

Pilot's Notes

WYVERN S.4





VZ799/690/FD of
764NAS RNAS FORD,
1956

VZ794/131/J of
827NAS HMS EAGLE,
1955



VZ767/121/J of
813NAS HMS EAGLE,
1955.
CO's Aircraft



VZ782/082
703NAS W Flight
RNAS FORD
1954





WN324/380/O of
831NAS HMS ARK
ROYAL, 1957

WP337/378/J of
830NAS HMS EAGLE,
1957
Post Suez Conflict



VZ765/270/E of
813NAS HMS EAGLE,
1957

VZ778/363/FD
Wyvern Conversion
Unit RNAS FORD,
1957



Wyvern S.4

Introduction

- i. The Wyvern S.4 is a single-seat Naval strike aircraft powered by a single Python 3 reverse axial flow propeller-turbine engine, driving two four-bladed counter-rotating constant-speed propellers and developing 3605 shaft horsepower plus 1340lb static thrust at sea level.
- ii. Numbers in brackets refer to the illustrations at the end of this document.

Fuel System

- i. Fuel is carried in three fuselage tanks, two inner wing tanks and two outer wing tanks. Two external tanks may also be carried.
- ii. The capacities of the tanks, in gallons, are:-

Main tank	-	67
Fuselage rear tank	-	106
Fuselage front tank	-	95
Inner wing tanks (2 x 29)	-	58
Outer wing tanks (2 x 95)	-	<u>190</u>
Total (internal)	-	526
Drop tanks (2 x 90)	-	<u>180</u>
Total (all tanks)	-	706

- iii. The four positions of the fuel selector cock (6):-
EXTERNAL, ALL, FUSELAGE and OFF
- iv. When less than 245 gallons remain in the fuselage tank group indicator (39) will illuminate, this is just under 50% internal fuel.
- v. Three electric fuel contents gauges (34)(37) & (38) indicate the contents of the
 - Fuselage tank group
 - Inner wing tanks
 - Outer wing tanks.

Engine Controls

- i. The **throttle** lever gives complete control over the engine and propeller through the fuel control unit and the propeller control unit.
- ii. The propeller control unit acts as a **constant-speed unit**, controlling propeller pitch to **maintain constant rpm**.
- iii. **Reverse torque** is indicated by illumination of (30).
- iv. In the event of complete **engine failure** the blades will move to the feathered position.
- v. **Fire indicators** are located on the starboard panel (35) next to the **fire extinguisher** controls (36)
- vi. **Engine instruments** are located on the starboard panel. The fuel distributor pressure gauge (31) is intended for ground fault diagnosis, there is no correlation between fuel pressure and consumption.

Electrical System

- i. A single 3000-watt engine-driven generator supplies the whole of the electrical system. A **failure lamp** (26) illuminates whenever the generator is not supplying power.

Aircraft Controls

- i. The **flying controls** are conventional. A combined **indicator for rudder and aileron trim** is located on the port instrument panel (46). The **elevator trim** is controlled by a hand wheel (3) with trim marking.
- ii. The **undercarriage** is operated by a switch (15) above the standard **indicator** (14). **Emergency operation** is by the U/C EMERGENCY release pedal removing the locks and allowing gravity to extend the gear.
- iii. The **tail wheel lock** (1) is located to the left of the ejector seat.
- iv. **External lights** are controls are located on the starboard cockpit wall (49)-(51)
- v. An **API Mk.2** (7) and its control unit are situated on the cockpit port shelf and provide a latitude and longitude readout, and true heading indication.

- vi. A **Radio Altimeter** (41) is located on the port instrument panel with the limit setting knob on its left. Warning lamps (19) are to the left of the GGS.
- vii. A **Contact Altimeter** (43) is to the left of the Radio Altimeter with the associated warning lamp (27) to the right of the GGS.
- viii. The **Gyro Gun Sight** (GGS) is mounted above the centre of the instrument panel, the **master switch** (20) to its left allows for the sight to be energised and moved to the operational position. An **emergency retraction switch** (25) is to the right.

Limitations

Maximum all up weights

Take off	-	24500lb
All permitted forms of flying	-	21200lb
Airfield landing	-	20700lb
Deck landing	-	18500lb

Note: Gentle manoeuvres only are permitted at all up weights in excess of 21200lb.

Maximum speeds in knots

Clean aircraft	-	435 or 0.7M
With external tanks	-	435 or 0.7M
Airbrake operation	-	No Limit post Mod 258 (incorporated)
Flaps at first stage	-	305
Flaps at second and third stage	-	170
Undercarriage extension	-	170
Hood opening	-	205

Flying Limitations

- i. The aircraft is released for universal land or carrier based operation.
- ii. Intentional spinning, all aerobatics (other than barrel rolls at speeds above 250 knots) and the carriage and use of RATOG are prohibited.

Starting Checks

Before switching on electric power, check:

Undercarriage selector (15)	DOWN
Jettison control	SAFE
Electrical controls	All on
Flying controls	Full and free
Tailwheel lock (1)	Unlocked
Elevator trim (3)	Full and free
Throttle (5)	Fully aft
Mixture (4)	Fully aft
Flap lever (11)	Up
Tank selector (7)	ALL
Airbrakes (8)	Closed
Ignition switch(45)	Off, Light (44) out
Power failure lamp (26)	On
Engine fire lamp (35)	Out
Lighting	As required
Ignition switch	On, Lamp on
Starter (42)	Engaged
Mixture	Fully open

Once engine is self sustaining, Starter – Off, Ignition – Off, Lamp out.

After Starting Checks

Fire warning lights	Out
Flaps (11)	Operate, check movement against gauge (12)
Compass (21)	Check against standby
Oil temperature (33)	90C max
JPT (32)	500C
Generator warning lamp (26)	Out

Before Take Off Checks

Elevator Trim	Set
Airbrakes	Closed
Flaps	2 Stages
Instruments	Set
Canopy	As required
Tailwheel	Locked

Once airborne retract the undercarriage and then the flaps, retrimming as necessary.

Recommended climb speed is 165kts from sea level to 10000ft, thereafter reducing by two knots per 1000ft.

Stalling

Approximate stall speed in knots.

	18500lb	19400lb	21200lb
Power off			
Flaps & u/c UP	105	110	115
Flaps & u/c DOWN	90	95	105
Power on			
Flaps & u/c Down	85	90	95

Checks Before Landing

Brakes	Off
Airbrakes	Closed
Undercarriage	Down and Locked
Tailwheel Lock	On, if landing ashore
Flaps	2 nd Stage, Fully down on final approach
Fuel	Note contents

Approach and Landing

The circuit should be made at 140-150kts. The turn on to final approach should be made at 120-130kts, and the airfield boundary crossed at 105-110kts.

If necessary cycle the cockpit view (A) to raise the eyepoint for landing.

Deck landing, the recommended speed by day at all weights on the final approach is 105kts.

At low fuel levels it may be necessary to use fuel aft trim to avoid reaching the limits of elevator effectiveness. N.b. this was a 'feature' of the real aircraft, the mind boggles.

Shut Down Checks

Run the engine at 60% rpm for 30 seconds.

Close the throttle to the ground idle position and stop the engine by fully closing the Mixture lever.

When the propellers have ceased turning:-

Electrical services	Off
---------------------	-----

Notes on the FSX Model

Certain simplifications have been made to the operation of the FSX Wyvern. In some cases due to the constraints of the program, in others because either it was more fun or it exceeded the limits of the teams knowledge!

The engine controls were more sophisticated than modelled with the throttle control (and an additional switch) limiting the minimum pitch that could be applied to the prop. This ensured level flight could be maintained in the event of a control unit failure, as FSX doesn't allow direct control of the prop pitch the code was simplified to allow carefree handling of the throttle control.

Additionally the mixture control operated a propeller brake and activated a number of systems as it was advanced. These systems are not directly modelled in FSX and although some could have been implemented the end user was unlikely to notice eg. Low Pressure fuel cock.

As far as any of the references consulted could reveal the real aircraft didn't have a landing light! Therefore the position chosen was a best guess. The Wyvern also featured a number of external signalling lights which are not currently modelled, in the event of some form of bribe by an interested party (we all like beer) these could be implemented.

The API was actually a Doppler fed navigation computer which would require an initial fix. These systems are also prone to drift due to inaccuracies in their operation of the order of more than two miles in a twenty minute period. This hasn't been modelled, the system simply showing the aircraft's position from the simulation value, however an enterprising programmer could alter the gauge coding to reduce the accuracy of the instrument.

There are no wing fold or parking brake controls modelled in the virtual cockpit, in the real aircraft they appear to have been on the floor either side of the ejector seat. As this would require the virtual aviator to shift his eyepoint around it was decided not to model them as their actual use would probably be limited.

The version modelled does not feature the folding wingtips. These were only a feature of the early production Wyvern (VZ791 and prior) and were unpopular with the aircrew as the tips were ideally positioned to hit their heads on leaving the aircraft. As post war carrier hangars were higher than those the Wyvern was originally designed for they were deleted, additionally as the outer sections were manually folded it was possible for the early aircraft to dispense with folding them.

Carrier landings are possible, if tricky. With the eyepoint in the raised position (Press A to cycle the VC viewpoints) the aim point should be just on top of the engine cowling. Approach speed as per the notes above, so far in tests on achieving a successful trap the aircraft will tip forwards on its main gear and suffer a tip strike. It may be possible to avoid this with a better three point landing or it may be a problem with the way FSX conducts arrested landings. In the event of a tip strike either conduct an aircraft reload (key can be assigned in FSX) or de-activate the failure and carry out a restart.

The Pilot doesn't disappear on shutdown. We tried to include this but due to the hierarchy of the model and the animations used for his legs when we did all kinds of weird things happened. We'll sort it on the next model.

Unfortunately the only surviving Wyvern is a TF.1 Eagle engined prototype which has a number of detail differences from the production S.4 aircraft. To this end we had to make some guesses as to what some items did and or where they were located or what colour they were. If anyone has more accurate information we'd love to hear about it, and if it doesn't threaten what's left of our sanity we might include it in an update.

External stores. If you load up the external tanks with fuel in the Fuel and Payload settings they should appear, similarly if you add 1000lb to any of the weapons stations a 1000lb bomb will appear in the correct position. You can add bombs and external fuel which is unrealistic, however only the bombs will show. The bombs are the later UK style with a cruciform tail, rather than the earlier circular unit. The Wyvern carried both through its life but the first pictures we examined were at Suez where it had the later style so we stuck with that.

Bombs can also be added as droppable objects, save a flight near the area you want to blow up. Locate the file in your My Documents/Flight Simulator X Files folder and add the following lines at the end:

[DroppableObjects.0]

ObjectSet.0=1000lb,3

Reload the flight and you'll be set to go. To drop the ordinance either use Shift + D, or flick the master arm switch (57) and use the trigger button on your joystick (should be mapped to the brake as per default). Unfortunately FSX seems to be setup for level bombing rather than dive or toss bombing so take care not to fly into your own bombs.

We hope you enjoy the Wyvern for FSX and take some time to remember that of the 90 S.4 built 68 had accidents and 39 were lost including 13 fatalities and 14 ejections. For more information we'd like to recommend 'Wyvern' From the Cockpit by Michael J. Doust and published by Ad-Hoc Publications. Amazon are probably a good bet, they sell most things.

Comments, Information and offers of beer to p.chandler@btinternet.com, subject:Wyvern

Credits

Due to the frankly ridiculous gestation time of this project a large number of people were in some way involved. For providing the initial cutaways and other technical resources Richard Harris and Andrew Goodair were invaluable, even if they've probably forgotten they ever sent me anything! The posters at the Free Flight Design Forums, Combatace and Classic British Flight Sim all provided inspiration, advice and information throughout the two and a half years and three sims that the Wyvern has been going.

Richard Ruscoe	-	The Flight Model
Fraser Paterson	-	Graphics
Philip Chandler	-	Models
Ian Kirby	-	Alpha, Beta and possibly Gamma testing
Mark Barber	-	Beta Testing
Steve Beeny	-	Web Guru

FIG 1 – COCKPIT PORT SIDE

- 1 Tail Wheel Lock
- 2 Arrestor Hook Switch
- 3 Pitch Trim
- 4 Mixture
- 5 Throttle
- 6 Fuel Tank Selector (Off – All – Centre – External)
- 7 Air Position Indicator (Lat/Long and True Heading)
- 8 Dive Brake
- 9 OAT
- 10 Emergency Flap Extension
- 11 Normal Flap Extension

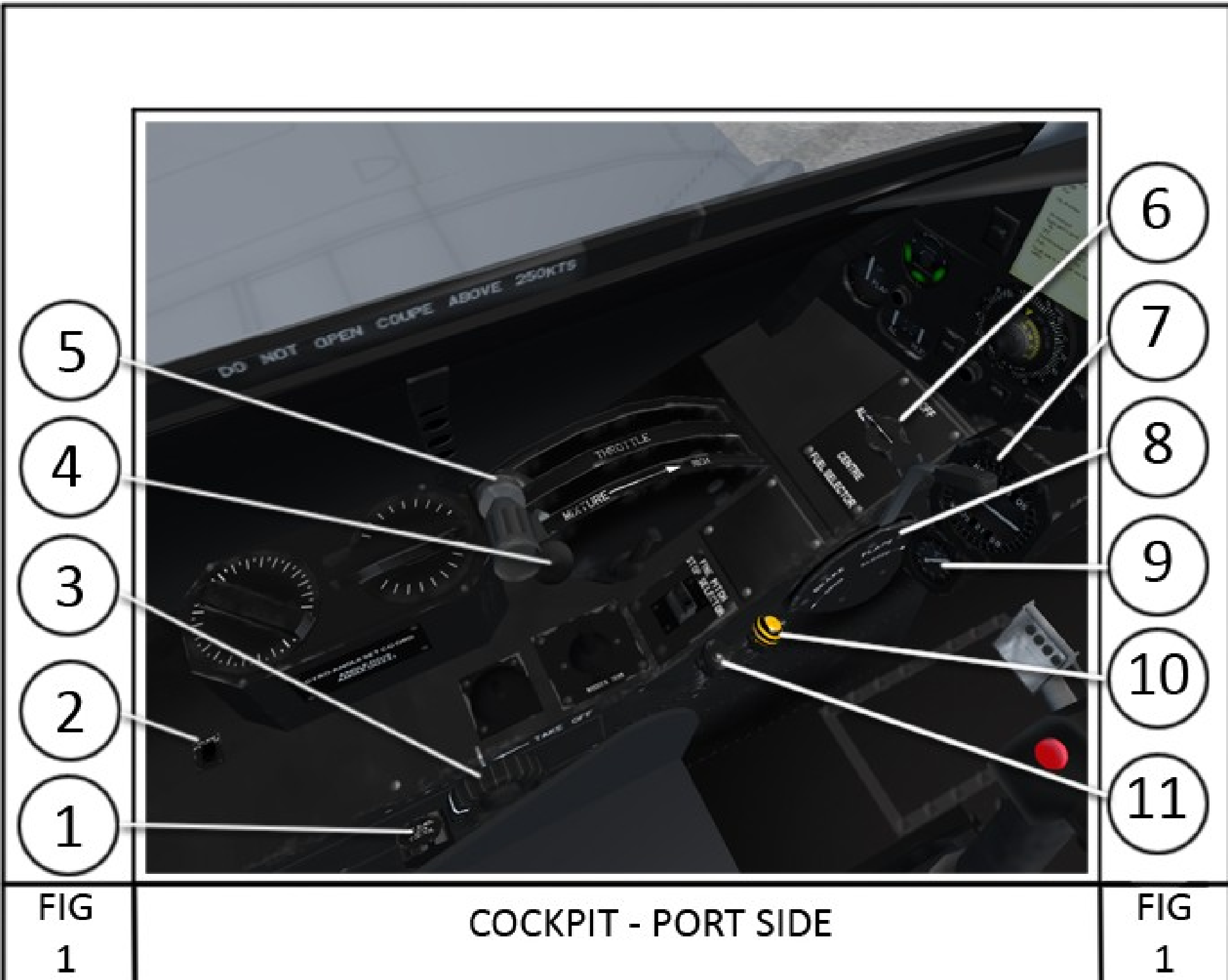
FIG 2 – COCKPIT FORWARD VIEW

- 12 Flap Position Indicator
- 13 Arrestor Hook Deployed Light
- 14 Gear Indicator
- 15 Undercarriage Switch
- 16 Mach Meter
- 17 Pressure Altimeter
- 18 ASI
- 19 RAD ALT Warning Lamps
- 20 Gyro Gun Sight Retraction Switch
- 21 Gyro Compass
- 22 Attitude Indicator
- 23 Turn and Slip Indicator
- 24 RCDI (Rate of Climb and Descent Indicator)
- 25 GGS Emergency Retraction
- 26 Generator Warning Lamp
- 27 Contact Altimeter Warning Lamp
- 28 RPM Gauge
- 29 Torque Gauge
- 30 Reverse Torque Warning Lamp

31	Fuel Pressure
32	Exhaust Gas Temperature
33	Oil Temperature
34	Fuselage Fuel Tank Contents
35	Fire Warning Lamps
36	Fire Extinguisher Switches (Guarded)
37	Inner Wing Fuel Tank Contents
38	Outer Wing Fuel Tank Contents
39	Low Fuel Lamp (245 Gallons Remaining)
40	Oil Pressure Gauge
41	Radar Altimeter
42	Starter Switch (Guarded)
43	Contact Altimeter
44	Igniters Warning Lamp
45	Ignition Switch
46	Trim Indicators

FIG 3 – COCKPIT STARBOARD SIDE

47	Wing Pylon State
48	Fuselage Pylon State
49	Navigation Lights
50	Strobe Light
51	Landing Light
52	Canopy
53	Cockpit Lighting
54	Battery
55	Avionics
56	Generator
57	Master Armament



5

4

3

2

1

6

7

8

9

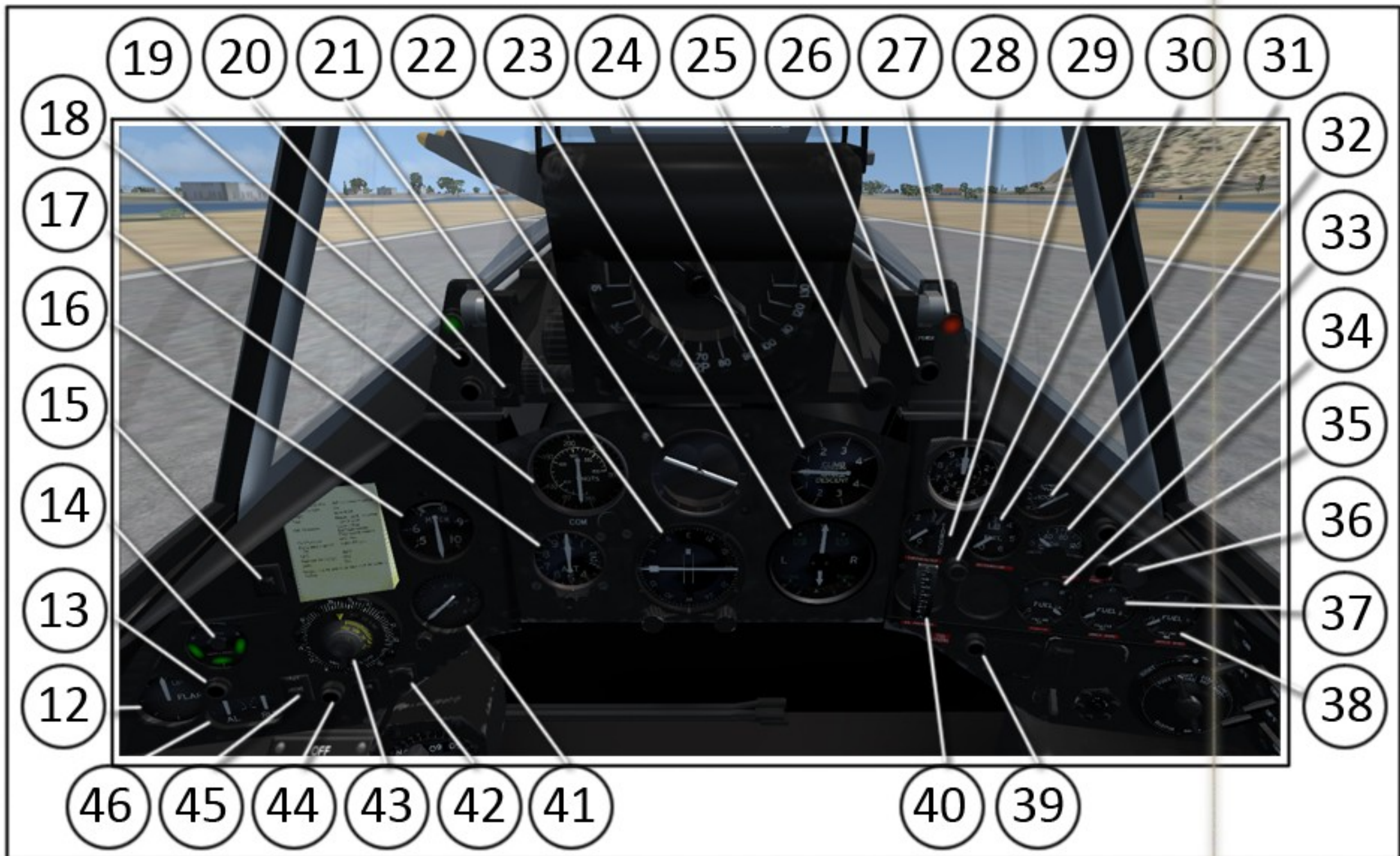
10

11

FIG
1

COCKPIT - PORT SIDE

FIG
1



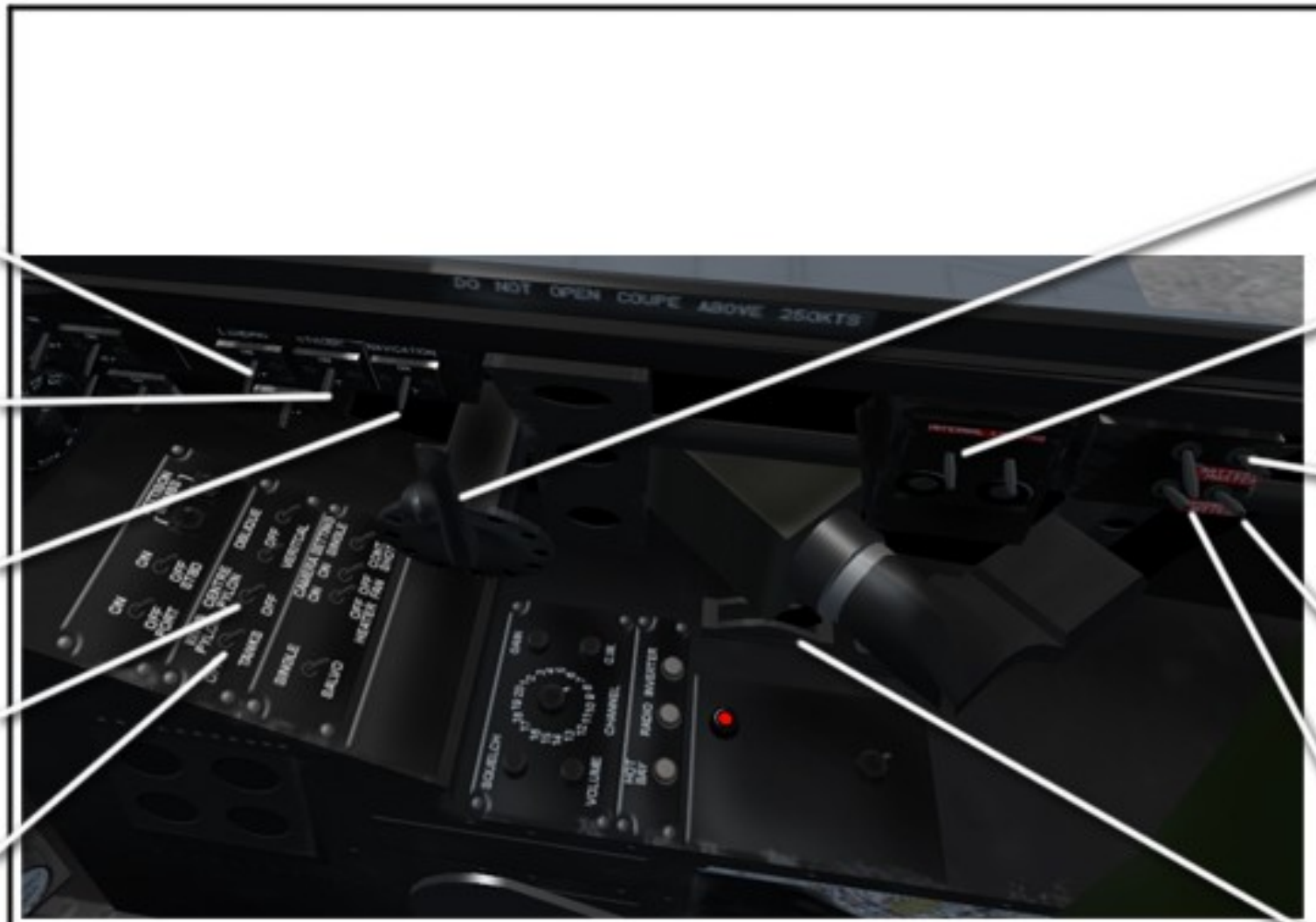
51

50

49

48

47



52

53

54

55

56

57

FIG
3

COCKPIT - STARBOARD SIDE

FIG
3