracy , especially for poorer bombsights, although pilot skill and bombsight quality are the key factors. You can also strafe the primary target if you want to (see 13.2.3).

13.1.1 Target Value: Affects the number of points you get for hitting the target. If it's high value, it's worth taking some casualties to hit.

13.1.2 Accuracy needed: All Primary targets look and act the same in *Strike Jets*, but they can represent just about anything. An accuracy-needed value of "Low" could represent an infantry unit out in the open. "Medium" could be an airfield, where an accurate hit does the most damage, but a near miss still hurts. "Pinpoint" could be Saddam Hussein's bunker or a ship at sea, where only a direct hit will cause damage. You get half points for partial hits and no points for misses (you'll be informed of how accurate your bombs were in the message window).

13.2 Ground Units: These nasty dudes will shoot back at you! They come in two flavors: surface-to-air missiles (SAM), and anti-aircraft guns (AAA). The SAM units carry 6 missiles at a time, but

can reload once they've been fired, although this will take some time. Ground units are intended to represent "ground" units but can certainly represent armed ships at sea as well.

13.2.1 Technology: SAM technology ranges from 1 to 4. Higher-tech SAM's have longer ranges at which they'll open fire (out to about 30 squares horizontally). AAA technology ranges from 1 to 3 and affects the chance of scoring a hit. Horizontal range for AAA is 10 and they can only fire as high as altitude 12. AAA accuracy is decreased by target altitude and speed.

13.2.2 Bombing: Aircraft can bomb SAM's and AAA's as well as the primary target. 4000 lbs. of bombs (or whatever you have left, if it's less than 4000) will be dropped. The SAM/AAA is treated as a "pinpoint" for "accuracy-needed" purposes. If it's hit, it's destroyed.

13.2.3 Strafing: Drop to altitude level *zero* and fly directly through the SAM/AAA. You'll automatically open fire in the action phase and maybe kill it.

13.2.4 Spotters: Ground units will radio information to friendly aircraft about enemies they can see (and the enemy will show up in the "Bandits" menu).

13.2.5 Suppression: Active jamming will reduce the frequency with which SAM units are able to fire. This is because the jamming interferes with their fire control systems. This effect is increased by the power of the active jammer and decreased by the technology level of the SAM.

13.3 Air to Surface Missiles: Strike weapons with a range greater than 4 are treated as air to surface missiles. They suffer no accuracy penalties from the speed or altitude of the firing aircraft. They are also more likely to hit SAM/AAA sites. Reasonable ranges for modern air to ground missiles are:

- Anti-Radar Missiles: 30 (latest Western: 90)
- Guided Rockets (like the U.S. Maverick): 25

- Anti-ship Missiles: max 250 (for those that the aircraft in this game can carry)

14 **The Sun**: You'll notice the sun in your visual display. No aircraft can visually spot or fire a heat-seeking missile at an aircraft that is "upsun" of it. An aircraft is "upsun" if it is ***above*** the spotting aircraft and bears within **10** degrees of the path to the sun. **NOTE**: The Sun's picture on the screen behaves a little differently than others in that no matter where an aircraft is, the sun will always have the same bearing in the sky. For example, when the sun is located at the center of the bottom of the visual display, it will bear 180° at all times to all aircraft regardless of their locations. Mouse click on the sun to find out what its bearing is.

15 **Computer vs. Computer**: Watching the computer play against itself is a good way to learn effective tactics when you're just beginning. You will see a dialog that allows you to enter the number of turns between interrupting the action. When the action is interrupted you can scroll around by dragging the little grey rectangle in the comprehensive view. All aircraft and missiles of both sides are displayed. Note also the two interrupt controls in the dialog. Click on "missile launch interrupt" if you want an interruption to take place as soon as any missile is launched, and click on the "skip dialogs" box if you don't want any dialogs to appear on the screen (so the action is continuous).

16 **Score Tally (The End)**: At the end of each battle a window will appear, showing you the losses on each side, with point values next to each one. These point values are proportional to the quality of the aircraft and its pilot. These values are totaled on the right hand side next to the word "absolute". The line below, reading "scaled" is a score based both on the "absolute" score ***and*** the relative sizes of the forces that began the game, and is the more important of the two scores. Note that radar controllers are figured in as well. These point values are only meant as a rough guide to determining victory, though. The ultimate judge is you, the player.

17 Aircraft Data

17 **Aircraft Data**: The specifications of the aircraft in this game are listed on the next several pages. Here's an explanation of the format:

Name
of **crew** on board
Subsonic or supersonic: Affects "envelope" speed
Type:
   Fighter: Primarily used to fight enemy aircraft of all types in air-to-air combat. Typically small and very maneuverable. They are usually very versatile aircraft and some can perform strike missions as well.
   Interceptor: Engages in air-to-air combat, but usually of a different sort than the fighter. The interceptor is designed to shoot down intruding aircraft (often bombers) with long-range radar homing missiles. Interceptors are usually quite fast, but often lack maneuverability. They are usually big aircraft, this being necessary to carry a large number of radar-homing missiles. Older interceptors are often relegated to the role of strike once their weapons systems are obsolete.
   Strike: A ground attack aircraft.
   Close-support: Similar to strike, but these aircraft are intended more for "battlefield loitering" - i.e. simply flying around above a battlefield looking for enemy troops to fire at.
   Multi-role: Fully capable of both the fighter and strike missions.
   ECM: Equipped with an active jammer, it is intended to accompany a strike squadron to its target and shield them from enemy radar.
   AEW: Air-Early-Warning. These aircraft carry huge 360° radars and effectively act as airborne radar controllers.
Maximum Speed: MPH at sea level/at high altitude (24+)
Maneuver: Rated from F (worst) to A+ (best)
Engines: Normal full throttle thrust in lbs. (Thrust including afterburner listed in parenthesis)
Weight: Weight, in lbs., of the empty aircraft
   Fuel: Maximum fuel load in lbs. (efficient/inefficient = fuel consumption rate. Older jets burn fuel less efficiently. If there's no rating, then the efficiency is "average")
   Bombload: Maximum bomb load in lbs.
Bombsight: None, Basic, Standard, Modern, Advanced
Size: Tiny, Very Small, Small, Average, Large, Very Large, Huge
Wing Area: In square feet. Divide the weight of the aircraft by the wing area to get "wing loading" in pounds per square foot. Higher wing loading values translate to greater deceleration during maneuvers, so fighter aircraft prefer to have low wing loading.
Ceiling: The highest altitude the aircraft can reach. When carrying external weapons, however, the effective ceiling may be lower.
Stall: 1 (best = lowest stall speeds) to 4 (highest). See 12.5.
Toughness: A measure of how much damage the aircraft can take before going down (Weak, Light, Standard, Sound, Tough, Super-Tough).
ECM: Defensive jamming equipment typically carried by the aircraft. Used to break enemy lock-ons and to decoy radar-homing missiles. Not to be confused with *active* jammers. Values are: None, Basic, Standard, Modern, Advanced, Highly Advanced
Cannon: None, Basic, Standard, Modern. Quality affects accuracy. (Ammunition listed in parenthesis).
Missile Rails: The numbers and types of missile rails on the aircraft
   h: carries one heat-seeking missile
   r: carries one radar-homing missile
   x: carries one missile of either type
   d: carries either one radar-homer or *two* heat-seekers
Types: The kinds of missiles this aircraft can carry

Radar: Special characteristics are listed here (if any). They are: arc (listed only if 180° or 360°, otherwise it is 90°), look-down capable, track-while-scan (TWS), multi-lockon (# of targets in parenthesis). A radar with a 180° arc is more resistant to defensive ECM.
Range: The range of the radar to an aircraft of size "Average". Note that range to "huge" aircraft is nearly double this figure.
Strength: 0 (worst) to 10 (best). Affects chances of obtaining radar lock-on and of maintaining it versus target defensive ECM.
Special:
   Teardrop canopy: A high-visibility cockpit that allows the pilot to see aircraft in his rear 90° arc if they are at a higher altitude.
   Delta wing: Gives improved acceleration at supersonic speeds (≥ 700 MPH). It also multiplies wing-loading by 1.6 for purposes of calculating deceleration in high-G maneuvers and loops (because delta wings generally bleed off a lot of airspeed in sustained turns).
   Advanced delta wing: As a normal delta wing, but only multiplies wing-loading by 1.3.
   Swing-wing: These behave as delta wings at supersonic speeds (≥700 MPH) otherwise they're normal.
   HUD: Heads-up display. Because it projects target information onto the pilot's windscreen, it allows him to fire heat-seeking missiles with a radar lock-on (i.e. and no visual contact).
   IRST: Infrared Search and Track system. See 10.3
   Active Jammer: Rated from 1 (worst) to 3 (best). See 10.2.2. Not to be confused with *defensive* ECM/jamming.
   VIFF: Stands for "vectoring in forward flight". Possessed only by the Harrier - it can point its jet nozzles downward to pull a tight turn. This is reflected in an artificially high maneuver rating, but the Harrier will also suffer a greater deceleration when making *high-G* turns. Aircraft with VIFF will never stall.
   Stealth: Rated 1 (good) or 2 (even better). It hides the aircraft from radar controllers and greatly reduces the effective ranges of radars and IRST systems looking for it. It also reduces missiles' probability of hit.
   Supercruise: The ability to cruise at supersonic speeds without afterburners.
Points: The score given to the enemy for shooting down this aircraft (with a pilot of skill 4).
Notes: A brief description of the aircraft.

Here are the two aircraft provided in the demo:

MiG-23 Flogger G
1 man, supersonic interceptor
Maximum Speed: 910/1550
Maneuver: C-
Engines: 18000 (27530)
Weight: 24250
  Fuel: 10140 (ineff.)
  Bombload: 6000
Bombsight: Basic
Size: Small
Wing Area: 300
Ceiling: 40
Stall: 3
Toughness: Light
ECM: Basic
Cannon: Basic (4)
Missile Rails: 6h 2x
 Types: AA-2, AA-2-2, AA-7, AA-8, AA-11
Radar: Look-down
  Range: 120
  Strength: 6
Special: Swing-wing, HUD
Points: 40
Notes: The backbone of the Soviet air defense force, the MiG-23 was designed in the 1960's. It has been produced in very large quantities and is significantly more effective in the interception role than the older MiG-21, although it is a poor dogfighter due to mediocre maneuverability and low engine power.

F-16A Fighting Falcon
1 man, supersonic fighter
Maximum Speed: 910/1350
Maneuver: A-
Engines: 16200 (23900)
Weight: 14600
  Fuel: 6970
  Bombload: 12000
Bombsight: Standard
Size: Very Small
Wing Area: 300
Ceiling: 34
Stall: 2
Toughness: Standard
ECM: Basic
Cannon: Modern (6)
Missile Rails: 6h
 Types: AIM-9
Radar: Look-down
  Range: 120
  Strength: 8
Special: Teardrop canopy, HUD
Points: 52
Notes: Designed as a counterbalance to the trend of high-priced, high-tech aircraft like the F-15, the F-16A entered service in 1979 as a basic, yet remarkably agile and effective tactical fighter. It lacks the capacity for a long-range kill, but this is one reason it was relatively cheap to produce.

18 Missile Data

Name

Type

Kill%: This is the rough chance that the missile will hit a non-high-G-turning targ

et from the rear, with no special circumstances.

ECCM: Anti-ECM. The better it is, the more the r

a
dar-homing
missile
can
overcome
the
effects
of

target
ECM.
(Heat-seekers
don't
have
or
need
ECC

M). Quickness: Measures how well the missile can successfully hit a target that is in a high-G t

urn. Values are: Very Slow, Slow, Average, Agile, Highly Agile. Range: Minimum-maximum. Maximum

Speed: in MPH.

Burn Time: The number of game-tur

ns the missile will stay aloft before running ou

t of fuel and energy (and self-destructing). Weight: in lbs. Notes: A brief description. Here

are

the

missiles

included

in

this

demo:

AA-8 Aphid

Rear-Aspect Heat Seeker

Kill: 55%

Quickness: Highly Agile

Range: 1-12

Max Speed: 2000

Burn Time: 2

Weight: 121

Notes: Credited as being all-aspect. The author finds this claim qui

te dubious. It is the most abundant heat-seeker in current use by the Soviet air force.

AA-7 Apex (R) Semi-Active Radar Homing

Kill: 40%

ECCM: 0

Quickness: Average

Range: 5 - 60

Max Speed: 2200

Burn Time: 8

Weight: 705

Notes: Soviet built a

nd reasonably effective.

AIM-9L Sidewinder

All-Aspect Heat Seeker

Kill: 70%

Quickness: Highly Agile

Range: 1 - 33

Max Speed: 1650

Burn

Time: 6

Weight: 188

Notes: The first all-aspect Sidewinder, available since 1977.

SAM-2

Surface-to-Air Missile

Kill: 40%

ECCM: 1

Quickness: S

Max Speed: 2000

Burn Time: 5

Notes: Represents obsolescent systems like the Soviet SA-6.

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