The in-home cockpit
Part 2: Yoke and throttle

Andrew Underwood report and photographs

As described in last month's *Aviation News* (page 16), I have embarked on a project to progressively construct an interactive home cockpit around my desktop computer running Flight Simulator X. This is thanks to Saitek which is generously providing me with monthly instalments from its plug-and-play hardware peripheral range to add to my current basic keyboard and mouse controlled setup.

The first piece of hardware despatched from Saitek HQ was the Pro Flight Yoke System, comprising two separate units: a double-axis controller for elevator pitch and aileron roll; and a three-lever power quadrant designed to replicate throttle, propeller and mixture inputs.

Attaching the peripherals to my desk was intuitive and didn't require the reading of the included instructions. A 10cm deep desk clamp slots into the 25cm by 28cm base of the yoke and clips under the surface of the desk it rests upon to hold the unit steady. A thick plastic screw is then wound through one of three holes on the bottom of the clamp, with a flat plate clicking on to the rounded head of the screw via a ball and socket joint, which presses up against the bottom of the desk to hold it in place.

The throttle quadrant has a backing plate clamp that can be screwed onto either its back or underside face, allowing for the top of the unit to sit either flush with the table top or up on top of it. I elected to sit my unit lower down to the right-hand side of the yoke, its common position in most light aircraft cockpits. Again, three circular holes on the bottom of the clamp take a plastic screw with the same flat plate clip to secure the clamp tightly to a variety of table top thicknesses.

The throttle quadrant connects by wire through a PS/2 type socket into the rear right-hand side of the yoke base, with the base itself connecting to my computer by a half-metre-long USB 2.0 cable. Three further USB ports on the side of the yoke are for additional Saitek peripherals to connect to, such as the autopilot, nav and comms panels that will be discussed in future articles.

A single 5V 1.5amp power adapter socket is also included to provide additional power to these devices so as not to drain the computer's power supply unit (with the adapter itself needing to be purchased separately), although this is not actually required to run the yoke and throttle system which sources its power through the master USB connection. Online research reveals the smaller Saitek devices draw as little as 100mA each, well within the standard USB 2.0 current output of 500 mA per bus powered hub.

Both the yoke and throttle quadrant clamp to the desktop.

My first impressions visually were that both items appeared solid and sturdy, with the 32cm wide yoke handle looking roughly 1:1 scale with most general aviation aircraft that I've flown, albeit a little thicker in depth and lighter to hold.

An LCD chronometer display at the centre of the yoke displays both local time and an inflight timer than can be started, stopped and reset via adjacent named function buttons. I found this very handy for timing IFR holding patterns without having to use the fiddly mouse cursor to find and click a clock button on the virtual aircraft panel up on the computer screen.

On the yoke itself are three two-way rocker-like switches (which Saitek has configured by default to control elevator trim, flap up/down and gear up/down in FSX), along with two simple one-function buttons (configured by default to apply wheel brakes and to cycle through simulator viewpoints), a point-of-view hat switch of the sort commonly found on gamepads that can be nudged one of eight directions to pan the pilot's-eye camera angle around. These can all easily be customised through the Microsoft Flight Simulator X Settings -> Controls screen to user-preferred function assignments if desired.

A special feature unique to the Saitek design is a 1-2-3 mode selector switch which allows the user to assign up to three different functions for each button through external downloadable Saitek profile editor software, therefore transforming the device from an eight-button into a 24-button controller.

The ergonomic looking throttle quadrant has three levers, topped with black, blue and red clips. Each of the three axes can also be simply assigned through the FSX settings to change the inputs to throttle, propeller pitch and mixture should you be virtually flying a single engine piston aircraft. If you are flying a twin or multi-engine aircraft, each lever can be assigned to either control the throttle/pitch/mixture of multiple engines or, if you purchase another quadrant, easily run it in parallel with the original quadrant, swapping over the coloured caps to set up individual levers to control individual power, pitch and fuel systems.

I would imagine this would be a most useful arrangement for the student pilot learning engine failure drills for multi-engine aircraft, with the ability to obtain a muscle memory familiarity with the order of lever positions to save transitional learning time spent in an actual aircraft.

Right out the box, lever operation is smooth with an expected amount of friction (although non-adjustable) matching similar real-world light twin quadrants that I'm familiar with manipulating.

Each of the three lever ranges has a slight detent at the bottom of its travel, which completes a circuit when fully down to create a button selection. This allows the user to assign the likes of reverse thrust, feathered propeller and mixture idle cutoff button assignments to the controller. A further six programmable buttons sit at the base of the quadrant and can be assigned to any multitude of other functions within the flight simulator software.

The required drivers for the hardware come included on CD in the box and take only a matter of seconds to install. From here, I booted up FSX to confirm the program had already automatically detected the Saitek yoke system as a replacement controller from my previous joystick, and I was then able to load a virtual flight and fly immediately without any further programming required.

I tested a variety of GA aircraft in nil wind conditions and tweaked the deadstick null zone amounts and axis sensitivities through the Windows 7 control panel to give me a nil drift and a realistic feedback that generally felt correct for the types of aircraft I enjoy simulating in. For pilots who virtually fly large airliner types or bulky radial-engine warbirds, some calibration tweaking may be required for the control inputs to match the force required to manoeuvre the heavier control surfaces.

Resistance to pulling and twisting the yoke handle is provided through internal coil springs coupled to the cylindrical stainless steel shaft. The travel and twist movement of handle feels realistic, similar to that of a traditional Cessna yoke, with internal detents limiting the travel range and rotation angle by an authentic amount. However, weight of the control in hand doesn't differ after trimming, as it would in the real world — it can be gauged only by horizon level on screen in the simulator.

It took a little getting used to flying with the yoke, after being so familiar with a right-handed joystick controller for many years. I took particular effort to remember to use my left thumb to change the view around and squeeze the brake button upon landing, but after a few sessions it steadily became more natural. The twist and pull motion of the yoke feels so natural now that I don't think I could go back to the original pivot joystick interface.

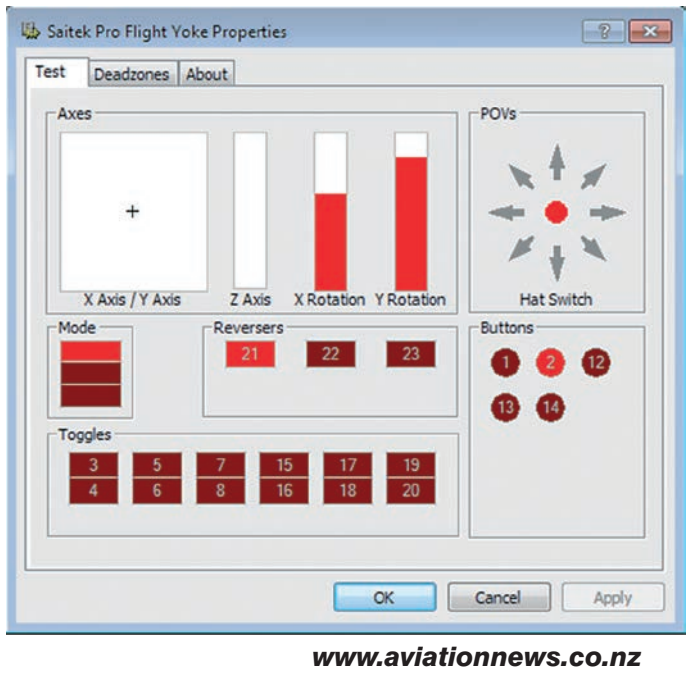
Whereas before I used my flight time in the simulator to rehearse IFR procedures or fly around scenic points of interest, since receiving the yoke controller I have reverted to basics and have been able to derive pleasure simply cruising around nondescript open areas, taking similar enjoyment from the experience as when I first learned to fly.

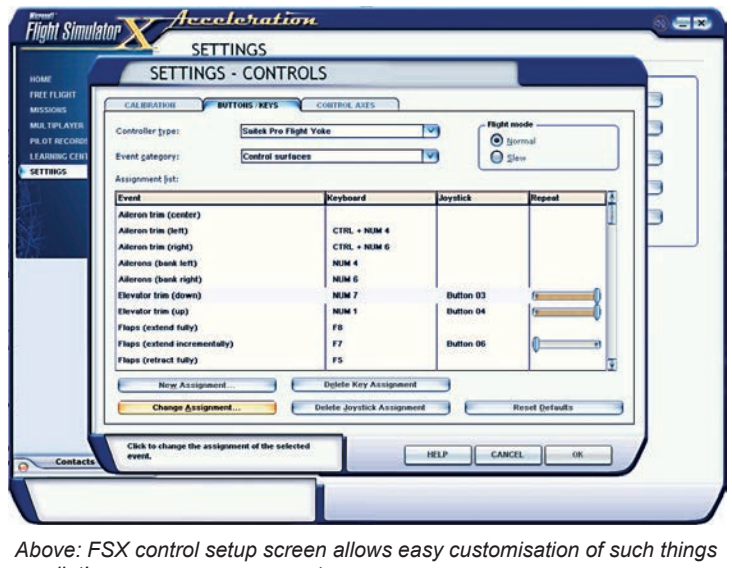
I've also been able to persuade various friends and family members to sit down and give it a go, and all of them were able to fly along without my instruction and seemed to be entertained by the novelty of interacting with a computer game through "aeroplane handlebars"!

However, the one thing that my old joystick was able to do that the yoke cannot was control the rudder axis — obviously a fairly essential part of the GA flying I like to simulate. Until next month, when I receive the Saitek Pro Flight Rudder Pedals to add to my home cockpit, I have had to enable Autorudder in the FSX realism settings, which couples a calculated yaw input to the movement the user makes with the aileron axis.

Not a big deal, but I now require a keyboard at hand to overpower directional control on taxying, takeoff and landings.

To be continued





Above: FSX control setup screen allows easy customisation of such things as pilot's-eye camera movement.
Left: The calibration screen is used for setting up feedback and control response which vary between aircraft types.