Flying Stations

Buccaneer S1

For FSX Acceleration

Introduction

The Blackburn Buccaneer was the Royal Navy's answer to the Soviet Union's proliferation of Sverdlov class heavy cruisers. The requirement was for an aircraft capable of carrying conventional and nuclear stores at 200' and 550kts with a radius of more than 400 miles.

The S1 was the first production model powered by Gyron Junior turbojets and as such was underpowered. However despite a number of other engines being available it was the only one that would allow the Buccaneer to remain within the weight limits imposed by the catapult equipment installed on RN carriers of the time. Due to this lack of power the aircraft modelled is slow to initially accelerate and requires a certain level of concentration when operating from afloat and in the circuit generally. Once up to speed the aircraft is however in its element and capable of 0.95M at sea level.

The more powerful S2 version is planned for release as part of a follow on package.

Buccaneer S1 of 809 NAS

Installation Notes

To accommodate various extra functions in the aircraft on first loading the you will be asked if you want to allow three dll gauges to operate, these are Dynamics.dll, Ballistics.dll and Blue_Parrot.dll.

To accommodate the extra functionality in the model a number of extra controls have been implemented. Specifically:

1	-	Bomb-bay door	-	Ctrl+Shift+b
2	-	Jettison	-	Ctrl+Shift+j
3	-	Weapons release	-	Ctrl+Shift+m or joystick button 0 (trigger)

Note the weapons release will only operate with the armament selector made and therefore nothing will be released if you use the trigger to control the aircraft brakes. Items 1 & 2 can also be operated via switches in the cockpit.

Aircraft Configuration

Once the aircraft is loaded it is possible to set the desired fuel and weapon load via the Loading Sheet (Shift+1), if an overweight configuration is selected the Aircraft AUM will display in red. It is necessary for the parking brake to be applied for the load to be successful.

Flight Reference Cards

The flight reference cards (Shift+2) contain checklists for flight operations and operating data for climb/descent/circuit speeds.

Air Brake Lever

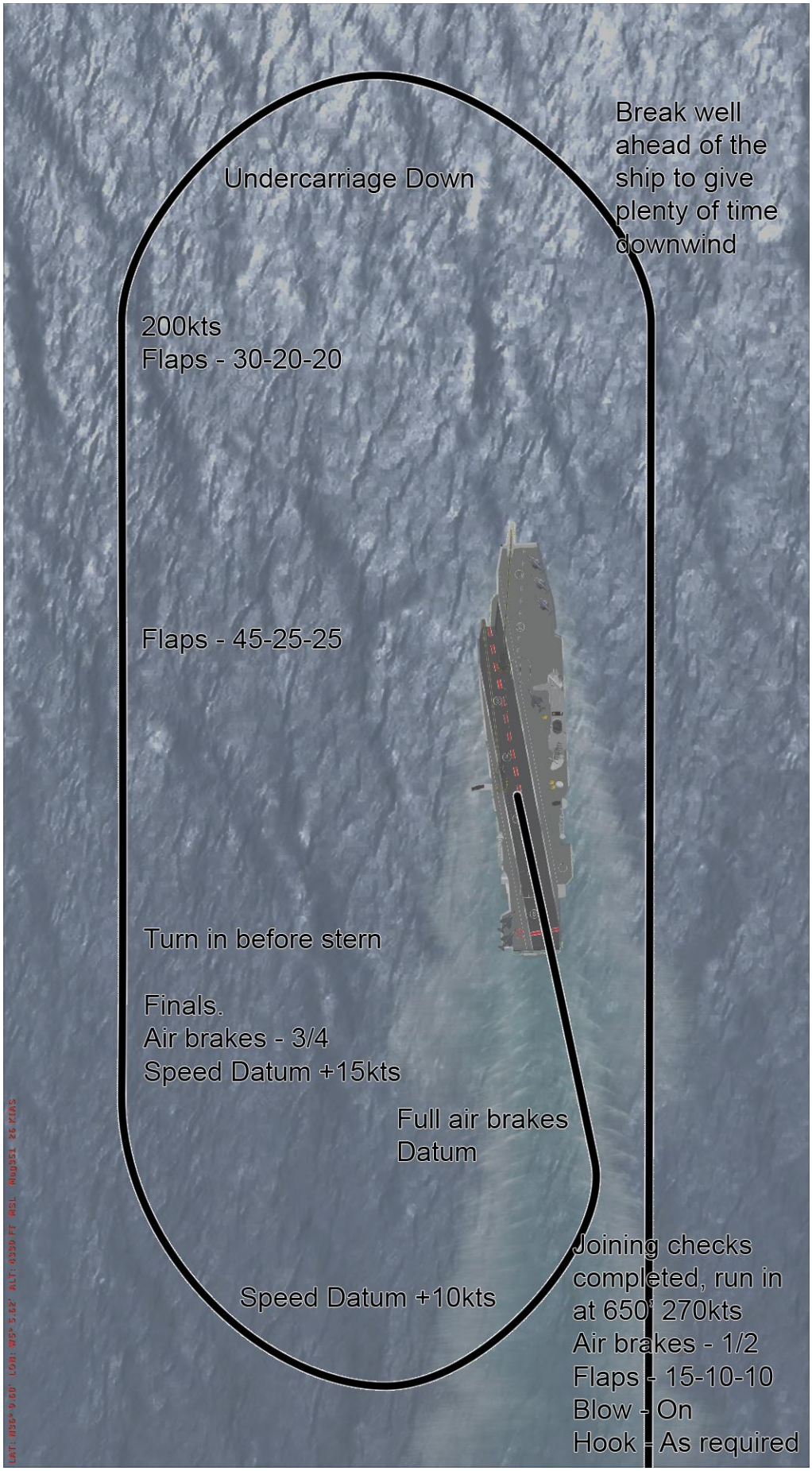
Circuit flying in the Buccaneer requires use of the air brake at partial settings e.g. ½ open, to allow sufficient engine speed to provide air to the boundary layer control system while preventing the aircraft from accelerating. It is recommended to assign the spoiler axis to a slider on the joystick/throttle if possible, if not a sub-panel (Shift+4) provides access to a brake lever that allows selection of an intermediate position.

Wire Caught Gauge

The wire caught gauge (Shift+5) provides information on which wire was caught during a carrier landing as well as the speed and rate of descent on touchdown.

Carrier Pattern

The recommended carrier circuit is shown on the next page for reference.


Break well ahead of the ship to give plenty of time downwind
Undercarriage Down
200kts
Flaps - 30-20-20
Flaps - 45-25-25
Turn in before stern
Finals.
Air brakes - 3/4
Speed Datum +15kts
Full air brakes
Datum
Speed Datum +10kts
Joining checks completed, run in at 650' 270kts
Air brakes - 1/2
Flaps - 15-10-10
Blow - On
Hook - As required

TACAN Controller and HSI

The TACAN controller is situated on the left hand pilot's console. TACANs are similar to civilian VOR/DME receivers in function and as such will provide range and bearing to standard NAVAIDS. TACAN channels map to VOR/DME frequencies and a conversion chart is available in the Buccaneer via the Aircraft->Kneeboard->References tab.

The controller allows you to select a TACAN channel from 1 to 124 via the pushbuttons at each corner of the central display, a separate X/Y selector switch is situated to the left of the unit.

Navigation information is then displayed on the HSI.

Channels 1 to 16 and 60 to 69 inclusive map to UHF frequencies and as such are not supported in FSX. These spare channels have been used to provide ship based TACANs, to tune them the file TACAN.cfg in the Panel sub-folder can be edited in any text editor. To change a channel setting copy the name of the ship from its Sim.cfg file e.g.

Title=Victorious_1950

And paste it in the TACAN.cfg file after the appropriate Channel number being sure to enclose it in quotation marks e.g.

Ch1 =”Victorious_1950”

The parsing routine is primitive and assumes the vessel name on the first line is for channel 1, second line channel 2 etc. For ships with multiple configurations it is possible to enter only that portion of the Title that is common to all models e.g.

Ch2=”CVN69”

Will find models titled CVN69_Launch, CVN69_RAS etc. This allows one channel to operate for all versions of a model.

The HSI mode selector is to the right of the HSI display and controllers what information is displayed on the unit.

In COM mode (above) the HSI acts as a gyro compass, the arrow can be used as a heading reference and orientated by the bottom left knob. With the autopilot heading hold engaged the arrow will align with the desired course.

In direct mode the arrow is replaced with a line indicating the direction and distance to the selected VOR/DME or TACAN if in range. The aircraft's position is marked by the circle at the centre of the display with range rings centred on the NAVAID indicating range. A separate range subscale is to the top left of the display.

Range rings start at 100NM from the NAVAID in 20NM increments with intermediate marks at 10NM. Below 10NM the range rings switch scale to 2NM increments with 1NM intermediate marks. Finally below 5NM the rings switch scale again to 1NM with intermediate marks at ½ NM steps, as illustrated above.

The third mode allows an offset position to be set in the Observers cockpit, in this case 10NM at a true bearing of 000 from the NAVAID. The HSI display is as per the direct mode but will now guide the aircraft to a point offset from the actual beacon, in this case 10NM north of the default carrier.

Note the ILS mode was not operative on the Buccaneer prior to upgrades to the S2 in 1976; the switch position is due to the instrumentation being shared with the Lightning. However limited functionality is included in FSX and glide slope and centreline information will be displayed if tuned to an ILS with the switch in the correct position. The accuracy of the gauge is not guaranteed.

RADALT

The RADALT controller is located on the pilot's left hand console, the associated gauge is on the instrument panel to the left of the Pilot's Attack Sight (PAS). The controls consist of an On/Off switch, Warning Light Limit Selector, Test Switch and Display Range Selector.

The On/Off switch will provide power to the gauge and warning lamps once DC and AC supplies are available.

The Limit Selector allows the pilot to select an appropriate height for the warning lamp indications. When at the selected height the green light will be illuminated, when more than 5% above the selected height the amber light will be on and when more than 5% below the selected height the red lamp will illuminate. Note when the 50' limit is selected the green lamp is only on in a 5' height band.

The Test Switch will provide a signal to the gauge which drives the needle to the 60' height indication.

The Range Selector allows the pilot to choose between a 500' and 5000' height range.

RADALT off, 5000' Scale selected. RADALT test, 500' Scale selected.

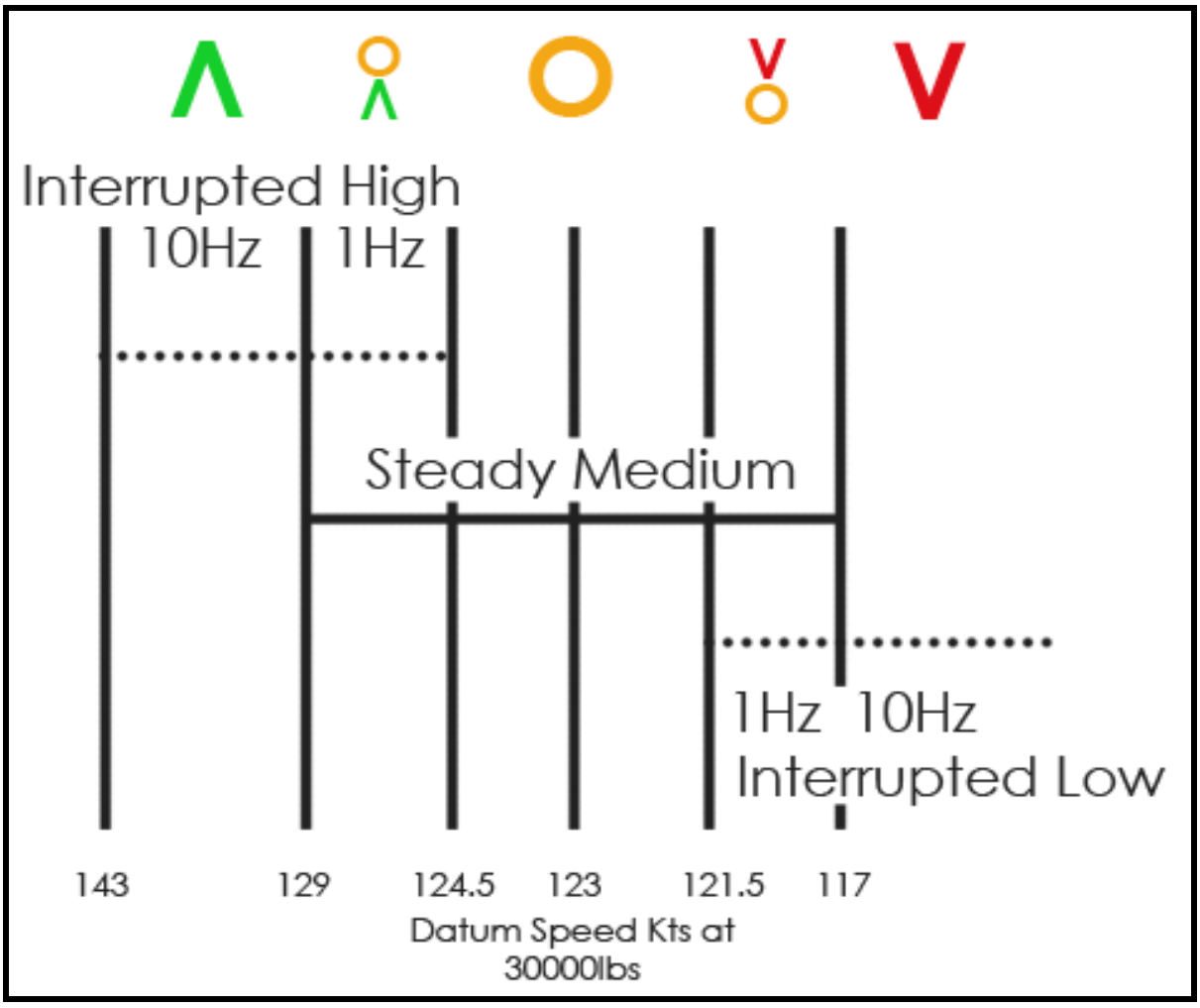
The warning lamps are attached to the right hand side of the windscreen framing.

Deck Landing Aids

The Deck Landing ASI is located on the left hand side of the instrument coaming and provides an accurate airspeed indication during the approach phase. To the right of it are the AoA index lights, these are activated by the ADD control switch on the left hand side of the cockpit, just below the canopy rail.

The index light illumination is based on the datum approach speed for the current All Up Mass (AUM) with full flaps and blow selected in which case the orange circle will illuminated when the aircraft is on speed. If not at the datum speed the appropriate arrow will light to indicate which direction the nose should be moved in, when approaching the correct speed the arrow will be accompanied by the orange circle.

In addition to the visual signal an audio tone is present when within 20knots of the datum speed, details summarised in the table below.



Datum speed is 123kts at 30000lbs AUM, an allowance for weight variation of 2kts per 1000lb should be made. E.g. at 33000lbs – 123kts + (3 X 2kts) = 129kts.

The Angle of Attack indicator is located to the left of the RADALT and is scaled from 0 to 30 units. On approach an AoA of 20 units should be aimed for. It becomes active when the ADD switch is made during the pre-landing checks.

UHF Radio

The Com 1 radio is represented by the Buccaneer's UHF controller on the pilot's front left console. It provides access to the FSX VHF frequencies which may be manually selected if desired. The early Buccaneers had no secondary UHF radio or standby frequency capability and none is modelled.

Armament Controls

The armament controls consist of the Jettison Selector and the Armament Selector.

The Armament selector allows the pilot to choose the weapon and mode of attack, active modes are:

Dive Prac	-	Conventional Bombs, Dive Attack
Bombs		Conventional Bombs, Level Flight
RP		2” Rockets
TMB Norm Prac		Conventional Bombs practice Toss attack profile
TMB OTS Prac		Conventional Bombs Over The Shoulder attack profile
TMB Norm		Red Beard Toss attack profile
TMB OTS		Red Beard Over The Shoulder attack

The Jettison selector allows stores to be selected for jettison, an inter-lock prevents bomb-bay stores being jettisoned if the bomb bay is closed. Jettison may be initiated either via the button on the port forward console or the Ctrl+Shift+j key combination.

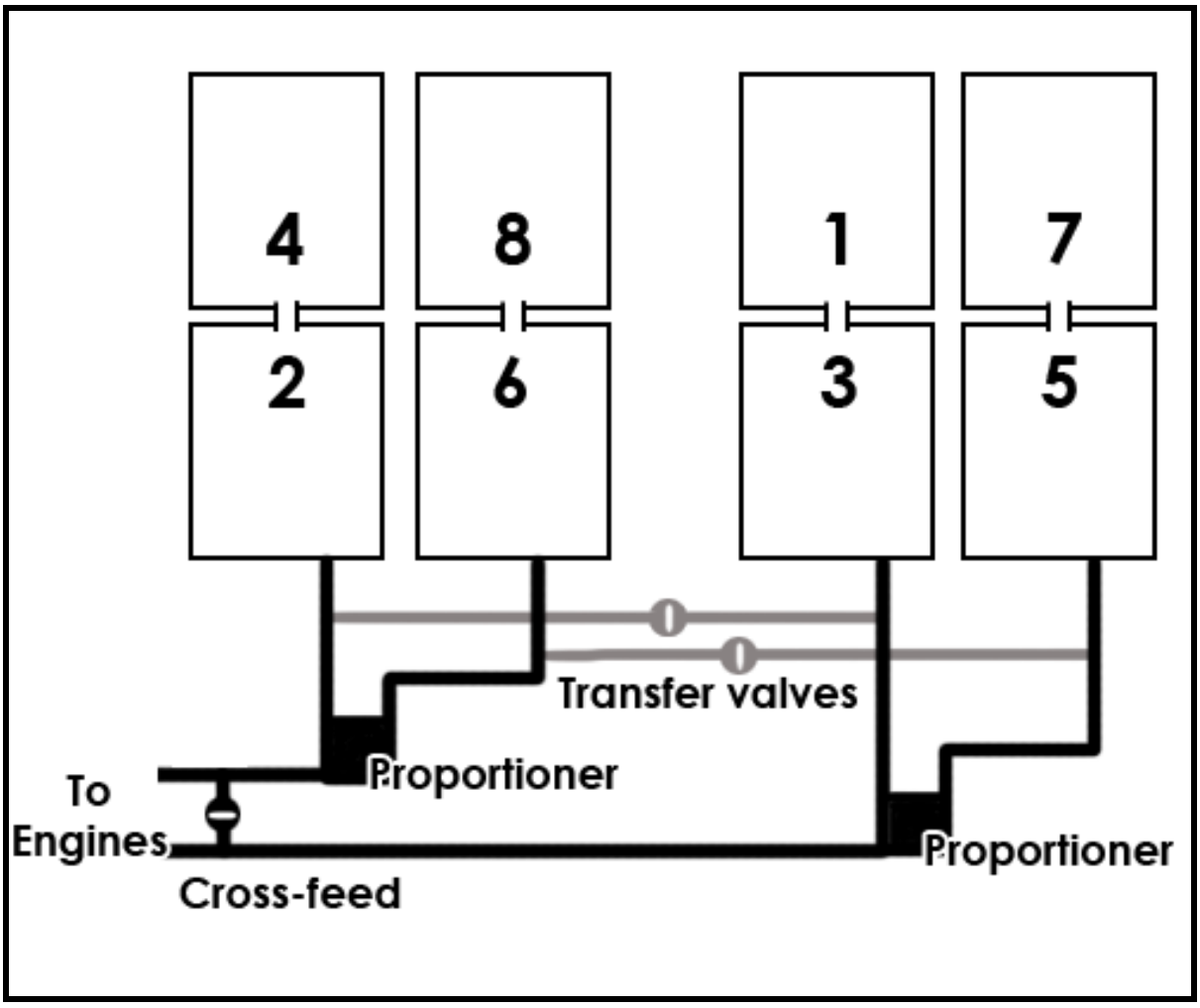
Fuel Controls

The fuel control panel allows the pilot to manage the fuel flow if the standard operation results in an unsatisfactory balance state.

Fuel is contained in eight tanks along the centre of the aircraft above the bomb bay, number 1 to 8 from the front of the aircraft. Odd numbered tanks feed the starboard engine while the even ones feed the port engine. The tanks are interconnected in a master slave configuration and pressurised to ensure the centre of gravity is maintained. A simplified layout is shown below.

When connected the external tanks feed into the master tanks and if these are full will overflow into the slave tanks.

The fuel control panel allows operation of the inter-tank transfer valves which will allow a limited amount of rebalancing between the tanks dependant on their current state. The cross feed cock will connect both fuel supplies prior to feeding to the engines, this allows fuel to be drawn from one sides tanks to drive both engines to correct an out of balance situation.



The Flight Re Fuel switch allows fuel to be transferred from another aircraft if the re-fuelling probe is fitted and the aircraft is in the stern sector of another within approximately 30 metres.

The fuel proportioners ensure an even pressure of fuel is delivered to the engine pumps and that a supply is available while the aircraft is experiencing negative g, this will last for approximately 20 seconds at full throttle. The indicators on the fuel panel will show white if they are not supplying fuel to the engines.

Similarly if the engine pumps are not receiving fuel at the required pressure the pump inlet indicators will show white. In both cases this is usual during start up before the system is pressurised by engine bleed air.

Either side of the fuel contents gauge are Fuel/No-Air (FNA) switches which control the flow of fuel from the tanks. When in the No-Air position the Master/Slave pair will not provide fuel to the engines. If both of one side's FNA switches are closed without the cross feed open the associated engine will suffer fuel starvation and stop.

The gauges are arranged with the slave tanks above their masters, fuel should drain from the slave tank and then the master. Total fuel mass (including external tanks) and fuel flow in lbs/minute are on the instrument panel immediately above the contents gauge.

The Fuel Jettison button is located to the right of the main Fuel Control panel when activated fuel is dumped via the pipe on the rear of the fuselage. Fuel will drain from the main tanks being replenished from the slave and external tanks if fitted. The jettison should cancel automatically when there is approximately 1000lbs in each main tank (4000lbs total).

External fuel is carried in two wing tanks, each tank holding approximately 1900lbs. The contents gauge and transfer switch are located in the Observer's cockpit on the left hand console.

Ancillary Switches

On the right of the pilot's cockpit adjacent to the Autopilot control are two banks of switches, functional details are listed below from top left to bottom right.

Inverter - Provides AC power while the alternators are offline (i.e. pre-engine start)

ATA Reset - Controls AC power output from the Air Turbine Alternators. In the event of failure one reset may be attempted.

ATA Valve - Feeds bleed air from the engines to the ATA to generate AC power. Note, ATAs will be on if simulation starts with engines running.

Engine Blow - On position allows automatic activation of the blown wing and flap system when aileron droop exceeds 5˚

Cabin Pressurisation Dumps cabin pressure

Pressure Heads	-	Turns Pitot heaters on.
Ice Detector	-	Energises the ice detection circuit, warning indicator in the centre of the instrument panel.
Ice Detector Test	-	Tests ice detection circuit to confirm operation.
Windscreen Heat	-	Icing protection for the windscreen (and airframe in FSX).
Engine Anti-ice	-	Diverts bleed air to the engine intakes to prevent icing.
W/Scr Clear	-	Provides bleed air to clear the windscreen of rain (Inoperative in FSX).
Downward Ident	-	Allows operation of downward ident light as Morse signalling device.
Formation Lights		Three position switch to control lights on trailing edge of ailerons and tailplane bullet. Off – Dim – Bright.
Rendezvous	-	Controls flashing lights on dorsal spine and forward of the bomb bay.
Nav Lights Bright		Controls nav light intensity, Dim or Bright.
Nav Lights Steady		Controls Nav Light Mode. Off – Steady – Flashing.

A further array of switches is on the left forward console and covers the following functions from the left.

DC Generator - Connect the output from the engine mounted generators to the DC busbar.

Battery Master - Connects the battery to the DC busbar.

Gear Up	-	Selects undercarriage up.
Gear Down	-	Selects undercarriage down.
Em Down	-	Guarded switch, allows one time operation of the emergency undercarriage extension.
Flap	-	Allows selection of flap stage 0˚ – 15˚ – 30˚ – 45˚.
Aileron Droop	-	Allows selection of aileron and tailplane droop 0˚ – 10˚ – 20˚ – 25˚ Note use of the FSX extract and retract keys will select between the four most commonly used combinations of flap and droop automatically.
Tailhook	-	Toggles tailhook, adjacent lamp illuminates green when extended.
Jettison	-	Jettisons external stores as selected on armament panel.

Carrier Take Off Button

Located to the left of the throttles the guarded switch will enable automatic retraction of the undercarriage when the weight on wheels sensor indicated the aircraft is airborne. Adjacent lamp illuminates red when armed. To disarm the system the main Gear Up button surround should be rotated anti-clockwise.

Autopilot

The Buccaneer has a simple autopilot the controls for which are located on the right hand pilot's console.

Toggles are provided to switch between Mach and Height hold modes and to disengage the Heading hold. The Mach and Height hold will operate at the level existing at the time the switch is made in the S1, the S2 features a toggle control adjacent to the throttles to adjust the setting subsequently. The Primary Attack mode is inoperative (described as such in the S1 Aircrew Manual). The Radio Alt hold provides a limited over water RADALT height hold mode which should be continuously monitored.

The Autopilot On/Off switch should be engaged once the desired modes have been selected. The Autopilot indicator will turn black when the autopilot is engaged.

If the RADALT height hold is selected it is imperative to ensure the aircraft is in level flight at the desired altitude before making the master Autopilot switch (Default FSX key – z). Additionally the RADALT hold should not be engaged below 400kts.

Central Warning Panel

Located below the fuel control panel the Central Warning Panel (CWP) provides centralised indication of serious system faults. Additionally an attention getter warning light is situated on each side of the pilot's cockpit.

Working indications in FSX are-

C PR - Cockpit Pressurisation Fail

GEN P - Port generator not supplying DC power.

GEN S - Stbd generator not supplying DC Power.

CON P - Port flying control hydraulic pump pressure insufficient.

CON S - Stbd flying control hydraulic pump pressure insufficient.

W FOLD - Wings not fully spread.

FIRE P - Port Engine Fire.

FIRE S - Stbd Engine Fire.

Other indications are for faults that are not replicated in FSX.

In addition the yellow and black engine fire extinguisher buttons feature red lamps that will illuminate in the event of a fire in the associated engine.

The Test (T) button tests operation of all warning lamps and the audio warner.

The Cancel (C) button will cancel the Master Caution audio alarm and flashing lights.

On initial detection of a fault the audio warner will sound, attention getter lights and all lights on the CWP will flash. After pressing the Cancel button the light for the detected fault will remain illuminated and all other lights will extinguish.

During start up and shut down various alarms will sound as systems run up to operating voltage/pressure, these should be cancelled in the usual way after confirming their cause.

RADAR and PAS Guide

The Blue Parrot radar is a surface search radar with range selections out to 240NM. Due to limitations in FSX a limited set of functions is supported.

In the above image shows a standard radar picture. A coast line is to the left of the aircraft with multiple surface contacts in front of the aircraft and a larger lone contact approximately 20 degrees to the left of the aircraft head. The range and bearing marker is currently positioned 14 miles ahead of the aircraft, a bearing of 68.9 degrees. In FSX multiple contacts near a coastline generally indicate autogen AI boats and small craft while a lone contact is either an AI ship following a route or a vessel placed using AI Carriers.

From left to right the controls are:

Scale - Marked ½M, 1M, 2M, B and EXP B these equate to 30, 60, 180 and 240 NM range scales. The lower marked scales corresponded to 1:500,000, 1:1,000,000 and 1:2,000,000 scale charts in the real aircraft allowing a direct transfer of the measured distance. The final EXP B setting changed the display pattern in a way not possible in FSX.

Brilliance - Allows an increase/decrease in the display brightness

Sensitivity - Increased sensitivity allows detection of smaller contacts at a greater distance, at the expense of clarity at close range. Decreasing sensitivity removes smaller contacts from the display allowing larger ships to be targeted in busy shipping areas.

The range and marker bearing is operated by moving the mouse over the radar screen. There are two methods of locking a contact:

Radar Lock - Left clicking over a discrete radar contact (i.e. ship) will cause the radar to lock onto it and remove all other contacts from the screen. This mode will maintain a lock while the contact moves as long as the rate of position change is within the acceptable limits, note this can be affected by aircraft movement e.g. high rates of turn.

Ground Stabilised Right clicking anywhere on the screen will ground stabilise the radar to that position in space. This allows tracking of non-discrete contacts e.g. the land, and the system can be used to guide the aircraft to that point in space. Additionally it is not necessary to keep the radar pointing at that point in space for the lock to be maintained, to that end a ship's position can be ground stabilised before descending the aircraft to low altitude, once closer to the contact a radar lock can be obtained for final positioning. Note the ground stabilised mode will not allow for contact movement.

In both cases the red lock light will illuminate in the event of a successful lock.

Although the CI controller in front of the Observer contains a number of controls only a subset are supported in FSX, namely the range and bearing offset controls. By either moving the dials or directly clicking on the Range and Bearing displays an offset position can be entered in to the radar system. In the picture above the offset is 31NM on a bearing of 039 True from the locked position. This allows the system to mark a point offset from a known feature e.g. a distinct point on a coast line can be ground stabilised and then the offset to a town can be entered to allow it to be found without reference to external NAVAIDS.

The Pilot's Attack Sight (PAS) is an early HUD system that displays limited flight and targeting information to the pilot.

In the image below the aircraft is approaching a locked radar contact, in this case an aircraft carrier.

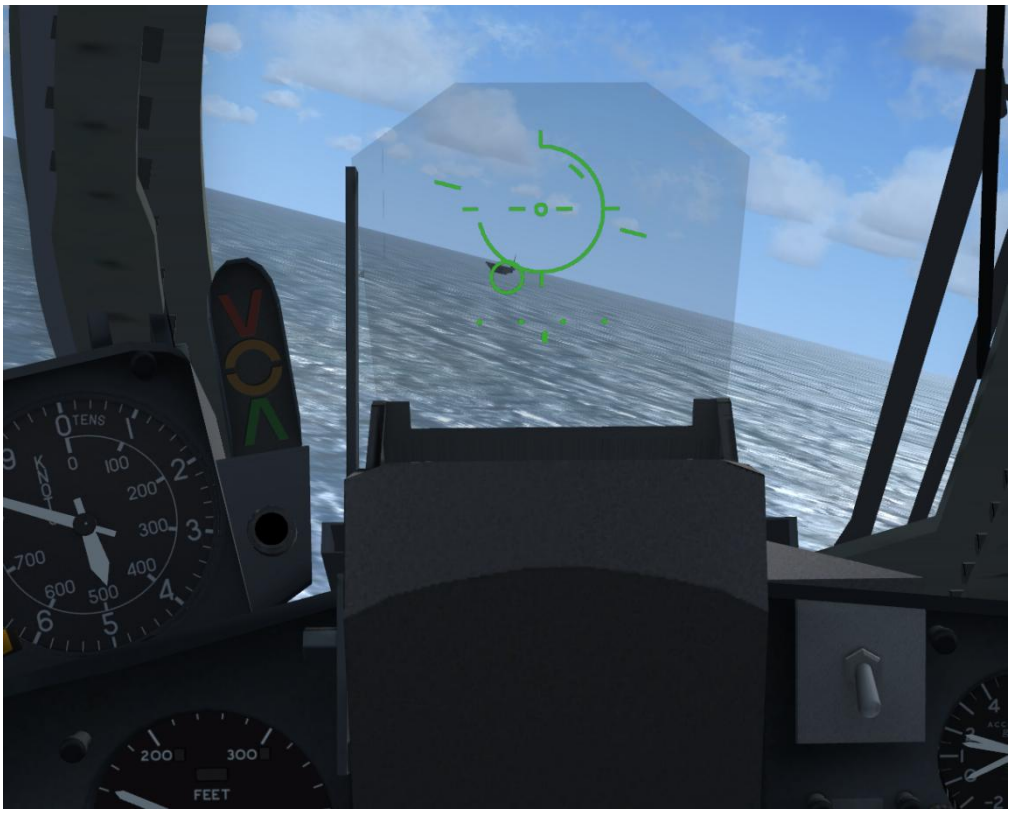
The target circle is positioned over the calculated position of the target and at this stage should not be used to drive the aircraft's pitch.

In the centre of the display is the aiming mark, bore sighted on the aircraft axis, flanked by the bank and horizon indicator bars.

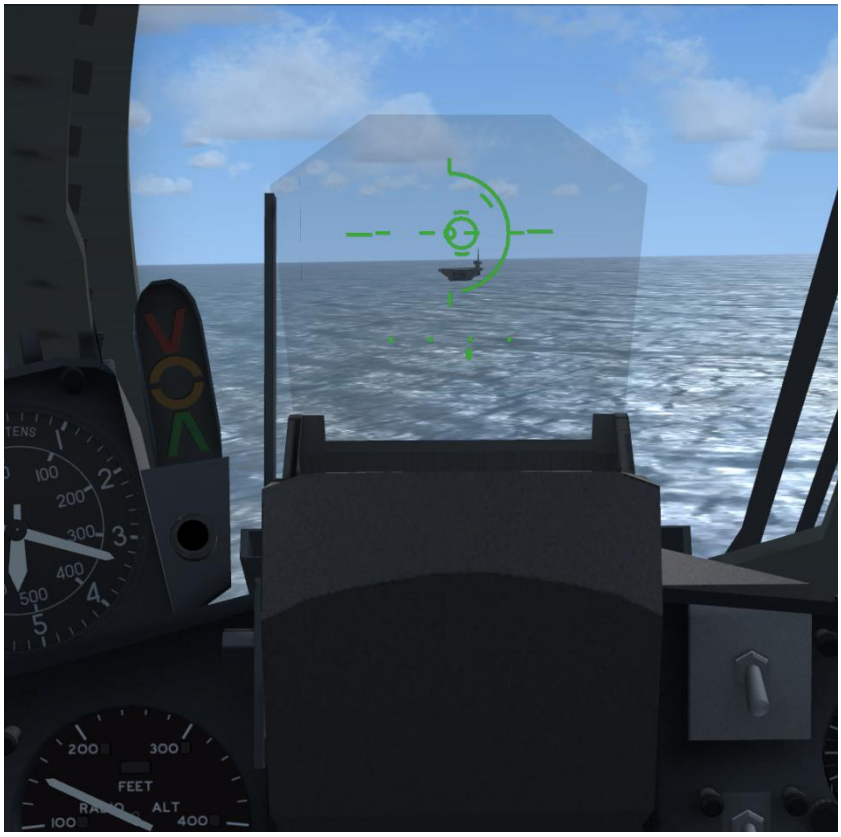
Surrounding the aiming mark is the range count down circle, in the selected mode (level bombing) it indicated four miles to run with a complete circle, with three miles at the 9 o'clock position, two miles at 6 o'clock, etc. This is also true for the dive bomb mode, in the long toss and over the shoulder modes the countdown starts at 12 miles and the display can be read as a clock, e.g. at 5 o'clock there are five miles to run.

The small mark at the 1 o'clock position is the release marker at indicates the anticipated release range, in the long toss bomb modes it indicates the range at which the aircraft pull up will be initiated to loft the weapon towards the target.

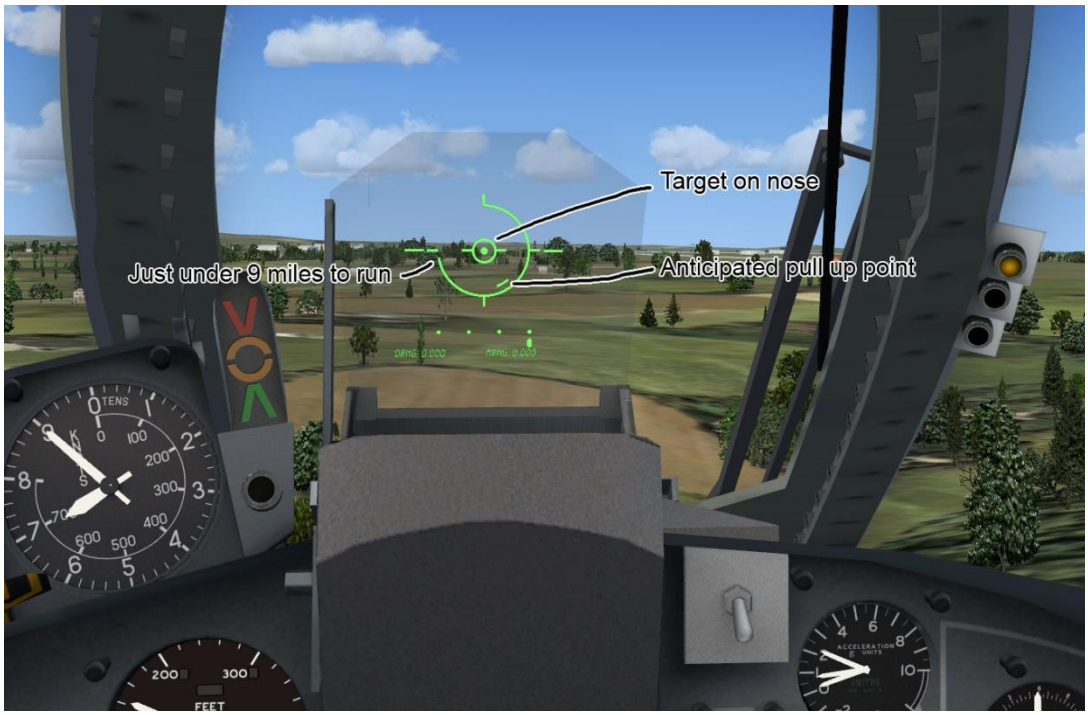
The four dots across the bottom of the display correspond to 300, 400, 500 and 600 Knots TAS indicating the aircraft is currently doing approximately 450KTAS.

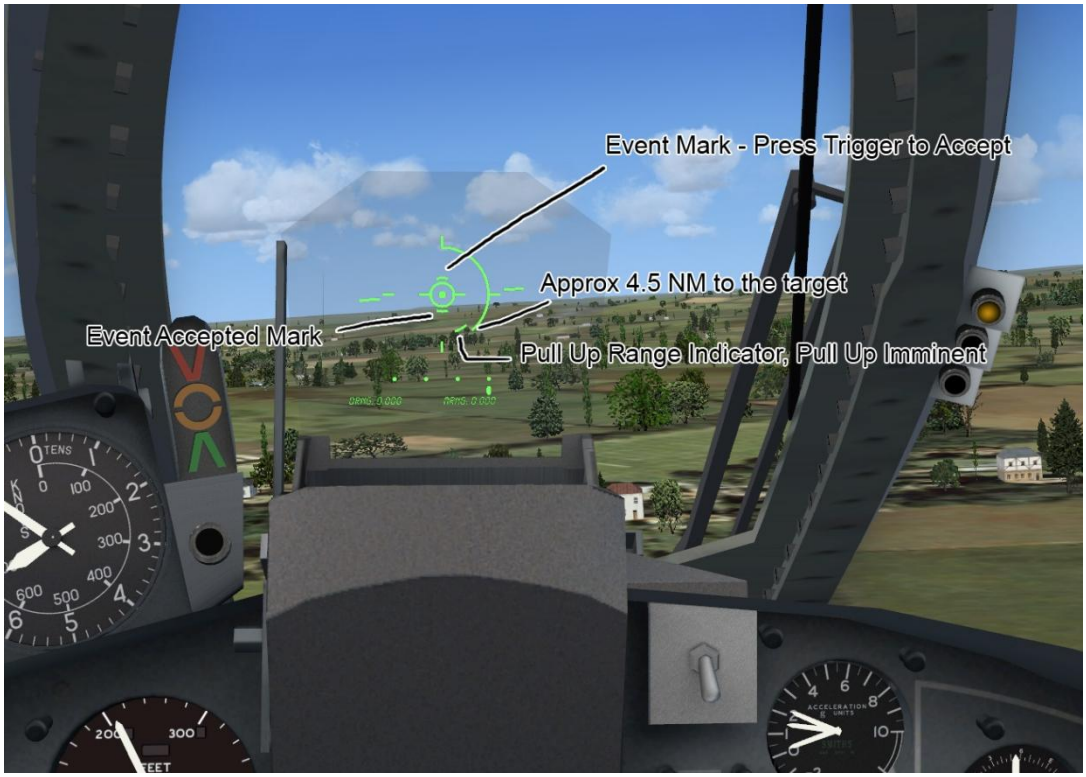


In this view the attack commit marks are visible above and below the target circle. The upper one will appear prior to the release point to indicate the system is ready for the attack and needs acknowledgement by the pilot for weapons release to take place. The lower mark indicates the pilot's acknowledgement (by pressing the trigger) and weapons release will now take place when the computer calculates the aircraft is in the optimum position.



The sequence of pictures below indicates the expected display sequence while conducting a long toss approach.






At Pull Up, follow aiming mark
to achieve release parameters


Maintain this picture until
weapon release

Note in the RP (Rocket) and Dive bomb modes weapons release occurs when the trigger is pressed.

In the OTS (Over The Shoulder) mode the pilot presses the trigger to accept the attack when on top the target, the PAS will drive the aircraft into a loop releasing the weapon after approximately 120 degrees. The attack can be made via a radar lock or after navigating to the target visually and allows for an ad-hoc attack to be made.

Credits/Blame

Philip J Chandler	-	3D Model, Gauge Programming, Flight Model
Fraser M Paterson	-	Textures, Testing
Rich Ruscoe	-	Flight Model, Testing
Ian Kirby	-	Testing
Mark Barber	-	Testing
Sylvain Parouty	-	Testing
Steve Beeny	-	Web Guru

Feedback is appreciated via our web forums http://z13.invisionfree.com/Flying_Stations/ although to answer the obvious question we are working on the S2 and it'll be ready when we're done.

I could probably explain the weapons system better there as well...