Simwings.nl

Virtual Naval Test Pilot School

Syllabus

Created by Marcel Hendrikse

DISCLAIMER

All material in this document is **FICTIONAL**.

None of the procedures and manoeuvres have been reviewed or sanctioned by the United States Navy, nor by the U.S. Secretary of the Navy.

The contents in this document is intended for recreational flight simulation use only.

At no time and under no circumstance whatsoever can anything described in this document be used for real life flight purposes.

Foreword

This document contains the step-by-step procedures for the Virtual Naval Test Pilot School's curriculum. Before using this document, please be aware of the fact that it does NOT intend to provide any basic or even intermediate training for Microsoft Flight Simulator ®. If you use this document, I'm assuming above-average interest and ample experience in the field of flight simulation.

Throughout this fictional course, you will also get to fly helicopters. If you are not into flightsim helo flying, but want to acquire a well-established basic knowledge in that area, I suggest checking out Hovercontrol's training program.

On the website (http://www.simwings.nl/vntps) you will find references to the aircraft you can use for the flights, as well as some downloads. Over time, it is my intention to create and add NTPS liveries of those aircraft if not already available. So: regularly check the site.

On the next page is an overview. The numbers mentioned there are not the actual hours; they represent the number of flights for that particular airframe and the associated flight profile. In all, flying all flights will most probably add up to about 90-100 simulated flight hours.

As said: I'm not going to teach you basic stuff. This virtual course will just expand on basic flightsim knowledge in order to give you some nice rides in a variety of aircraft.

Have fun doing that!

Marcel Hendrikse

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Course overview

EXERCISE	AIRCRAFT	BRIEFS	FLIGHTS
T-2 Familiarization	T-2		4
T-38 Familiarization	T-38		5
Jet Orientation/Area Fam (3)	T-38/T-2		1
Integrated Sys Demo	P-3(443)		1
Perf Demo #1	T-2		1
ILS/FDS Eval	C-12		1
Aircraft Performance Eval	T-38		3
Qual Eval I	U-1/U-6		1
Performance / F.Q. Practice (8)	T-2/T-38		1
Instrument Proficiency (4)	Any		4
Pitot-static Evaluation	T-38		1
Qual Eval 2	T-38		1
Radar Test Techniques	P-3(443)		1
Long Stab Demo	T-2		1
F/A- 18 Sys Demo/Fam	F-18		1
Perf Prog Check	T-2/T-38		1
Safety/Photo Chase	T-38		1
Long Stab Eval	T-38		1
Long Stab Demo (5)	Learjet		1
Radar Eval	F-18		1
Lat-Dir Demo	U-6/U-1		1
Lat-Dir Demo (5)	Learjet		1
Multiengine Qual Eval (6)	P-3		1
FLIR Eval	P-3(443)		SKIPPED
Night Vision Eval/Demo	F-18/UH-60		1
Refresher Fam	T-38/T-2		1
Long Stab Prog Check	T-2		1
Lat-Dir Eval	T-38		1
Qual Eval X	T-38		1
Dynamics Eval	T-38		2
Asym Power Demo/Eval	C-12		1
VTOL Demo	OH-58		1
Stall/Spin Demo	T-2		1
Lat-Dir Prog Check	U-6/U-1		SKIPPED
S & C Review (4)	Learjet		1
In-flight Loads Demo	P-3(443)		1
Stall/Spin Eval	T-2		1
Transonics Eval	T-38		1
Qual Eval 3	SNJ/AT-6		1
A/G Wpns Integration	F-18		1
Adv FCS Demo	Learjet		1
Qual Eval 4/5	T-38		2
GRADUATION			54

On each page you will find check boxes. You can use those to check off each flight and move on to the next. I'd also advise you to keep a logbook (either manual or flightsim-controlled) so you can easily see how many hours you spent flying to, from and around NAS Patuxent River, Maryland.

As you can see, the curriculum calls for flights in quite a variety of types: jets, props, piston, multi-engine and helo. The types you will fly most frequent will be the T-38 and the T-2. These are in real life also the most-used types for progress checkrides and proficiency flights.

Flights will consist of specific testing in the field of aeronautical behavior, but can also be about basic airwork, instrument flying, formation flying and system testing.

You can simply place the aircraft of the flight involved on the active runway at Patuxent River and start the flight when ready. The creation of startup modes I leave up to you. By default, use the “Fair Weather” weather theme unless otherwise instructed (example: instrument flight proficiency).

For navigational aids, I can refer you to http://www.airnav.com and http://skyvector.com/. Here you can retrieve approach charts and airfield diagrams. I recommend printing the available documents for KNHK (Pax River) to have them ready for each flight. Also, the program known as “**FSNavigator**” is a great tool to create your own flight plans.

Restricted areas in relation to KNHK:

- R-4005 (to the South)
- R-4002 (to the Southeast)
- R-4006 (to the South, adjacent to R-4005, extends also to the East)
- R-4007 (in which KNHK is located)
- R-6609 (south of R-4005)

Navigational resources at KNHK consist of a non-directional beacon (NDB) with frequency 400.0 and a VOR beacon transmitting at 117.60. At all times you can use the GPS to navigate.

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Flights:	4			
Airframe:	T-2C			
Flight profile:	FAM			
Completion:	1	2	3	4
	O	O	O	O

FLIGHT 1: Pattern flying

Take off from the active runway at KNHK in a T-2C

Climb straight ahead to 1600 feet and level off at that altitude, 250 KIAS

Turn left, angle of bank 30 degrees, until your heading is reciprocal (has changed 180 degrees), maintain 1600 feet

Look to the left and when the runway center is at your 9 o'clock, start descending to 800 feet. Reduce speed to 190 KIAS and lower the gear

Start counting 15 seconds when passing the runway end at your 9 o'clock and set 1 notch of flaps. Reduce speed to 150 KIAS. Apply speedbrakes, set full flaps and add power to maintain 150 KIAS

Make a left turn back toward the runway (final approach). Landing speed should be 135-140 KIAS. **Do not flare and do not idle the throttle!!**

Upon touchdown, retract speedbrakes, full power, flaps retract 1 notch and take off again.

Repeat until you have grown accustomed to the T-2C in pattern flying and landing configuration. Make at least 3 **right-hand** patterns as well.

FLIGHT 2: S-Turns and climbs

The essence of this exercise is to learn you how to trim the aircraft. As you turn from one heading to the other, you will need to trim the aircraft in such a way that the altitude changes are kept to a minimum, preferable zero. Base rule: initiating a turn will require upward trim, coming out of a turn will require downward trim.

You may choose to change visibility to near-zero, as this exercise requires you to monitor your instruments at all times. With little or nothing to see outside, you can force yourself to concentrate on instruments. At this point, however, setting the visiblity is NOT mandatory.

Take off from the active runway at KNHK in a T-2C

Climb straight ahead to 5000 feet, engage autopilot to hold that altitude and proceed to R-4005 at 300 KIAS

Once within the boundaries of R-4005, climb to 10,000 feet and level off there at 250 KIAS

Turn to heading 090, 10,000 feet, 250 KIAS and **disengage autopilot**

Start a 30-degree AOB **right-hand** turn to heading 270. Altitude tolerance is +/- 200 feet, speed tolerance +/- 15 KIAS

Once on heading 270:

Start a 30-degree AOB **left-hand** turn to heading 090, same altitude and speed tolerance

Once on heading 090:

Start a 30-degree AOB **right-hand** turn to heading 270, climbing at 1000 fpm to 12,000 feet at 250 KIAS, speed tolerance +/- 10 KIAS

Once on heading 270:

Start a 30-degree AOB **left-hand** turn to heading 090, descending at 1000 fpm to 10,000 feet at 250 KIAS, speed tolerance +/- 10 KIAS

Once on heading 090:

Use the NDB of KNHK to return to base. Contact tower for 1 touch and go, after that make a full stop landing.

FLIGHT 3: Radio navigation

Take off from the active runway at KNHK in a T-2C

Climb to 5000 feet at 300 KIAS (+/- 10 KIAS) and level off at 250 KIAS. Hold heading for another 2 minutes. Set ADF to 400.0

Turn left, 30 degrees AOB, directly toward the Pax River NDB. When crossing the NDB (the needle will swap), start counting 2 minutes

Turn right, 60 degrees AOB, directly toward the Pax River NDB. Over the NDB, turn to heading 180 and hold heading for 3 minutes

Set your VOR to 315 degrees, NAV1 radio to 117.60. Make a left turn, intercepting the 315 radial inbound to the Pax River VOR. Fly over the VOR

Once 1 mile from the VOR, contact Pax River tower, request a touch and go and start descending to 800 feet

Enter the traffic pattern and carry out the touch and go; after that request a full stop landing

FLIGHT 4: Basic aerobatics and stalls

Take off from the active runway at KNHK in a T-2C

Climb straight ahead to 15,000 feet and turn toward the Chesapeake Bay (situated East of the air station)

At 15,000 feet, level off at 300 KIAS

First, practice a couple of aileron rolls (unlike the barrell roll which requires back pressure on the stick, the aileron roll is simply a roll done by sideways stick deflection; the aircraft will lose altitude!)

Climb back to 15,000 feet and increase the airspeed to 450 KIAS

Once you reach the target airspeed, execute a looping, holding 4G as long as possible. End up at 15,000, feet **not below!!** Repeat as often as you like

Next is the Split-S. Decrease airspeed to 200 KIAS, the roll the aircraft upside down and pull 3-4G until in level flight, 180 degrees from your original course. Climb back to 15,000 and repeat

Stalls:
Make sure the autopilot is OFF and set throttle to idle. As the airspeed decays, use trim and/or back stick to hold altitude

When the aircraft has run out of airspeed and the stall warning sounds, release the stick and watch the nose lower. Airspeed will increase and at 200 KIAS or more start pulling up to end the dive. Add power and climb back to 15,000 feet

REPEAT this stall exercise in both horizontal flight AND in turns

Return to KNHK, request permission for a full stop landing.

Flights: 5
Airframe: T-38
Flight profile: FAM

Completion:	1	2	3	4	5
	O	O	O	O	O

Remarks: The first four flights will be identical to those flown in the T-2C. Flight #5 will introduce you to the T-38's supersonic capability. After flight #5 you will have reasonably been acquainted to both aircraft.

FLIGHT 1: Pattern flying

Take off from the active runway at KNHK in a T-38

Climb straight ahead to 1600 feet and level off at that altitude, 250 KIAS

Turn left, angle of bank 30 degrees, until your heading is reciprocal (has changed 180 degrees), maintain 1600 feet

Look to the left and when the runway center is at your 9 o'clock, start descending to 800 feet. Reduce speed to 190 KIAS and lower the gear

Start counting 15 seconds when passing the runway end at your 9 o'clock and set 1 notch of flaps. Reduce speed to 150 KIAS. Apply speedbrakes, set full flaps and add power to maintain 150 KIAS

Make a left turn back toward the runway (final approach). Landing speed should be 140 KIAS. **Do not flare and do not idle the throttle!!**

Upon touchdown, retract speedbrakes, full power, flaps retract 1 notch and take off again.

Repeat until you have grown accustomed to the T-38 in pattern flying and landing configuration. Make at least 3 **right-hand** patterns as well.

FLIGHT 2: S-Turns and climbs

The essence of this exercise is to learn you how to trim the aircraft. As you turn from one heading to the other, you will need to trim the aircraft in such a way that the altitude changes are kept to a minimum, preferable zero. Base rule: initiating a turn will require upward trim, coming out of a turn will require downward trim.

You may choose to change visibility to near-zero, as this exercise requires you to monitor your instruments at all times. With little or nothing to see outside, you can force yourself to concentrate on instruments. At this point, however, setting the visiblity is NOT mandatory.

Take off from the active runway at KNHK in a T-38

Climb straight ahead to 5000 feet, engage autopilot to hold that altitude and proceed to R-4005 at 300 KIAS

Once within the boundaries of R-4005, climb to 10,000 feet and level off there at 250 KIAS

Turn to heading 090, 10,000 feet, 250 KIAS and **disengage autopilot**

Start a 30-degree AOB **right-hand** turn to heading 270. Altitude tolerance is +/- 200 feet, speed tolerance +/- 15 KIAS

Once on heading 270:

Start a 30-degree AOB **left-hand** turn to heading 090, same altitude and speed tolerance

Once on heading 090:

Start a 30-degree AOB **right-hand** turn to heading 270, climbing at 1000 fpm to 12,000 feet at 250 KIAS, speed tolerance +/- 10 KIAS

Once on heading 270:

Start a 30-degree AOB **left-hand** turn to heading 090, descending at 1000 fpm to 10,000 feet at 250 KIAS, speed tolerance +/- 10 KIAS

Once on heading 090:

Use the NDB of KNHK to return to base. Contact tower for 1 touch and go, after that make a full stop landing.

FLIGHT 3: Radio navigation

Take off from the active runway at KNHK in a T-38

Climb to 5000 feet at 300 KIAS (+/- 10 KIAS) and level off at 250 KIAS. Hold heading for another 2 minutes. Set ADF to 400.0

Turn left, 30 degrees AOB, directly toward the Pax River NDB. When crossing the NDB (the needle will swap), start counting 2 minutes

Turn right, 60 degrees AOB, directly toward the Pax River NDB. Over the NDB, turn to heading 180 and hold heading for 3 minutes

Set your VOR to 315 degrees, NAV1 radio to 117.60. Make a left turn, intercepting the 315 radial inbound to the Pax River VOR. Fly over the VOR

Once 1 mile from the VOR, contact Pax River tower, request a touch and go and start descending to 800 feet

Enter the traffic pattern and carry out the touch and go; after that request a full stop landing

FLIGHT 4: Basic aerobatics and stalls

Take off from the active runway at KNHK in a T-38

Climb straight ahead to 15,000 feet and turn toward the Chesapeake Bay (situated East of the air station)

At 15,000 feet, level off at 300 KIAS

First, practice a couple of aileron rolls (unlike the barrell roll which requires back pressure on the stick, the aileron roll is simply a roll done by sideways stick deflection; the aircraft will lose altitude!)

Climb back to 15,000 feet and increase the airspeed to 450 KIAS

Once you reach the target airspeed, execute a looping, holding 4G as long as possible. End up at 15,000, feet **not below!!** Repeat as often as you like

Next is the Split-S. Decrease airspeed to 200 KIAS, the roll the aircraft upside down and pull 3-4G until in level flight, 180 degrees from your original course. Climb back to 15,000 and repeat

Stalls:
Make sure the autopilot is OFF and set throttle to idle. As the airspeed decays, use trim and/or back stick to hold altitude

When the aircraft has run out of airspeed and the stall warning sounds, release the stick and watch the nose lower. Airspeed will increase and at 200 KIAS or more start pulling up to end the dive.

Add power and climb back to 15,000 feet

REPEAT this stall exercise in both horizontal flight AND in turns

Return to KNHK, request permission for a full stop landing.

FLIGHT 5: Supersonic

Take off from the active runway at KNHK in a T-38

Execute a full afterburner (SHIFT+F4 when at full throttle) takeoff and climb directly to FL320

Turn to the south, while maintaining at least 300 KIAS during the climb
Level off at FL320 (autopilot is allowed) and fly heading 180 for 3 minutes at 400 KIAS

Make a left-hand, 60 degree angle of bank-turn in the general direction of KNHK (or use GPS for a precise heading)

Increase power to full and light afterburners. Monitor your speed; you should be able to reach at least Mach 1.0

Over, or just past, KNHK set throttles to idle and allow speed to bleed off.

Start a 45-60 degree AOB, left-hand **descending** turn over KNHK. Target altitude: 3,000 feet

Contact the tower for 1 touch-and-go

After the touch-and-go, request permission for a full-stop landing and bring the T-38 in.

Flights: 1
Airframe: T-2C **or** T-38
Flight profile: FAM

Completion: 1
O

This flight will be used to scout the area around NAS Patuxent River.

Take off from the active runway at KNHK in a T-2C or a T-38

Climb to 2,500 feet, 250 KIAS and fly a rough circle around the field. Check for prominent features in the landscape and use for example FSNavigator to mark them on your map for future reference.

Take a good look at Webster NOLF, south of Pax River and make 1 or 2 touch-and-go's on that field to get to know it a bit.

Also take a close look at the shorelines of the Chesapeake Bay near Pax River.

Circle the field somewhat closer and study the runways and taxiways; compare it with an airport diagram you might have printed out.

Finally, return to KNHK and land.

Flights: 1
Airframe: P-3
Flight profile: DEMO

Completion: 1
O

This will be your first vNTPS flight in the Lockheed P-3C Orion. Purpose of this flight is to check out

- How the instrument panel looks and where the most important gauges are located
- How the aircraft handles
- How the onboard navigational and radar technology works

♦ First take some time to closely look at the cockpit layout
♦ Identify primary and navigational instruments
♦ Check additional panels
♦ Set NAV1 to 117.60 and ADF to 400.0 and see if there is a reaction on the navigational instruments

Take off from the active runway at KNHK in the P-3C

Climb to 3,000 feet at runway heading and level off, airspeed 180 KIAS, **engage autopilot altitude hold**

After 2 minutes, **disengage a/p** and turn back toward the field (use the ADF on 400.0), maintain 3,000 feet

Over the field, turn to heading 180 and climb to 5,000 feet. Add power to maintain between 180-200 KIAS

At 5,000 feet make a 30 degree AOB left-hand turn to heading 360

Once at heading 360, turn right to heading 180 and climb to 6,000 feet, airspeed 180-200 KIAS

Increase airspeed to 250 KIAS and retrim to maintain 6,000 feet. Strive to arrive at 250 KIAS rather than exceeding that airspeed and then having to decelerate back toward it!

Now check the radar console. Let's see if we can 'shadow' some AI traffic!
Experiment with the buttons: range and mode and see if you can pinpoint the radar bracket to a plane in your vicinity, within 10 miles so you can visually see the aircraft. Compare the aircraft's altitude as mentioned on the radar screen with actuality. Remember, you are at 6,000 feet. Where is he?

While keeping the powersetting as is, make a level turn to course 030, maintain 6,000 feet

As soon as you arrive at course 030, decrease power and start a descent to 2,500 feet. Do not go below 180 KIAS

At 2,500 feet, use the VOR to determine the direct course toward the Pax River VOR beacon and fly directly toward it, whilst descending to 1,500 feet

Over the field, ask permission for a full stop landing, enter the assigned pattern and land.

Flights: 1
Airframe: T-2C
Flight profile: DEM

Completion: 1
O

Performance demonstration flight #1 is a demonstration for the T-2C in the field of fuel consumption. We are going to put in weather settings that will allow you to measure the difference in fuel consumption while flying upwind and downwind.

Runway to take off from:	rwy 6 KNHK
Wind direction:	240 degrees
Wind strength:	20 knots
Wind layer:	ground > FL200

This setup translates to a 20-knot wind from the ground up to 20,000 feet, blowing straight along runway 6/24 at KNHK. You will – of course – be taking off **into** it. The first leg will consist of flying straight ahead after takeoff, so directly into the wind for a preset amount of time.

The second leg will be flown with the wind from directly behind (which technically means: fuel advantage!).

Take off from runway 6 and climb to 15,000 feet, level off at that altitude flying 300 KIAS

Go into the fuel menu and note your **total amount of fuel in pounds**.

Total fuel: _____ pounds

The moment you switch back to the simulator, press your stopwatch and time **10 minutes**

After precisely 10 minutes, enter the fuel menu again and look at your total amount:

Total fuel: _____ pounds

Used: _____ pounds

Return to the simulator

Make a left-hand, 180 degree turn to heading 240

You now have the wind in your back. This will mean you will have to set a power setting that will be lower than the one required to fly 300 KIAS straight into the wind

Once stabilized at 300 KIAS, again enter the fuel menu and look at your fuel state

Total fuel: _____ pounds

The moment you switch back to the simulator, press your stopwatch and time **10 minutes**
After precisely 10 minutes, enter the fuel menu again and look at your total amount:

Total fuel: _____ pounds

Used: _____ pounds

The used amount of fuel will be larger when flying into the wind. Depending on the speed you want to travel, the fuel consumption will change.

REPEAT THIS SEQUENCE FLYING AT:

250 KIAS

400 KIAS

NOTE:

Speed (KIAS)flown during upwind & downwind	Difference in fuel consumption (pounds)
300	_____
250	_____
400	_____

After the last run, return to KNHK and land (into the wind…) at runway 6

Flights: 1
Airframe: C-12
Flight profile: EVAL

Completion: 1
O

As Patuxent River itself lacks an ILS provision on any of its runways, evaluating the C-12's ILS equipment can only be done at an airport that has such provision.

Check the area for airports equipped with ILS. Use a **regional** airport, not an international one (such as the international airports around Washington). These will be too crowded with air traffic (unless you've put that to 0%...). A relatively quiet regional airport will give more freedom executing your ILS approaches.

Once you've established which airport(s) you want to use to practice ILS approaches, download the appropriate ILS approach charts for your reference.

Take off from the active runway at KNHK and set course for your target airport.

Carry out 3 ILS approaches, with respectively the following visibility settings: 5 Nm / 2 Nm / 1 Nm.

After that, return to KNHK (set weather theme to "Fair Weather). Make 1 touch and go, then a full stop landing.

Flights: 3
Airframe: T-38
Flight profile: EVAL

Completion:

1	2	3
O	O	O

Flight 1: Fuel consumption

Take off from the active runway at KNHK, climb to 9,000 feet, 250 KIAS

Proceed to the Chesapeake Bay and head South, heading 180

When straight and level, constant speed 250 KIAS, engage A/P altitude hold

Note the exact number of pounds of fuel aboard (fuel menu in flightsim)

Continue the flight and start timing **10 minutes**

After 10 minutes, note the fuel amount again

Repeat the test at 20,000 feet, 250 KIAS

Repeat <u>both</u> tests, this time based on Mach number 0.85

Navigate back to KNHK.

Flight 2: Acceleration/deceleration

Take off from the active runway at KNHK, climb to 9,000 feet, 250 KIAS

Level off and engage A/P altitude hold, then accelerate to and hold 300 KIAS

Once stabilized at 300 KIAS, start your stopwatch and apply full MIL power (no afterburner)

Clock the time it takes to get to 600 KIAS

Once clocked, idle power, monitor speed and <u>at the moment it drops through 600 KIAS, start clock again</u>

Clock the time it takes go drop down to 300 KIAS

Repeat the test at 20,000 feet

Navigate back to KNHK.

Flight 3: Climbing tests

Take off from the active runway at KNHK. **Start your stopwatch the moment you begin your takeoff roll**

Accelerate at runway heading to Mach 0.80 and maintain that speed by pitch control

Target altitude for starting this test: 10,000 feet. When passing, start stopwatch

Time how long it takes to get to 20,000 feet from takeoff

Roll the aircraft 180 degrees ('on its back'), pull down and dive back down to 10,000 feet

Level off at Mach 0.85 and initiate a 4000 feet per minute climb. Start the stopwatch at 15,000 feet and climb at the same rate to 25,000 feet. **Mathematically, this should take you (25,000 -/- 15,000)/4000 = 2.5 minutes**

Level off at 25,000 feet and activate your GPS

Navigate back to KNHK.

Flights: 1
Airframe: U-1/U-6
Flight profile: EVAL

Completion: 1
O

Qual eval is an abbreviation of the phrase '**qualitative evaluation**'. Flights of this sort can include tests in the fields of

- Performance
- Flying qualities
- Systems

In this flight, you will test the takeoff performance, Vne, general aircraft handling and avionics

Performance

Take off from the active runway at KNHK. Note the speed in KIAS at which the aircraft lifts off and add 30%. Maintain the 130% value for your climb to 3,000 feet

At 3,000 feet, start a turning climb back toward KNHK. Use the NDB (400.0) for orientation. Climb to 5,000 feet at the same time

Once you have passed the field, keep the ADF needle pointed at your 6 o'clock and hold this course for 2-3 minutes, maintaining 5,000 feet altitude

Turn back toward the field, directly at the NDB and increase your speed until the overspeed warning sounds. Make a note of Vne (V never exceed)

Flying qualities

Fly toward the Chesapeake Bay

Once you are there, trim the aircraft for hands-off flying: power and trim setting should hold the aircraft straight and level

Carefully start a shallow left-hand turn and use engine power to maintain altitude

Level your wings and assume straight and level, hands-off trimmed flight again

Now give a short forward-stick input (more like a bump) without changing the power setting and monitor the aircraft's reactions: how long does it take before your disruption is 'leveled out' ?

Systems

Check VOR tracking to the Pax River VOR (117.60)

Fly a random heading, then set the autopilot to hold a different heading and monitor its functioning

Set autopilot altitude to 2,000 feet and control your speed while the autopilot lowers the aircraft to 2,000 feet

Return to KNHK

Flights: 1
Airframe: T-2C or T-38
Flight profile: PERF

Completion: 1
O

Let's work on your pattern flying a bit. This flight will involve flying the T-2C (or T-38, as you prefer) in the Pax River runway 6 pattern. Practicing touch and go's is not exactly the correct contents for the designation of this flight, but as you have flown both types several times now, a bit of touch and go practice won't hurt.

Set weather conditions: wind 15 knots blowing in direction 059

1. Take off from runway 24 and climb straight forward to 5,000 feet.

2. Once you arrive there, make a wide left-hand turn, using the NDB at Pax River to make sure you are flying approximately heading 240 again toward the field once you have almost completed the circle

3. Passing the NDB, start turning left to heading 090 and descend to 1,200 feet

4. Once at 1,200 feet, make another left-hand turn, intercept the R-240 radial to Pax River (use VOR or ADF). Descend to 800 feet

5. Pass runway 24 at 800 feet and once at center-runway turn hard left (60 degrees angle of bank), idle throttle

6. On the downwind leg slow to 150 KIAS, descend to 600 feet, landing configuration

7. Count 10-15 seconds after passing the runway treshold, then turn left onto base leg and final approach. Descend to 400 feet

8. Make a touch and go, climb to 1,200 feet, do not exceed 300 KIAS

9. Turn downwind and repeat steps from **#6**

10. After having completed at least 5 touch and go's, request permission for a full-stop landing

Of course, all throughout this flight you communicate with Pax River ATC for your clearances

Flights: 4
Airframe: see "Completion"
Flight profile: INSTR

Completion:	1 (T-2)	2 (T-38)	3 (C-12)	4 (Learjet)
	O	O	O	O

Instrument proficiency consists of 4 identical flights, each carried out in different types of aircraft. Two of those are high-performance jets, one is a twin-engine turboprop and one is a business jet. See above for the exact types. Flights are conducted at medium altitudes (15,000-18,000 feet), under low visibility conditions.

First things first: set the simulator for the following weather pattern:

➔cloud type: stratus
➔cloud base: 3,000 feet
➔cloud tops: 23,000 feet
➔visibility: **maximum of 2 miles**
➔visibility layer: 3,000 ➔ 23,000 feet
➔ wind: 15 knots, direction 059 [so you should take off from runway 24!]
➔ wind layer: ground > 23,000 feet

Take off from KNHK and climb straight ahead to 15,000 feet. Force yourself to limit your view to the instrument panel!

Reaching 4,000 feet, turn back toward KNHK using the NDB (400.0), continue climbing

Passing the NDB, turn to heading 045 until you reach 15,000 feet. Level off there and set cruising power & speed

♦ Turn right to cardinal heading 090

♦ Turn right to heading 270, maintain 15,000 feet

♦ Once you reach heading 270, turn left to heading 090, climb to 16,000 feet

♦ Once you reach heading 090, turn right to heading 270, maintain 16,000 feet

♦ Once you reach heading 270, turn left to heading 090, climb to 18,000 feet

♦ Once you reach heading 090, turn right to heading 270, maintain 18,000 feet

Take a 1-minute break, holding heading and altitude

♦ Turn left to heading 090, descending to 17,000 feet

♦ Once you reach heading 090, turn right to heading 270, maintain 17,000 feet

♦ Once you reach heading 270, turn left to heading 090, descend to 15,000 feet

Take a 1-minute break, holding heading and altitude

From your current position, start a descending turn, 30 degrees angle of bank, down to 4,000 feet. Once there, use your GPS to aim your aircraft toward KNHK

While flying toward Pax River, choose an airport nearby where you will be able to make an ILS approach. Use the GPS to fly toward that airport and contact its ATC for an ILS approach and touch-and-go.

After the ILS approach, use the GPS to navigate back to runway 24 at KNHK and land there

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

We will start this flight with a quote from the US Navy Navair Flight Test Manual 108:

The purpose of pitot static system testing is to investigate the characteristics of the aircraft pressure sensing systems to achieve the following objectives:
1. Determine the airspeed and altimeter correction data required for flight test data reduction.
2. Determine the temperature recovery factor, K_T.
3. Evaluate mission suitability problem areas.
4. Evaluate the requirements of pertinent Military Specifications

Now, let's see how that translates back to flightsim circumstances.

First set your weather to "real-life weather" using that functionality within Flight Simulator.

Take off from the active runway at KNHK and climb to 12,000 feet, while turning in the direction of the Chesapeake Bay

Level off at 12,000 feet and engage the autopilot. Stabilize your heading by engaging the autopilot heading hold

Make sure you're flying at a constant speed and complete the following table:

Fly three legs at a constant heading, altitude and airspeed. **The run directions should be about 90 to 120 degrees apart. All runs must be at the same airspeed and altitude**. For each run, record:

indicated airspeed	_____KIAS
pressure altitude (***with altimeter set to 29.92 in HG or 1013.25 mb***)	
GPS ground speed	
GPS track (heading indicated by GPS)	
outside air temperature (OAT)	**LISTEN TO NEAREST ATIS!**
fuel remaining	_____lbs
flap and landing gear position	Flaps: Gear:

indicated airspeed	_____KIAS
pressure altitude (***with altimeter set to 29.92 in HG or 1013.25 mb***)	
GPS ground speed	
GPS track (heading indicated by GPS)	
outside air temperature (OAT)	**LISTEN TO NEAREST ATIS!**
fuel remaining	_____lbs
flap and landing gear position	Flaps: Gear:

indicated airspeed	_____KIAS
pressure altitude (***with altimeter set to 29.92 in HG or 1013.25 mb***)	
GPS ground speed	
GPS track (heading indicated by GPS)	
outside air temperature (OAT)	**LISTEN TO NEAREST ATIS!**
fuel remaining	_____lbs
flap and landing gear position	Flaps: Gear:

,

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

Qual Eval 2 will be a short flight with two main parts:

1. takeoff performance
2. avionics (nav)

1. Takeoff performance

Start your takeoff run at the active runway at KNHK

At 90 KIAS, start pulling back on the stick. At this point, your forward speed will at best raise the nose a little. Hold the stick back until the nose starts to rise more swiftly, then keep the nose at about 8-10 degrees AOA

Monitor (and write down!) the speed at which the aircraft leaves the ground **and keep the same AOA**

TAKEOFF @ _____KIAS

Retract landing gear at positive rate of climb and flaps at 190 KIAS

Turn 180 degrees to the left at 3,000 feet. When the runway is at your 9 o'clock start descending to 1,500 feet

At 1,500 feet, make another left-hand turn and land back at KNHK. **At the same time, dump fuel toward 30% of the total capacity**

Taxi back to the beginning of the runway and repeat this cycle

TAKEOFF @ _____KIAS

Turn back toward the runway, make a touch and go and climb to 10,000 feet, 250-300 KIAS

Proceed to part 2

2. Avionics (NAV)

First of all, enter the Fuel menu and replenish your tanks up to 55% of the total capacity

Set NAV1 radio to 117.60

Fly to about 20 miles distance of KNHK in a southern direction, then turn back toward the base and use the VOR to intercept radial 360

Fly over the base, distance 20 miles, turn to intercept radial 180

Check ATIS for the active runway, fly over KNHK and set VOR to intercept the radial for the active runway. Start a descend and use VOR tracking to navigate to and land at KNHK

Flights: 1
Airframe: P-3
Flight profile: TEST

Completion: 1
O

During this flight, you will be 'shadowing' a random aircraft, constantly monitoring its radio traffic and course changes. In order to have a good target, make sure the simulator shows ALL air traffic.

The default radar in the P-3 shows the frequency to which the target's radio is set and its altitude. You should monitor course changes yourself and act accordingly to avoid losing track of your target.

Take off from KNHK, runway 6 and climb straight ahead to 4,000 feet

From there, change course to 045 and continue to climb to 9,000 feet

Level off at 9,000 feet and start cruising at a speed between 200 and 220 KIAS

Look at the radar console and pick out a target that is cruising at about a similar speed. Usually this will mean you will be tracking an AI De Havilland Dash 8 turboprop. Maximum radar range is 40 miles

Click the target and look at the data the radar console reproduces: speed, comms frequency, altitude

Select the same comms frequency and start working on an interception solution

Your aim is to get within 10 miles (visual range in FS) of your aircraft and stay within that 10-mile radius

Now you must find out a comfortable position from where you want to fly in formation with your target: above/below/same altitude? Which distance?

That is all for you to determine. Main focus is to keep within 10 miles, within formation and aware of the target's intentions

At the same time, you should be able to correlate the position and attitude of the target with what your radar scope tells you

REMARK:
If you are lucky, you have picked a target that is flying into an airport and in the process gets vectored for approach. It is difficult to predict. In any event: limit the tracking/radar scope reading exercise to 45 minutes

Return to KNHK and request permission for a full-stop landing

Flights: 1
Airframe: T-2C
Flight profile: DEM

Completion: 1
O

Testing the longitudinal stability of an aircraft determines a steady hand and keen eye on detail. This flight will be executed in the T-2C. It is highly recommended to activate the flight data using the SHIFT+Z key combination so that you will have a very accurate overview on your speed. Make sure the weather theme is set to "Clear Weather"

The trim speed band (sometimes called the "free return speed") is a range of airspeeds in which your plane will fly hands-free without retrimming. Not all aircraft have this speed band, but let's test if the T-2C has one.

These are the steps:

Take off from KNHK and climb to FL180

Fly straight and level and trim the aircraft so it flies **hands-off** at a steady airspeed

Decelerate a few knots by using only the stick – **do NOT touch elevator trim or engine controls!**

Stabilize at the new airspeed

Compare the position of the nose of the aircraft (or a structure reference of the aircraft) with the horizon

Relax the back pressure on the stick and look at the nose and the horizon

♦ if the nose of the aircraft remains above the horizon (so if it does not drop below it), you are inside the speed band. Repeat the process starting at the pull-back to decelerate a few knots

♦ if the nose of the aircraft sags to below the horizon, you are outside the speedband. Use just the control stick to establish at a new steady airspeed between your current speed and the last speed at which the nose failed to drop. Do not use trim or engine power controls and start the process at the "Stabilize at the new airspeed" step

Go on with this technique to determine the slow end of the trim speed band

THIS IS ONLY A PARTIAL TEST OF THE REAL PHENOMENON: THERE ARE ALSO TECHNIQUES TO TEST THE HIGH END OF THE TRIMSPEED BAND, BUT FOR NOW, THIS EXERCISE IS SUFFICIENT.

Return to KNHK, make 1 touch and go, then land, taxi in and shut down

Flights: 1
Airframe: F-18
Flight profile: FAM

Completion: 1
O

This will be your first F-18 flight in the vNTPS. The performance of this jet is by far the best of the entire line of aircraft flown in this virtual course. Therefore, be carefull with the power!

Throughout this flight, the following items must be worked off:

- Pattern flying
- Medium altitude (12,000 feet) S-turns, climbs and descends
- Aerobatics: loop, aileron roll, barrel roll, Split-S and Immelmann
- Stall + spin – start at FL200!
- Supersonic flight (FL300+) to the South
- VOR/ADFD tracking back to KNHK
- **3 touch and go's before full-stop landing**

Start the flight by taking off and keeping your speed between 250-300 KIAS and carrying out a few touch and go's in order to get acquainted with the aircraft's behavior in landing configuration. After that, continue with the rest of the program.

Landing configuration includes using the speed brake. That will force you to have a high powersetting (around 90%) during the approach phase. This, in turn, will make it easier to power up and go around again.

Remember: you must land this aircraft on the Pax River runway like you would on a carrier: with power.
No flaring, no idling!
Just thumb in the speedbrake, pull up the flaps 1 notch and add power to get away from the tarmac.

Flights: 1
Airframe: T-38
Flight profile: CHECKRIDE

Completion: 1
O

You will be visiting NAS Norfolk, where you are going to make a couple of approaches in different configurations. Reason we're doing this at Norfolk is to get you out of the (by now) familiar surroundings at Pax River. Norfolk has an East/West runway. You'll be coming from the North, so be prepared for an arch-like approach into KNGU. Distance of this trip: 81 miles (straight-line).

Create a file plan in Flight Simulator, taking you from Pax River (KNHK) to NAS Norfolk (KNGU).

Make it an IFR flight plan and use your GPS to neatly follow the lines and follow ATC. Make sure you have your GPS window open, so you can steer the corrections yourself instead of getting a lot of corrective vectors from ATC

1st approach
Touch and go, use 60% flaps (1st notch)

2nd approach
Touch and go, use no flaps

3rd approach
Full stop, full flaps (2 notches)

Note the difference in speed between flaps and no flaps!

After the full stop, taxi to the ramp and shut down

Have a cup of coffee and make sure there is enough fuel in the tanks for the trip back to Pax River

Back at Pax River, execute the exact same routine:

1st approach
Touch and go, use 60% flaps (1st notch)

2nd approach
Touch and go, use no flaps

3rd approach
Full stop, full flaps (2 notches)

After the full stop, taxi to the ramp and shut down

Flights: 1
Airframe: T-38
Flight profile: FORM

Completion: 1
O

The default Learjet will be the leader for this flight and it is your responsibility to stay in formation with that aircraft. The guys aboard the Lear are testing some airborne measurement equipment and you are flying the safety/photo chase plane. Your backseater will monitor the test object (the Lear) and snap photos while you keep the T-38 in formation.

Download *s_p_chase.frc* from the site and make sure you have FSRecorder installed on your system

Take off from runway **6** at KNHK

Climb to 1,200 feet, maintain 250 KIAS and make a 180-degree turn so the runway is at your left-hand side

Once you are abeam runway 6 (=you see it at your 9 o'clock), go to the FSRecorder menu, select the "Play as traffic…" option and select **s_p_chase.frc**

The Learjet will appear on the runway. It will start its takeoff run at t=30 seconds. Make sure you are flying parallel to runway 6 while the Learjet takes off. **Do NOT overtake it; it should remain at your 9-11 o'clock position!**

Throughout the flight, the Learjet will maintain about **300 KIAS**. Angles of bank will be limited to 25-30 degrees. Just stay close and switch your position every once in a while, for example:

- At his dead 6 o'clock (directly behind), same altitude/lower/higher
- At his 3 o'clock or his 9 o'clock (directy beside to him), same altitude
- In the 4-8 o'clock region, same altitude/lower/higher
- Inside/outside his turn

When the Learjet is landing, follow it and make sure you are in landing config as well

Once you see him touch down safely, add power to maintain about 160-180 knots and make another circle-around before landing yourself

Alternatively, you can carry out a few touch and go's

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

For this longitudinal stability evaluation, we are going to exercise the long and short period phugoids. The phenomenon "phugoid" is described as

an aircraft motion where the vehicle pitches up and climbs, and then pitches down and descends, accompanied by speeding up and slowing down as it goes "uphill" and "downhill."

The phugoid is a basic flight dynamics mode in which an aircraft can be and can be seen as a textbook example of a positive feedback system.

Let's see how this translates for a jet like the T-38

Take off from KNHK, climb to 20,000 feet over the Chesapeake Bay and establish 300 KIAS

Have a stopwatch ready!

Long Period Phugoid

Using only the control stick (no trim, no power setting changes!), pull up the nose of the aircraft until the speed drops to 280 KIAS

Upon reaching that speed, release the stick **and start timing**

Count the number of oscillations leading to regaining 20,000 feet @ 300 KIAS

Short Period Phugoid

[start this maneuver at 20,000 feet @ 300 KIAS]

The short period phugoid requres a control doublet: a swift displacement of the control stick back-and-forth after which it is returned to the center.

The moment the stick returns to center, **start timing** how long it takes for the oscillations to straighten out

---

Upon returning to KNHK, make a no-flap approach and touch-and-go, then a full-flap, full stop landing

Flights: 1
Airframe: Learjet
Flight profile: DEM

Completion: 1
O

Now that you have tested the fighter-like T-38 for its longitudinal stability, it is time to find out what an aircraft like the Learjet behaves like under identical circumstances. The mission text for the previous flight has been copied, the exception being that now you will be conducting this test flight with the Gates Learjet

Take off from KNHK, climb to 20,000 feet over the Chesapeake Bay and establish 300 KIAS

Have a stopwatch ready!

Long Period Phugoid

Using only the control stick (no trim, no power setting changes!), pull up the nose of the aircraft until the speed drops to 280 KIAS

Upon reaching that speed, release the stick **and start timing**

Count the number of oscillations leading to regaining 20,000 feet @ 300 KIAS

Short Period Phugoid

[start this maneuver at 20,000 feet @ 300 KIAS]

The short period phugoid requres a control doublet: a swift displacement of the control stick back-and-forth after which it is returned to the center.

The moment the stick returns to center, **start timing** how long it takes for the oscillations to straighten out

Upon returning to KNHK, make a no-flap approach and overshoot*****, then a full-flap, full stop landing

*****the overshoot (or go-around) is assumed known to you. If not, see this source: http://en.wikipedia.org/wiki/Go-around

Flights: 1
Airframe: F-18
Flight profile: EVAL

Completion: 1
O

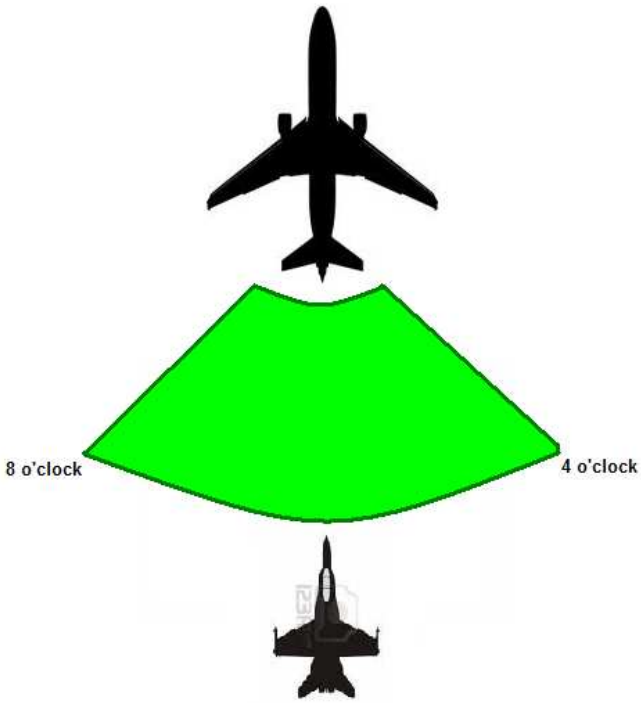
This flight will be used to track an airliner flying as traffic within FS. You will be flying the F-18 to intercept this air target and use your formation flying skills to keep track of it.

Take off from the active runway at KNHK and proceed to FL200, whilst turning to the northeast.

At FL200, level off at 300 KIAS and take a look at your radar screen. Set the range to 40 NM.

Pick out an air target that is between 20 and 40 NM away from you. Make sure it is an airliner. These can be recognized based on their speed and altitude.

Once you have picked your target, fly an interception course that will put you in its stern quarter, i.e. between 8 o'clock and 4 o'clock in relation to the airliner:



Use the virtual cockpit to keep yourself in formation with the target. Follow the target for about 10 minutes

Roll your fighter on its back and pull down in a 4-G dive

Proceed back to KNHK

Carry out one touch and go before you make full-stop landing

Flights: 1
Airframe: U-6/U-1
Flight profile: DEM

Completion: 1
O

During this flight, you will again test the aircraft's lateral stability, Consecutive flights will take place at higher altitudes, in jet aircraft, this one will be in the prop-driven U-6 or U-1. The tests will be carried out at different altitudes and different speeds, to be registered in the below depicted table.

Make sure you activate the on-screen flight data (SHIFT+Z) in order to be able to accurately view your precise heading and the changes this test will produce.

Take off from KNHK, climb to 10,000 feet to a restricted area of your choice

Level off at 2,500 feet, flying 100 KIAS – NO autopilot

Once level at the desired altitude and speed:

- proceed with a rudder input to the **left**, changing heading by **10 degrees**
- **followed by** a rudder input to the **right**, changing heading by **10 degrees**

Keep an eye on any rolling motion, which you can register as angle-of-roll. Speeds and altitudes for this test:

ALTITUDE	***SPEED 1***	***Angle of roll***	***SPEED 2***	***Angle of roll***
5,000	100		150	
10,000	100		150	
12,000	100		150	
15,000	100		150	

Flights: 1
Airframe: Learjet
Flight profile: DEM

Completion: 1
O

During this flight, you will again test an aircraft's lateral stability, This time the Learjet. Tests will be carried out at different altitudes and different speeds, to be registered in the below depicted table.

Make sure you activate the on-screen flight data (SHIFT+Z) in order to be able to accurately view your precise heading and the changes this test will produce.

Take off from KNHK, climb to 10,000 feet to a restricted area of your choice

Level off at 10,000 feet, flying 300 KIAS – NO autopilot

Once level at the desired altitude and speed:

- proceed with a rudder input to the **left**, changing heading by **10 degrees**
- **followed by** a rudder input to the **right**, changing heading by **10 degrees**

Keep an eye on any rolling motion, which you can register as angle-of-roll. Speeds and altitudes for this test:

ALTITUDE	***SPEED 1***	***Angle of roll***	***SPEED 2***	***Angle of roll***
15,000	300		350	
20,000	300		350	
26,000	300		350	
31,000	300		350	

Flights: 1
Airframe: P-3
Flight profile: EVAL

Completion: 1
O

Set ADF radio to 400.0

Take off from the active runway at KNHK in the P-3 and proceed to the Chesapeake Bay

Climb to 8,000 feet, set cruise speed to 250 KIAS

TEST 1

Select engines 1 + 4 (E+simultaneously 1 and 4 keys) and decrease power on both engines. Monitor airspeed and increase power on the engines to hold 190 KIAS

Select engines 2 + 3 (E+simultaneously 2 and 3 keys) and decrease power on both engines until the airspeed has decreased to 160 KIAS

Select engines 1 + 4 (E+simultaneously 1 and 4 keys) and increase power on both engines. Monitor airspeed and hold 200 KIAS

TEST 2

Turn back toward the NDB at Pax River using the ADF gauge

Select engines 1 + 2 (E+simultaneously 1 and 2 keys) and **IDLE** both engines. Monitor the aircraft's reaction and counteract roll-off in order to keep track of the NDB.

Keep a close eye on the airspeed: depending on the total weight, it might drop too low! In that case consider getting rid of some of your fuel

Select all four engines, idle them simultaneously, then set them to cruise at 200 KIAS and proceed with the next test

TEST 3

Turn to heading 090

Select engines 1 + 2 (E+simultaneously 1 and 2 keys) and **IDLE** both engines. Monitor the aircraft's reaction and counteract roll-off

Select all four engines, idle them simultaneously, then set them to cruise at 200 KIAS and proceed with the next test

TEST 4

Access the simulator's Aircraft failure menu and allow **two random engines** to fail between 10 minutes you're your current time

Use the GPS to select an intersection close to you and fly a holding with that intersection as the starting/ending point

As soon as both engines have failed, return to KNHK, request a full stop landing, set your transponder to code **7700** and bring the P-3 safely back home.

BEWARE: make sure you lose sufficient fuel to enable the aircraft to fly on two engines AND make it back to KNHK!

Flights: 1
Airframe: P-3
Flight profile: EVAL

Completion: 1
O

SKIPPED

Flights: 1
Airframe: UH-60
Flight profile: DEM

Completion: 1
O

This flight is a demanding one, even if you have prior flightsim helicopter experience!

In order to practice you night vision skills, you are going to make a night flight from Patuxent River to the Wallops Island Flight Facility (KWAL, a NASA base), land there and then return to Patuxent River.

KWAL is approximately 49 miles from Pax River, course 125. With a ground speed of 110 knots, it should take you about 27 minutes to get there.

You are allowed to use GPS navigate.

SET REAL WORLD WEATHER FOR THIS FLIGHT AND CONFIGURE THE TIME TO 23:00 ZULU!

The fact that it will be dark during this flight, poses an extra challenge. Concentrate on your instruments and limit your glances outside to occasional ones.
Remember: you are flying a helicopter. Unlike aircraft, they can NOT be trimmed to hold altitude and/or direction.

***Constant** control inputs will be required to maintain altitude and direction.*

After landing back at KNHK, shutdown the aircraft.

Flights: 1
Airframe: T-38/T-2
Flight profile: FAM(R)

Completion: 1
O

As part of the refresher familiarization flight, carry out the following tasks in either the T-38 or the T-2C:

Take off from the active runway at KNHK and fly the pattern. Finish off 4 touch and goes

Proceed to the Chesapeake Bay at 20,000 feet and do a short aerobatics sequence
- loop
- immelmann
- split-s
- roll

Next, navigate your way to the Wallops Flight Facility (KWAL), land there and refuel

Take off, climb to 10,000 feet and proceed back to Patuxent River for a full stop landing

REMARK:
Set real-life weather for this flight!

Flights: 1
Airframe: T-2C
Flight profile: CHECKRIDE

Completion: 1
O

By the Numbers

1. Establish straight and level flight with the airplane trimmed for hands-off flight at a steady airspeed.

2. Using only the control stick, decelerate a few knots. Do not touch the trim or engine/propeller controls.

3. Stabilize at the new airspeed.

4. Note the relationship between the plane's nose (or some fixed structural reference) and the outside horizon.

5. Relax your stick pull while observing the nose and the horizon.

6A. If the nose does not drop relative to the horizon, you're inside the band. Repeat the process starting at Step 2.

6B. If the nose drops relative to the horizon, you're outside the band. Using only the control stick, establish a new steady airspeed between this speed and the last speed at which the nose did not drop. Do not touch the trim or engine/propeller controls. Repeat the process starting at Step 3.

7. Continue this bracketing technique until you determine the slow end of the trim speed band.

8. Using only forward stick, establish a steady airspeed a few knots faster than the original trim speed from Step 1. Do not re-trim or adjust the engine/propeller controls. Repeat Steps 3 through 8 substituting the word "push" for "pull," "rise" for "drop" and "fast" for "slow."

9. After determining the slow and fast end speeds of the trim speed band, subtract the smaller number from the larger number-the difference is the trim speed band.

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

This flight will be a copy of an earlier flight in the Learjet. As during that flight, you will be testing the aircraft's lateral stability. However, during this flight, you will be flying a fighter-like jet as opposed to the business jet in the previous "Lat-Dir" mission.

Take off from KNHK, climb to 10,000 feet toward the Chesapeake Bay

Level off at 10,000 feet, flying 300 KIAS – NO autopilot

Once level at the desired altitude and speed:

- proceed with a rudder input to the **left**, changing heading by **10 degrees**
- **followed by** a rudder input to the **right**, changing heading by **10 degrees**

Keep an eye on any rolling motion, which you can register as angle-of-roll. Speeds and altitudes for this test:

ALTITUDE	*SPEED 1*	*Angle of roll*	*SPEED 2*	*Angle of roll*
15,000	300		350	
20,000	300		350	
26,000	300		350	
31,000	300		350	

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

This evaluation flight will be done with a T-38 that **includes the belly pod**. You are going from KNHK to KCHS (Charleston Air Force Base/International Airport, Charleston, South Carolina, USA) and from there to KCOF (Patrick AFB) in Florida, near to the NASA resources at Cape Kennedy and the exotic Cocoa Beach.

Your flight profile will be FL260 at Mach 0.85

Refuel at Charleston, then continue your trip to Florida.

OUTBOUND

1st LEG: KNHK – KCHS
General direction will be R-210, for 368.5 miles

2nd LEG: KCHS – KCOF
General direction will be R-186, for 281.4 miles

INBOUND

1st LEG: KCOF - KCHS
General direction will be R-006, for 281.4 miles

2nd LEG: KCHS - KNHK
General direction will be R-030, for 368.5 miles

Total trip distance outbound and inbound: 1299.8 miles

Flights: 2
Airframe: T-38
Flight profile: EVAL

Completion:

1	2
O	O

Dynamics evaluation will consist of two separate flights. One flight will let you work with G-loads that are sustained as long as possible. The second flight will consists of zero-G maneuvring. Operating area will be **R-4006**.

It is important for this flight to have a legible accelerometer in order to accurately monitor G-loads throughout the flight.

1.

Take off from the active runway at KNHK under real world weather conditions

Climb to 10,000 feet and level off at 300 KIAS, fly into R-4006

Once well inside R-4006, accelerate to 500 KIAS

The moment your aircraft reaches 500 KIAS, apply back stick (careful!) until the accelerometer reads **5G** and hold this g-loading as accurately as possible

Monitor your airspeed: once it drops below 180 KIAS, release the back pressure and stabilize to straight and level flight as soon as possible

Now practice maintaining different g-loading values, each time starting at 500 KIAS, at altitudes between 10,000 and 15,000 feet

Do not go below 10,000 feet; make sure you're maneuvring upward or in the horizontal plane

Keep high power settings all the time

Monitor your fuel state carefully and make sure you return to KNHK before the fuel state becomes critical

Time and fuel permitted, you can practice 1 or 2 touch and go's

2.

Take off from the active runway at KNHK under real world weather conditions

Climb to 10,000 feet and level off at 300 KIAS, fly into R-4006

Once well inside R-4006, accelerate to 330 KIAS

Upon reaching that speed, pull up with 2G to 45 degrees nose-up attitude

When you reach 19,000 feet, push the stick forward and keep the accelerometer needle at 0 until the nose of the aircraft is 45 degrees below the horizon

The aircraft will accelerate; release the stick and let the airspeed increase

Plan your pull-out to end up straight and level at 10,000 feet

Check your position within the restricted area, correct your course if needed

Set up for another run

Make sure you execute 6 zero-G parabolas

Return to KNHK

Flights: 1
Airframe: C-12
Flight profile: DEM

Completion: 1
O

This flight will be a demonstration of the asymmetric nature of a twin-engined propellor-driven aircraft in single-engine flight.

Take off from the active runway at KNHK in the C-12

Climb to 5,000 feet while turning toward the Chesapeake Bay

Level off at 5,000 feet, 200 KIAS, set power for cruise

Tune the ADF to 400.0 and turn toward the beacon

Set engine 2 (starboard) to **idle power**

The aircraft will now yaw to the right, as the right engine no longer provides the same 'pulling' power as the left one. As a result, the nose is pushed to the right by the forces of the left engine. You will most probably also notice a slight rolling movement.

Counter-act the rolling movement by using the aileron trim, use the rudder to keep the aircraft pointed toward the NDB at Pax River. **KEEP AN EYE ON YOUR AIRSPEED; YOU DON'T WANT IT TO BLEED OFF TOO MUCH!!**

Once you pass the NDB, synchronize the power of both engines and check altitude, speed and direction:
ALT 5,000 ft
SPD 200 KIAS (+/- 10)
DIR NHK NDB (400.0) indicates directly behind (arrow down)

Take about a 10-12 mile distance from KNHK (set NAV1 to 117.60 to measure and monitor) and turn back toward the NDB

Now set engine 1 (port) to **idle power** and repeat the exercise

Once you pass the NDB, synchronize the power of both engines and check altitude, speed and direction:
ALT 5,000 ft
SPD 200 KIAS (+/- 10)
DIR NHK NDB (400.0) indicates directly behind (arrow down)

Go to the Aircraft – Failures menu and set a **random engine** to fail within 10-15 minutes.

The moment the engine fails, feather the prop, set your transponder to 7700 to indicate an emergeny and return to and land at KNHK.

Flights: 1
Airframe: OH-58
Flight profile: DEM

Completion: 1
O

Helicopter flight

Flying a helicopter is a very specialized trade and getting it right is not easy. The basic flight controls of a helicopter consist of the cyclic (the stick), the collective (throttle) and the rudder controls.

The cyclic control tilts the rotor disk in the direction you desire. The fuselage of the helicopter will be pulled along in that direction, suspended from the disk.

The collective increases and decreases the angle of the rotor blades with the surrounding air, thus providing or decreasing lift. The collective can be used to climb or descend and in combination with the cyclic, the collective steers to the helicopter to where you want.

Rudders are used in very much the same way as in a fixed-wing aircraft: directional control in both straight and level flight and in turns.

If you already have previous flightsim helicopter experience, this flight should not be a problem. If you lack such experience, I can recommend taking lessons over at **HoverControl.com** or **Metro Helicopters**, both can be reached on the Internet.

The flight

Position the helicopter on the active runway and first try to hover it for 1 minute. Then proceed with the following actions:

- Turn the helicopter 90 degrees to the right and assume a steady hover
- Turn the helicopter 180 degrees to the left and assume a steady hover
- Turn the helicopter back to the original heading (= runway heading) and assume a steady hover
- Transition to forward flight, climb to 1,500 feet at a constant speed of 60 KIAS
- Level off at 1,500 feet, set 70% torque and keep the helicopter at runway heading while you accelerate. Hold this heading for 5 minutes
- Pause the simulator and set your nav radios: NAV1: 117.60, ADF: 400.0
- Unpause the sim and make a climbing, left-hand turn toward the NDB, leveling off at 2,500 feet, directly toward the NDB
- When directly over the field, adjust torque to 55% and start descending to 1,000 feet at 70 KIAS
- At 1,000 feet, go back to straight and level flight, 70% torque
- Turn back toward the field, whilst climbing back to 1,500 feet
- Prepare for autorotation. When you are almost passing over the field, press CTRL+F1. This will close the throttle and throw you into autorotation mode. Immediately lower the collective to keep the RPMs up
- Manoeuver to land at KNHK. The best way is to first change course, then reverse the turn toward the field. This will give you some opportunity to spot a landing site. **You MUST have determined where you are going to land BEFORE you actually try to get there**.

- Make a sliding landing at the field. Beware of tipping the aircraft on its nose or hitting the ground first with the tailrotor. You will note that the rotors will very quickly lose RPMs.
- Take a few seconds to assess your actions, then press CTRL+F4 to increase RPMs again, take off and hover-taxi toward one of the platforms
- Shutdown aircraft

Flights: 1
Airframe: T-2C
Flight profile: DEM

Completion: 1
O

Stalls and spins are not conditions that a pilot wants to meet in flight under normal circumstances. However, test pilots who will be testing new aircraft designs to their limits, will have to explore the boundaries those aircraft have when it comes to stalls and spins. Naval test pilots are going through some real harrowing situations in order to be able to tell how to get out of a stall or spin **before** a 23-year old Lieutenant does without having that knowledge…

Therefore, it is important for naval test pilots to have extensive knowledge of the circumstances under which a given aircraft will enter a stall and how aircraft generally behave once they are actually *in* the stall. One step further, yaw input during a stall will thrown the aircraft into a spin. This, too, is a phenomenon test pilots must be acquainted with. This flight serves to give you an idea of those circumstances.

Take off from the active runway at KNHK in the T-2C

Proceed to restricted area R-4005, 20,000 feet, 300 KIAS

Activate autopilot altitude hold and set throttle to idle

Watch the airspeed bleed off; at 180 KIAS, disengage autopilot, maintain 20,000 feet

Kill some more speed by applying airbrakes until 120 KIAS, maintain 20,000 feet

You will notice that more and more back pressure on the stick is needed. Eventually, you will have the stick full back. Stall will then be imminent

Once the aircraft stalls, keep the full back pressure on. Monitor the aircraft's behaviour

Release the stick and let the airspeed build up until 200 KIAS, then pull up and add power

Climb back to 20,000 feet and verify you are still within R-4005 boundaries. Correct course if necessary and get prepared for the spin test

Basically, spinning the aircraft is the same as stalling it, only this time at the moment of stall, you apply full left or right rudder, whilst keeping the stick full back

The aircraft will start more violent, rotating movements and it will at the same time start losing altitude at a very rapid rate. Monitor what you are seeing and keep an eye on your altitude. **Before 10,000 feet**, you must start measures to end the spin

Ending the spin is done by releasing the back pressure on the stick and kicking the rudder back to normal

The aircraft will start a nose-down fall toward the ground. Pull back at 200 KIAS and add power while pulling the nose up. Climb back to 20,000 feet

In order to get a good hang of stalls and spins, make 4 of each during this flight, then return to KNHK

Flights: 1
Airframe: U-6/U-1
Flight profile: CHECKRIDE

Completion: 1
O

SKIPPED

Flights: 1
Airframe: Learjet
Flight profile: EVAL

Completion: 1
O

Stability and Control

Test #1

Take off from KNHK, climb to 20,000 feet and proceed to the Chesapeake Bay

Stabilize your speed at 180 KIAS; make sure you have trimmed the aircraft to be able to fly hands-off at 180 KIAS @ 20,000 feet

Do not touch the trim or power setting for the rest of the test speed run. Make a screenshot of the cockpit, pause the sim and go to MSPaint. Paste your picture and cut out the trim indicator; save it as TRIMx.JPG

Follow this table for the next test steps, creating the below mentioned files:

Speed (KIAS)	Trim setting screen shot (.JPG)
180	*TRIM1.JPG*
230	*TRIM2.JPG*
250	*TRIM3.JPG*
270	*TRIM4.JPG*
290	*TRIM5.JPG*
300	*TRIM6.JPG*

Now proceed to test #2

Test #2

Maintain 20,000 feet and slow the aircraft to 200 KIAS

Trim the aircraft for hands-off flight using these parameters

Do not touch power or trim controls and pitch up to slow back to 180 KIAS

Use the stick to maintain that speed; note the stick position

Now push the stick forward and allow speed to increase to 220 KIAS and again use the stick to stabilize this airspeed

Note the stick position

Return to KNHK to report your findings (you're allowed to make 1 touch and go if desired)

Flights: 1
Airframe: P-3
Flight profile: DEM

Completion: 1
O

This flight will consist of an experiment in which the internal load of the aircraft will be shifted under in-flight circumstances. As a result, you will have to compensate for the shifting weight.

Take off from the active runway at KNHK in the P-3 and proceed to the Chesapeake Bay

Over the Chesapeake Bay, turn to heading 180, climb to 8,000 feet and level off at 280 KIAS

Engage the autopilot, while you set up your navigations radios to 117.60 (NAV1) and 400.0 (ADF). If desired, you can also key in KNHK into the onboard GPS

Now enter the aircraft loading menu and change the load substantially, so you will notice the aircraft's reactions to it

Suggested scenarios:

- Total overload of the aircraft's lifting capability by several increases:
  - 1,000 lbs
  - 5,000 lbs
- Aircraft load emphasis on port side of fuselage
- Aircraft load emphasis on starboard side of fuselage
- Aircraft load emphasis on forward portion of fuselage
- Aircraft load emphasis on aft portion of fuselage

Once you have experienced/documented the flight behavior under these circumstances, you can return to KNHK for landing. **Make sure you first get the aircraft back within normal weight ranges and stabilized in both pitch and bank!!**

Flights: 1
Airframe: T-2C
Flight profile: EVAL

Completion: 1
O

Prepare for some out-of-control flight! Flying the T-2C, you will enter stalls and spins and correct them accordingly. The basic rules of this flight are:

- start each stall and spin at 20,000 feet or higher
- don't drop below 10,000 feet
- make a **circling** climb back toward 20,000 feet each time you are going to setup for another stall/spin

The following table can be used for this exercise:

Item #	Type	Start from
1	Stall	Straight and level flight
2	Stall	Turn
3	Stall	Climb
4	Stall	Turning climb
5	Stall	Inverted flight
6	Spin	Straight and level flight
7	Spin	Turn
8	Spin	Climb
9	Spin	Turning climb
10	Spin	Inverted flight

After having completed all 10 out-of-control situations, return to KNHK, ask permission for 1 touch and go, after that one, make a full-stop landing.

Stalling from inverted flight can be done by closing the throttle, pointing the nose about 10 degrees above the horizon and – if you want to kill your airspeed more quickly – applying airbrakes

Flights: 1
Airframe: T-38
Flight profile: EVAL

Completion: 1
O

The T-38 is a supersonic trainer, so let's push it to that speed region. First, you will get a nice glimpse on how fast it can climb. After that, we are going to lower the nose, set maximum power and go supersonic. This should be a fun flight!

Take off in the T-38 from the active runway at KNHK

Climb to FL390 (MAX throttle!) and use pitch to maintain 400 knots of airspeed during the climb

Level off at FL390, about Mach 0.85, out of burners

Make sure you're flying over the Chesapeake Bay at this point

Set MAX throttles (full throttle, then SHIFT+F4), nose 2-3 degrees down

Monitor speed slide toward, then through, Mach 1. Do NOT go below FL300! See if you can get it up to at least Mach 1.1

AIRCRAFT RESPONSES
By design, the FSD T-38 is quite sensitive to control inputs, including elevator trim, except when in the landing speed region (<200 KIAS). During the transition into the supersonic speed spectrum, this sensitivity will be greatly enhanced so be carefull on the pull-out from dive to level!

Also make sure you don't accidentally flip the aircraft on its side; one way to prevent that is to activate autopilot wingleveler, although you should de-activate AP when you want to start pulling up from the dive.

At about FL310, idle throttles and level off at or above FL300

You now have the option of climbing back up and doing this again or returning to KNHK, with the added option of making some touch and go's (always fun and useful!)

Flights: 1
Airframe: SNJ/AT-6
Flight profile: EVAL

Completion: 1
O

The world-famous T-6 Texan has trained many WW2-era pilots. During this curriculum, the SNJ is used to enable pilots to carry out a quality evaluation. Points that are to be tested and reported upon:

- behavior on the ground
- determination of the speeds involved (takeoff, climb, cruising, etc.)
- aerobatics
- pattern flying (flap settings, power settings, etc.)
- stall behavior
- avionics

This will be a single flight after which the pilot should have a fairly good view on the aircraft's general characteristics

Flights: 1
Airframe: F-18
Flight profile: EVAL

Completion: 1
O

In real life, the Naval Air Warfare Center (NAWC) at Pax River tests aircraft as integrated weapons systems. Next to that, some aircraft have in the past been dedicated to testing aerodynamics or avionics, but in general, testing is done as a whole.

For this flight, you will use the F-18 to carry out a number of simulated air attacks on a fixed position on the ground.

You can choose to download a weapons effect from a flightsim site and then assigning it to one of your joystick's buttons for realism, but that is optional. Main focus of this exercise is to take off, proceed to the target area and carry out the attack as mentioned in the procedure. The F-18 is used for this as it is the U.S. Navy's prime attack aircraft.

Take off from KNHK, runway 14, climb to 22,000 feet, circling overhead, level off with 300 KIAS on the dial

This will be your route **(source: Skyvector.org)**

The technique to be used for this mock attack exercise:

During the last leg of the mission (heading 038 for 8 miles), descend to 15,000 feet. Start circling over the target area and use the virtual cockpit to check out details on the ground. Pick your choice for target, prepare for a diving attack on it.

Use the HUD to simulate your aiming and do NOT exceed 40 degrees down-angle while diving onto the target.

Simulate dropping your bombs by pressing a button on your stick (make sure it is a button that will not change a view!!) Do this **no lower than 6,000 feet**

Passing 6,000 feet, pull out at max 5 G's. You should not go below 3,700 feet.

Climb back to 15,000 feet and again set up, this time in relation to a different target.

Repeat the attack, the pull-out and the climb-out

Proceed back to KNHK via the same route as you entered the target area

Request permission for 1 touch and go, after that make a full-stop landing at KNHK

REMARK: Using FSNavigator to reproduce the flightplan above is highly recommended

Flights: 1
Airframe: Learjet
Flight profile: DEM

Completion: 1
O

The functioning of the autopilot will be central in this flight. You are going to use the Learjet to test the autopilot for its reactions to changes in the activated settings. This means you'll have a relatively easy task: monitoring the responses.

Set your NAV1 radio to 117.60 (VOR at Pax River)
Set your ADF radio to 400.0
Set autopilot altitude to hold 18,000 feet
Set A/P climb rate to 2,500 feet per minute
Set A/P speed hold to 250 KIAS

IMPORTANT: Activating the autopilot will always make it activate the **wing leveler** portion as well. In order to prevent being unable to change course while holding altitude (or speed, etc.), the pilot must press **CTRL+W** immediately after activating the A/P main switch (Z by default)

Take off from the active runway at KNHK. Immediately after raising the wheels, press "Z", then "CTRL+Z" to activate the autopilot master switch and the altitude hold

Press CTRL+W to disengage the wing leveler

Activate the A/P speed hold

Turn the aircraft to heading 135 and continue the climb

Once the aircraft has levelled of and is flying at a constant speed and altitude, start a standard 30 degree angle of bank turn to the right

Monitor your headings and concentrate on the A/P heading hold: choose a heading that will force the aircraft to end the current right-hand turn and initiate a left-hand turn

[example: if you see your passing heading 190, then choosing a heading between 70-100, so 90-120 degrees off course will ensure it will end the current turn and start a reverse one]

Note that the reverse of the turn will also influence the altitude hold portion of the A/P: aerodynamics will force it to counteract sudden climbing tendencies by applying downward elevator trim

Allow the aircraft get to the selected heading and level off

Now set A/P speed hold to 310 KIAS and watch the A/P add power, causing the aircraft to accelerate to the selected speed value

Use the NAV1 radio and the VOR needle switch to track a direct course to either NHK (117.60) or another VOR of your choice, then activate the NAV portion of the A/P. Monitor aircraft behavior as it tracks the selected beacon

Time to descend: first bleed off speed by setting A/P speed portion to 210 KIAS. Once the aircraft has decelerated to that speed, set the altitude hold to 4,500 feet. By default, the sim will select an 1800-feet per minute descent rate.

Make sure wing leveling is still off and put the aircraft in a 30-degree angle of bank while it is descending

At 4,500 feet, use the GPS to head back to KNHK and ask permission for a full-stop landing

Flights: 2
Airframe: T-38
Flight profile: EVAL

Completion:	1	2
	O	O

The last two flights of the course will consist of aerobatics and stall behavior measurements

FLIGHT #1

Take off from KNHK and proceed to the Chesapeake Bay at 10,000 feet / 300 KIAS

Revise your knowledge on aerobatics (if necessary, prior to this flight you can read http://en.wikipedia.org/wiki/Aerobatic_maneuver) and carry out aerobatic maneuvers with as much precision as you can muster. (This means ending up at 10,000 feet if you start a loop at that altitude, for instance)

Time reserved: **30 minutes max**

Head back to KNHK and execute a couple of touch and go's before landing (two of which should be no-flap touch and go's!)

FLIGHT #2

Take off from KNHK and proceed to the Chesapeake Bay at 10,000 feet / 250 KIAS

Idle throttle and maintain altitude by control stick back pressure only; monitor the airspeed as it decreases

Once you can't apply any more stick, **SLOWLY** add power to break the airspeed decay. You should try to end up in a situation where the aircraft is in or nearly in a stall situation, while the engine is at near-full power, nose-up

This is called the backside of the performance spectrum

Once a full stall develops, release the stick, let it center while the nose drops down and airspeed picks up again

Climb back to 15,000 feet, then restart the maneuver

Repeat at 20,000 and 30,000 feet

Return to KNHK

This concludes the virtual Naval Test Pilot School curriculum.

I hope you had a good time flying these missions. If you have any feedback/remarks/suggestions/etc., don't hesitate to contact me at mba@freeler.nl.

If you want to read more about navy test flight, I suggest reading

> "**Apollo 13**", in which James Lovell tells about his general experiences back in 1958 when he ended as #1 of Class 20

> "**The Right Stuff**", a classic by Tom Wolfe (made into a classic motion picture in 1983, starring Scott Glenn, Sam Sheppard, Ed Harris and others)

> **The official NTPS website**: http://www.navair.navy.mil/USNTPS/

> **Pat Svatek's weblog of NTPS class 130** at http://svatek.blogspot.com/

A salute to you!

Marcel Hendrikse

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