GNU ACM 5.1

The aerial combat simulator
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by Sergio Lopez

This file documents GNU ACM, the Aerial combat simulator.

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1 Overview

GNU ACM is a distributed aerial combat simulator that runs on the X Windows System. Players can engage in simultaneous air combat from different computers. Players fly jet aircraft (something close to either an F-16C Falcon or a MiG-29 Fulcrum) equipped with radar, heat seeking missiles and cannon.

GNU ACM is a slighty modified version of the original ACM made by Riley Rainey at WebSimulations.

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2 Invoking

The syntax for running GNU ACM is pretty simple:

```
acm [option]...
```

If no arguments are specified, a game will be created with default options. This environment is enough for getting to know the game and its controls.

2.1 Game Options

'`-plane` *plane*'
: Select *plane* as your aircraft. Valid options are F-16, MiG-29, C-172.

'`-team` *team_id*'
: The team id is used to determine in which point of the map are you going to start (all players with the same team id start in the same point).

'`-frame-rate` *rate*'
: Limits the displayed frame rate to n frames per second. If neither '`-frame-rate`' nor '`-update-rate`' are specified, ACM updates the display as fast as possible, effectively eating all available CPU time.

'`-update-rate` *rate*'
: Sets the simulation update rate to n interations per second. If neither '`-frame-rate`' nor '`-update-rate`' are specified, ACM updates the display as fast as possible, effectively eating all available CPU time. If '`-frame-rate`' is supplied alone the update rate defaults to 50 hertz.

'`-watch-frame-rate`'
: Print statistics about the actual display frame rate on standard output.

2.2 DIS Options

'`-dis-site` *id*'
: Sets the DIS site id to the specified value. This value is used to distinguish between different nodes in a network game.

'`-dis-sim` *address*'
: Sets the DIS simulation address to the specified value. The DIS standard defines this address as an enumerated value corresponding to a geographical site. For more information, consult the IEEE 1278 protocol definition.

'`-dis-appl` *app_id*'
: Sets the DIS application id to the specified value. This value is used in DIS packets to distinguish your acm application from other DIS applications running at the same site.

3 Playing

This chapter describes the basics you need to fly your jet and to start killing some drones.

3.1 How to Takeoff

Your mouse is the control stick. The neutral position is the center of your view display – denoted by the dot in the center of your heads-up-display (HUD). Moving the mouse away from you pitches the plane down, moving it back pitches the plane up. Left and right inputs roll the aircraft in the corresponding direction. On the ground at speeds up to 100 kts, nose wheel steering guides the aircraft.

To take off for the first time, select 20 degrees of flaps (press H twice), then press the full throttle key (the 4 key on the main keyboard). Keep the mouse in the neutral position until you are moving at about 140 kts, then pull the mouse about two-thirds of the way down the view window. You should pitch up and lift off the ground fairly easily. Gradually move the stick closer to the neutral position and let your airspeed build – don't move it back to neutral too quickly or you will end up back on the ground again! As your airspeed passes about 250 kts, raise the flaps (press Y twice) and landing gear (press G). Congratulations, you're flying a multi-million dollar jet.

3.2 Engine Controls

The following keys control your engine thrust:

'4' Full Power

'3' Increase Power (about 2 percent)

'2' Decrease Power (about the same amount)

'1' Idle Power

'A' Toggle Afterburner

Your engine gauge displays the power that you are generating. Below that, you have displays showing your total fuel remaining as well as your current fuel consumption rate. The afterburner uses fuel at an amazing rate; use it wisely.

3.3 Looking Around

The keys of the numeric keypad control which direction you're looking outside of the cockpit:

'KP_8' Forward

'KP_4' Left

'KP_5' Up

'KP_6' Right

'KP_2' Aft

It pays to look around when you're in a combat environment. Your chances of staying alive increase remarkably.

3.4 The Head-Up Display (HUD)

On the left side of the HUD is a ladder showing your current airspeed in nautical miles per hour (it displays true airspeed). Above that, in the upper left corner, is a G-meter.

The right ladder shows altitude; above that is a readout of your current angle-of-attack in degrees ("a=X.X"). Your jet will stall at a 30 degrees positive angle of attack and negative 16 degrees.

The airplane symbol (something like "-O-") shows the direction that the relative wind is coming from. The relative wind combines your current angles of attack and sideslip. A ladder in the center of the HUD show your aircraft's current attitude.

The lower, horizontal ladder shows your current heading. Discretes in the lower left-hand corner show the state of your weapons systems. Slightly above them is a readout of your current thrust percentage as well as the state of your engine's afterburner – the "AB" symbol means the afterburner is on.

3.5 Using your Radar

The radar system has a field of view of 130 degrees vertically and side-to-side. Radar automatically locks onto the closest threat in its field of view. A locked target is displayed as a solid block. Other hostile targets are displayed as hollow squares.

Targeting information is displayed in the lower right corner of the display. The top number is the heading of the locked target, the next number is the relative heading you should steer to intercept the target (displayed as "ddd R", and the third number is the rate that you are closing with this target, expressed in knots.

You can lock onto other targets by pressing the target designator key (Q).

3.6 Who's gunning for me?

Radar sets that are tracking your aircraft can be detected. Your Threat Early Warning System (TEWS) display warns you of potential threats. This circular display shows the relative direction of radars (other aircraft) that are looking at you.

3.7 Armaments

Your aircraft is equipped with heat-seeking missiles and a 20 millimeter cannon. Weapon information is displayed in the lower left-hand corner of your HUD. Different weapons may be selected by pressing mouse button 3.

The missiles are patterned after U.S. AIM-9M Sidewinders. They can detect infrared (IR) targets at any aspect (not just from the rear). Their range varies dramatically with the altitude and closure rate. The missile subsystem couples with your radar set to provide time-to-impact information when AIM-9's are selected.

4 Keyboard Command List

4.1 Stick and Rudder Controls

'`Mouse`' The Mouse if your stick. It controls pitch and roll.

'`Z`' Rudder Left

'`C`' Rudder Right

'`X`' Center the Rudder

4.2 Engine Controls

'`4`' Full Power

'`3`' Increase Power

'`2`' Decrease Power

'`1`' Idle

'`A`' Toggle Afterburner State

4.3 Radar Controls

'`R`' Toggle Radar State (On/Standby)

'`Q`' Target Designator

4.4 Flaps

'`H`' Extend 10 degrees

'`Y`' Retract 10 degrees

4.5 Speed Brakes

'`S`' Extend

'`W`' Retract

4.6 Weapon Controls

'`Mouse Button 2`'
Fire the selected weapon

'`Mouse Button 3`'
Select another weapon

4.7 Pitch Trim Controls

'`U`' Set Take-off pitch trim

'`J`' Set pitch trim to the control stick's current pitch setting

4.8 View Controls (Numeric Keypad)

'KP_8'	Forward
'KP_2'	Aft
'KP_4'	Left
'KP_6'	Right
'KP_5'	Up

4.9 Other Controls

'G'	Retract/Extend landing gear
'P'	Self-Destruct (Quit the game)
'L'	Launch a target drone

5 Network Play

After getting familiar with the controls and killing some drones, you're ready to engage in dog fight with a friend.

5.1 Requirements

ACM uses the DIS protocol to communicate between nodes running the game. Current implementation sends updates to broadcast, so both players need to be in the same LAN, and this one must allow broadcast traffic.

There're two parameters you must use when launching a network game: '`-dis-site`' and '`-team`'. The first one sets the player ID for this session (and must be unique between all the players), while the second selects a team (all players of a team start the game in the same point of the map).

Let's suppose you want to play a game with a friend. You could run ACM with this arguments:

```
acm -dis-site 1 -team 1
```

While your friend should use a different '`-dis-site`' and '`-team`' (though this one can be same, seems pretty pointless that both players start the game in the same point of the map):

```
acm -dis-site 2 -team 2
```

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