DIGITAL COMBAT SIMULATOR

C-101 AVIOJET

AvioDev
FLIGHT SIMULATION

PC SIM

THE FIGHTER COLLECTION

Eagle Dynamics

DCS SERIES

FOREWORD

The commissioning of the CASA C-101 in 1981 coincided with the appearance of the first personal computer, the Intel 8088 powered IBM XT desktop computer. More than three decades have elapsed since then, and technological advances since that time have completely changed the world of aviation, from purely analog systems, to fully integrated digital fly-by-wire flight control systems, EFIS displays, and full mission/flight management computers, that drastically alter the pilot-machine interface, increasing overall complexity, whilst reducing pilot workload and operating costs.

The C-101 was initially designed under requirements of the Air Force to provide an advanced yet simple training platform for the instruction of future fighter pilots. In addition, versions for light attack armed with more powerful engines, 7 hard-points, and heads-up display were also designed.

This project seeks to develop an advanced C-101 simulation that takes into account everything that concerns the operation of the aircraft in a military context, allowing the pilot to seamlessly enter the virtual world of military aviation, through the use of cutting-edge simulation software.

For this goal to be achieved, it is required to simulate all associated systems on the aircraft, and the complex, often inter-dependent relationships between them. The instruments have their own unique behaviors and characteristics programmed into the simulation, offering not a mere interpretation of the instrument, but a fully functional virtual counter-part. For example, gyroscopic precession instruments have the associated errors; the variometer has accurate lag behavior due to internal capsule aneroid; and the airspeed indicator responds in real-time to changes in angle-of-attack, as the result of the pilots control inputs, to name a few.

The visual models of both the cockpit and exterior were developed using photographs for both references and textures. Reproduction is faithful to the point that it is difficult to distinguish between photos of the real aircraft, and the simulation.

The final result is an advanced simulation that creates an immersive experience, where pilots are aware that in order to master the simulation, they must apply real-world skills and knowledge of the aircraft systems to accomplish virtual, yet highly realistic training missions, with unprecedented detail.

I hope you enjoy this aircraft, and a new level of flight and combat simulation.

Alejandro,
Military Pilot.

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C-101EB

AIRCRAFT TECHNICAL DATA

Basic Dimensions

Length.....12.245 m.....(40.17 ft)
Wingspan.....10.6 m.....(34.77 ft)
Height .....4.25 m.....(13.94 ft)

Wing Specification

Dihedral.....5.00°
Sweep Angle .....4.07°
Aileron Deflection Limits (Neutral Trim)..... -24.0°/ +17.0°
Flap Deflection.....10.0 ° TKOFF / 30.0 ° DOWN
Wing Area.....20.0 m^2
Flap Area.....2.45 m^2
Aileron Area.....1.17 m^2

Horizontal Stabilizer Specifications

Dihedral.....0°
Sweep Angle .....10.6°
Elevator Deflection Limit (Neutral Trim) ..... ± 20.0°
Elevator Trim Limits..... -6.5°/ +2.0°

Vertical Stabilizer Specification

Sweep Angle .....46.6°
Rudder Deflection Limit..... ±20.0°

Airbrake

Deflection Angle Limits ..... +0.0°/ -45.0°

Weights

Operating Empty Weight.....3380 kg ....(7440 lbs)
Normal Operating Weight (Standard Fuel).....4860 kg ..(10680 lbs)
Maximum Operating Weight (Ferry Fuel).....5380 kg ..(11830 lbs)

FRONT COCKPIT CONTROLS AND INDICATORS

Main Instrument Panel

1. Horizontal Situational Indicator (HSI)
2. Attitude Direction Indicator (ADI)
3. Altitude-Encoding Altimeter
4. Vertical Speed Indicator (VSI)
5. Turn and Slip Indicator
6. Clock
7. Hydraulic System Pressure Indicator
8. Radio Magnetic Indicator (RMI)
9. Combined Airspeed/Mach Meter
10. Vertical Accelerometer
11. Low Pressure Turbine (N1) RPM Indicator
12. Inter-Turbine Temperature Indicator (ITT)
13. High Pressure Turbine (N2) RPM Indicator
14. Oil Pressure Indicator
15. Oil Temperature Indicator
16. Fuel Flow/Fuel Used Indicator
17. DC Bus Voltage Indicator
18. Standby Artificial Horizon
19. Flight Director Control Panel
20. Trim Position Indicator
21. UHF Radio Control Panel
22. UHF Radio Frequency Repeater
23. Marker Beacon Indicator
24. UHF Control Transfer Button
25. VHF Control Transfer Button

FRONT COCKPIT CONTROLS AND INDICATORS

Continued

26. Master Warning Reset
27. Anti-Skid Status/Power Switch
28. Fire Warning Reset/Test
29. Master Caution Reset
30. Flap Position Indicator
31. Airbrake Position Indicator
32. Navigation Control Transfer Button
33. HSI VOR/TCN Source Selector
34. Backup UHF Antenna Selector
35. HSI “Dot/Cross” Sync Control
36. TARSYN ADI Fast Erect
37. TARSYN Mode Selector
38. HSI Brightness Control
39. Air Blower Control
40. Fuel Flow Test
41. Red Panel Light Adjust
42. Red Panel Light Adjust
43. Red Panel Light Adjust

Forward Lower Panel

55. HSI Course Selector
56. HSI Heading Selector
57. IFF Panel
58. Pedal Adjust Control

FRONT COCKPIT CONTROLS AND INDICATORS

Continued

Forward Left Panel

59. Gear Position Indicator
60. Gear Lock Override
61. Gear Handle
62. Pitot Heat
63. Stall Warning System Test
64. Stall Warning System Power
65. Anti-Rain System [NOT INSTALLED]
66. Left Taxi/Landing Light
67. Right Taxi/Landing Light
68. Parking Brake Handle
69. Canopy Locking Handle

FRONT COCKPIT CONTROLS AND INDICATORS

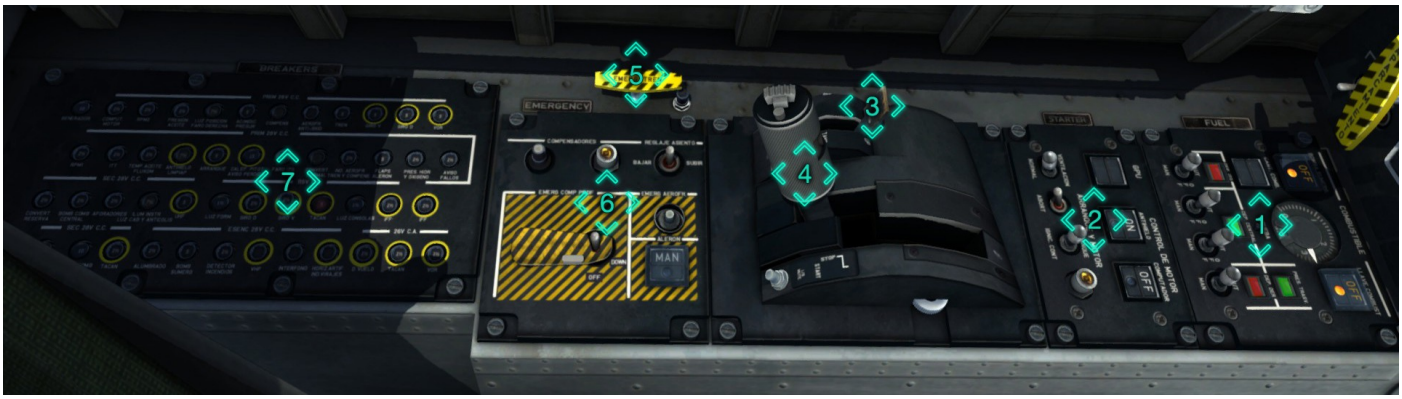
Continued

Forward Right Panel

44. Left Battery Contactor
45. Master Battery Contactor
46. Right Battery Contactor
47. DC Bus Tie
48. Engine Generator Contactor
49. Engine Generator Test Function
50. Essential DC Bus Transfer
51. AC Primary/Secondary Selector
52. Caution/Warning Panel Brightness Selector
53. Caution/Warning Panel Test
54. Caution/Warning Panel

FRONT COCKPIT CONTROLS AND INDICATORS

Continued



Left Side Panel

1. Fuel Panel
2. Engine Control Switches/Anti-Ice and GPU
3. Flap Lever
4. Throttle Lever and Gear Warn Mute
5. Emergency Gear Extension
6. Emergency Flight Control Panel
7. Circuit Breaker Panel

Right Side Panel

8. Oxygen System Pressure
9. Cabin Altitude
10. Intentionally Left Blank
11. Illumination Panel
12. VOR Radio Panel
13. TACAN Radio Panel
14. Oxygen Valve
15. Audio Panel
16. VHF Comm Radio Panel
17. Pressurization/Environmental Control Panel

NORMAL CHECKLISTS

INTERIOR INSPECTION

EJECTION SEAT _____ PINS INSERTED
EJECTION MODE _____ OFF
PEDALS _____ ADJUST
HARNESSES _____ ADJUSTED/SECURE
CIRCUIT BREAKERS _____ ALL IN
EMERGENCY PITCH TRIM _____ GUARDED/OFF
THROTTLE _____ CHECK FULL AND FREE/IDLE CUT-OFF
IGNITION _____ OFF
IGNITION MODE _____ NORMAL
STARTER MODE _____ NORMAL
GPU _____ AVAILABLE
FUEL TRANSFER PUMPS _____ OFF
LANDING LIGHTS _____ IN/OFF
STALL WARNING SYSTEM _____ ON
PARKING BRAKE LEVER _____ OUT
g METER _____ CHECK 1 g
UHF RADIO _____ OFF
UHF ANTENNA SELECT _____ AUTO
TARSYN GYRO COMPASS MODE _____ SLAVED
ALTIMETER _____ SET/X-CHECKED
CLOCK _____ ADJUST
BACKUP ADI _____ CAGED
IFF _____ CODE/OFF
AC INVERTER _____ OFF
GENERATOR _____ OFF
DC BUS TIE _____ OFF
BATTERY MASTER _____ OFF
CABIN ALTITUDE _____ CHECK IND. FIELD ELEVATION
COCKPIT ILLUMINATION _____ ALL OFF
POSITION LIGHTS _____ BRIGHT
ANTI-COLLISION LIGHTS _____ ON
VOR RADIO _____ OFF
TACAN RADIO _____ OFF
OXYGEN VALVE _____ OPEN
VHF RADIO _____ OFF
CAWS PANEL _____ CHECK
INTERCOM PANEL _____ SET
AIR CONDITIONING _____ OFF
TEMPERATURE MODE _____ AUTO
AIR FLOW SELECTOR _____ CABIN
TEMPERATURE SELECTOR _____ CENTER
EMERGENCY VENTILATION _____ OFF

BEFORE START CHECKLIST

BATTERY MASTER	ON
BATTERY VOLTAGES	CHECK (MIN 23V)
GPU	ON (MIN 28V)
BATTERY ISOLATION SWITCHES	CHECK "BAT"
ESSENTIAL BUS TRANSFER	CHECK OPERATION/OFF
DC BUS TIE	ON
AC INVERTER	STANDBY
INTERCOM	CHECK OPERATION
SEAT	ADJUST
PEDALS	ADJUST
IGNITION LAMP	TEST
ENGINE COMPUTER	ON
FUEL QUANTITY INDICATOR	TEST
FUEL TRANSFER PUMPS	TEST/SET AUTO
FUEL QUANTITY SELECTOR	FUS
FUSELAGE TANK PUMP	ON
FUEL VALVE	OPEN
STALL WARNING SYSTEM TEST	PERFORM/ON
FUEL FLOW METER	TEST
FIRE SYSTEM	TEST
VOLTMETER	CHECK (MIN 28V/MAX 30V)
CAWS PANEL	CHECK BRIGHTNESS/TEST/NORM
AC INVERTER	PRIMARY
OXYGEN MASK	DON/CHECK SECURE
STARTUP CLEARANCE	OBTAIN

STARTUP CHECKLIST

CAWS PANEL	CHECK 4 RED/1 AMBER
ITT	<= 200 C
VOLTAGE	MIN 28V
AREA	CHECK CLEAR
IGNITION	START 2 SEC/RELEASE
IGNITION LAMP	ON
VOLTAGE	>= 15 V
WHEN N2 >= 10%	THROTTLE IDLE
ENGINE PARAMETERS	MONITOR
WHEN N2 >= 50%	IGNITION LIGHT OFF
HYDRAULIC PRESSURE	CHECK GREEN RANGE
ENGINE INSTRUMENTS	CHECK
IDLE N1%	CHECK 29-33%
IDLE N2%	CHECK 58-71%

AFTER START CHECKLIST

GPU _____ OFF
GPU _____ DISCONNECT
GENERATOR _____ RESET/ON
CAWS PANEL _____ CHECK "X-GEN-CC" OUT
GENERATOR _____ TEST/ON
NAVIGATION RADIOS _____ ALL ON
COMMUNICATION RADIOS _____ ALL ON
BACKUP ADI _____ UNCAGE/CHECK
IFF _____ STBY
HYDRAULIC PRESSURE _____ CHECK GREEN RANGE
AIRBRAKE _____ TEST/IN
FLAPS _____ TEST/TAKEOFF POSITION
ROLL TRIM _____ CHECK
ELEVATOR TRIM TONE BREAKER _____ IN
EMERGENCY PITCH TRIM _____ TEST/SET MINUS 1.5 DEG.
ELEVATOR TRIM TONE BREAKER _____ AS REQUIRED
ROLL TRIM _____ TEST/SET ZERO DEG.
PITOT HEAT _____ TEST/AS REQUIRED
STALL WARNING SYSTEM _____ CHECK ON
ENGINE ANTI-ICE _____ TEST/AS REQUIRED
ENGINE COMPUTER _____ TEST/ON
LANDING LIGHTS _____ TEST/OFF
COCKPIT ILLUMINATION _____ TEST/AS REQUIRED
EXTERNAL ILLUMINATION _____ TEST/AS REQUIRED
INSTRUMENTS _____ CHECK
OXYGEN _____ TEST/NORM
CANOPY _____ CLOSED/LOCKED
CAWS PANEL _____ CHECK "BLOC CAB" OUT
AIR CONDITIONING _____ RESET/ON
EJECTION SEAT PINS _____ REMOVE/SHOW GROUND CREW/STOW
TAXI CLEARANCE _____ REQUEST

TAXI CHECKLIST

CHOCKS _____ OUT
PARKING BRAKE _____ IN
BRAKES _____ TEST
TAXI THRUST _____ MAX 76% N2
FLIGHT CONTROLS _____ CHECK FULL AND FREE
ENGINE INSTRUMENTS _____ CHECK
FUEL TRANSFER PUMPS _____ CHECK AUTO
FUSELAGE TANK PUMP _____ CHECK ON
FUEL VALVE _____ CHECK OPEN
FUEL QUANTITY SELECTOR _____ FUS
AIRBRAKE _____ CHECK IN
FLAPS _____ CHECK TAKEOFF
LANDING GEAR _____ CHECK 3 GREEN
CAWS PANEL _____ NO LIGHTS
HARNESS _____ CHECK
TRIMS _____ CHECK MINUS 1.5 AND ZERO DEG.
TAKEOFF CLEARANCE _____ REQUEST

BEFORE ENTERING RUNWAY CHECKLIST

CANOPY _____ CHECK CLOSED/LOCKED
ANTI-SKID _____ TEST/ON
ALTIMETER _____ CHECK QNH
PITOT HEAT _____ ON
SEAT CLAMP _____ RELEASED
IGNITION MODE _____ CONTINUOUS
IFF _____ CODE/NORM
AIR FLOW SELECTOR _____ CHECK CABIN
NAV AIDS _____ CHECK/IDENTIFIED
NAV INSTRUMENTS _____ SET
APPROACH AREA _____ CLEAR

LINE UP CHECKLIST

ADI _____ TEST/ZERO AND ZERO
GYRO COMPASS _____ X-CHECK/RUNWAY HEADING
ANTI-ICE _____ AS REQUIRED
ENGINE INSTRUMENTS _____ CHECK
VOLTAGE _____ CHECK (MIN 28V)

DEPARTURE CHECKLIST

6000 FT CHECKLIST

IGNITION _____ OFF
ALTIMETER _____ SET QNH/X-CHECK

10000 FT CHECKLIST

ANTI-ICE _____ AS REQUIRED
OXYGEN SYSTEM _____ CHECK
CABIN ALTITUDE _____ CHECK 8000 FT
ENGINE INSTRUMENTS _____ CHECK
HYDRAULIC PRESSURE _____ CHECK GREEN RANGE
VOLTAGE _____ CHECK (MIN 28V)
FUEL QUANTITY _____ CHECK

—— PASSING TRANSITION ALTITUDE ——
ALTIMETER _____ SET STANDARD

CRUISE CHECKLIST (REPEAT EVERY 15 MINUTES)

OXYGEN SYSTEM	CHECK
CABIN ALTITUDE	CHECK
ENGINE INSTRUMENTS	CHECK
HYDRAULIC PRESSURE	CHECK GREEN RANGE
VOLTAGE	CHECK (MIN 28V)
FUEL QUANTITY	CHECK
PITOT HEAT	AS REQUIRED
ANTI-ICE	AS REQUIRED

DESCENT CHECKLIST

ADI	CHECK
GYRO COMPASS	X-CHECK
IGNITION	CONTINUOUS
PITOT HEAT	ON
ANTI-ICE	AS REQUIRED
AIR FLOW SELECTOR	AS REQUIRED
OXYGEN SYSTEM	CHECK
ENGINE INSTRUMENTS	CHECK
NAVIGATION INSTRUMENTS	CHECK
FLIGHT INSTRUMENTS	CHECK
FUEL QUANTITY	CHECK

—— PASSING TRANSITION LEVEL ——

ALTIMETER	SET QNH

BEFORE LANDING CHECKLIST

IGNITION	CONTINUOUS
HYDRAULIC PRESSURE	CHECK GREEN RANGE
ALTIMETER	CHECK QNH
ANTI-SKID	CHECK ON
MARKER BEACON AUDIO	ON

VACATING RUNWAY

SEAT CLAMP	SET
PITOT HEAT	OFF
ANTI-ICE	OFF
IGNITION	OFF
LANDING LIGHTS	OFF
TAXI LIGHTS	AS REQUIRED
AIRBRAKE	IN
FLAPS	UP
IFF	OFF
VOR	OFF
TACAN	OFF

SHUTDOWN CHECKLIST

CHOCKS _____ IN
PARKING BRAKE _____ OUT
THROTTLE _____ IDLE

—— AFTER 2 MINS IDLE ——

AIRBRAKE _____ AS REQUIRED
FLAPS _____ DOWN THEN UP
BACKUP ADI _____ CAGE
COMMUNICATION RADIOS _____ ALL OFF
AIR CONDITIONING _____ OFF
CANOPY _____ UNLOCK/OPEN
FUSELAGE TANK PUMP _____ OFF
FUEL TRANSFER PUMPS _____ OFF
THROTTLE _____ IDLE CUT-OFF

—— WHEN N1% AND N2% ZERO ——

FUEL VALVE _____ CLOSE
GENERATOR _____ OFF
DC BUS TIE _____ OPEN
BATTERY MASTER _____ OFF
COCKPIT ILLUMINATION _____ ALL OFF
EXTERNAL ILLUMINATION _____ ALL OFF
OXYGEN VALVE _____ CLOSE
AIRCRAFT _____ VACATE