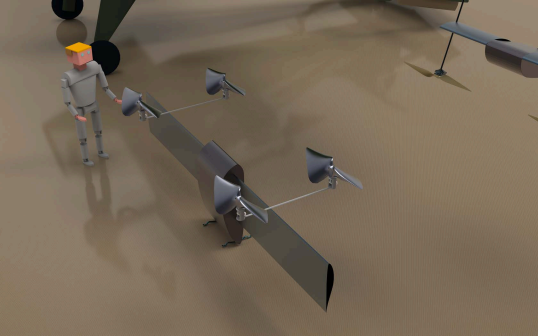
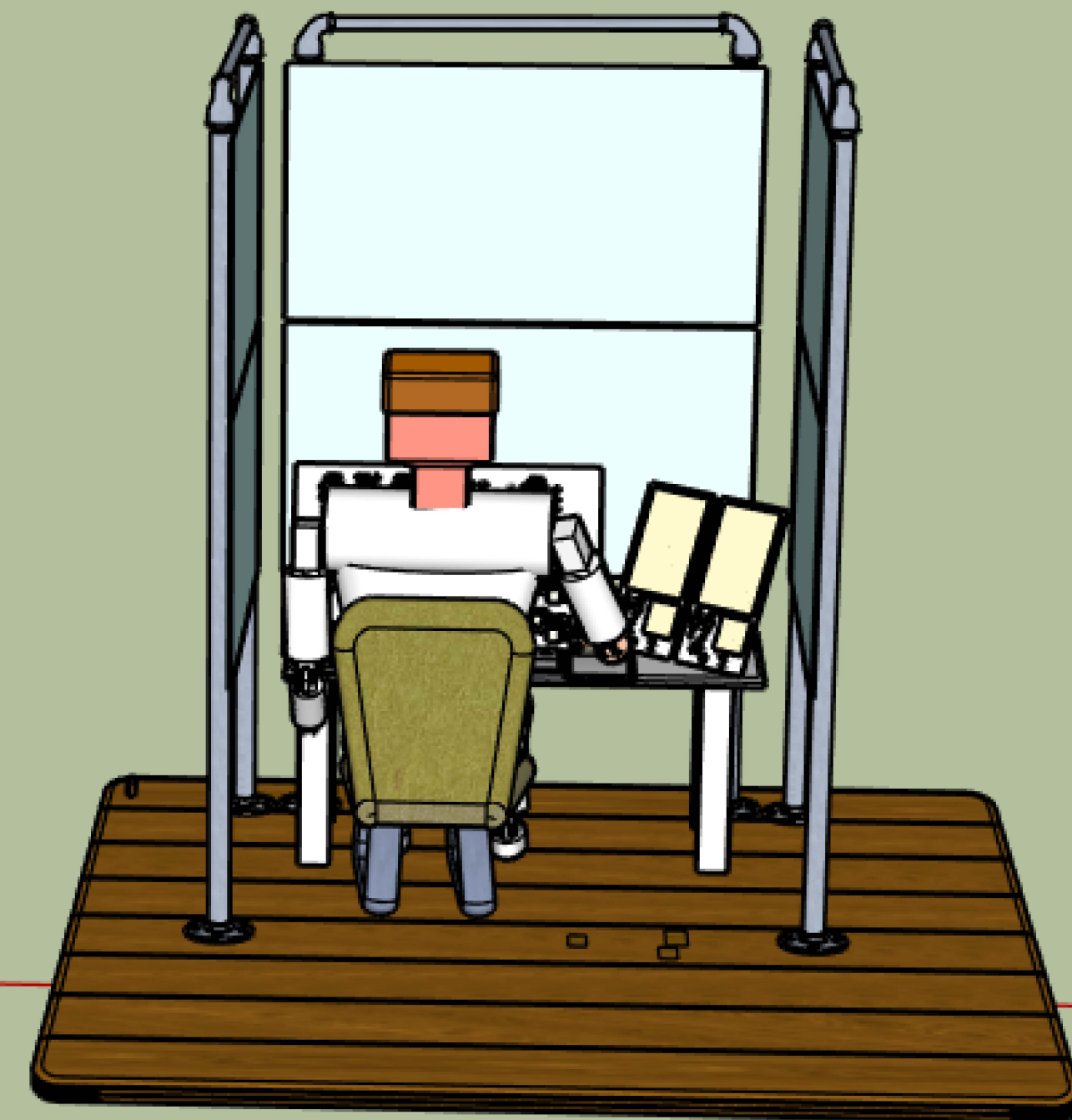
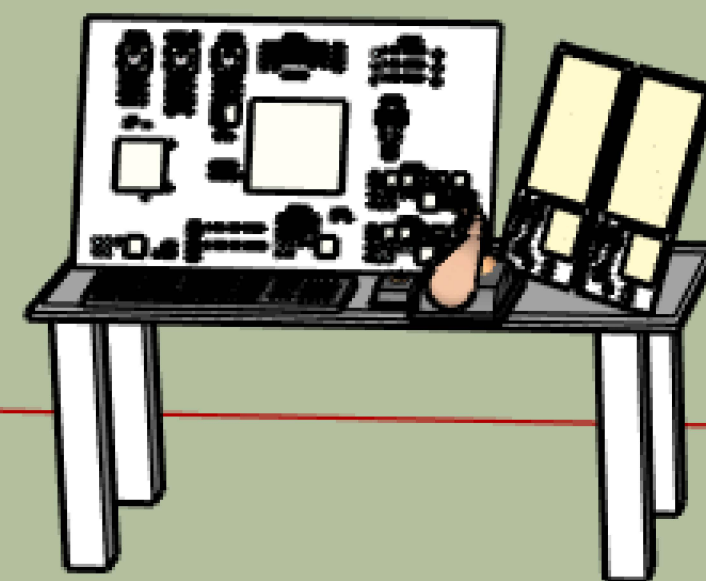
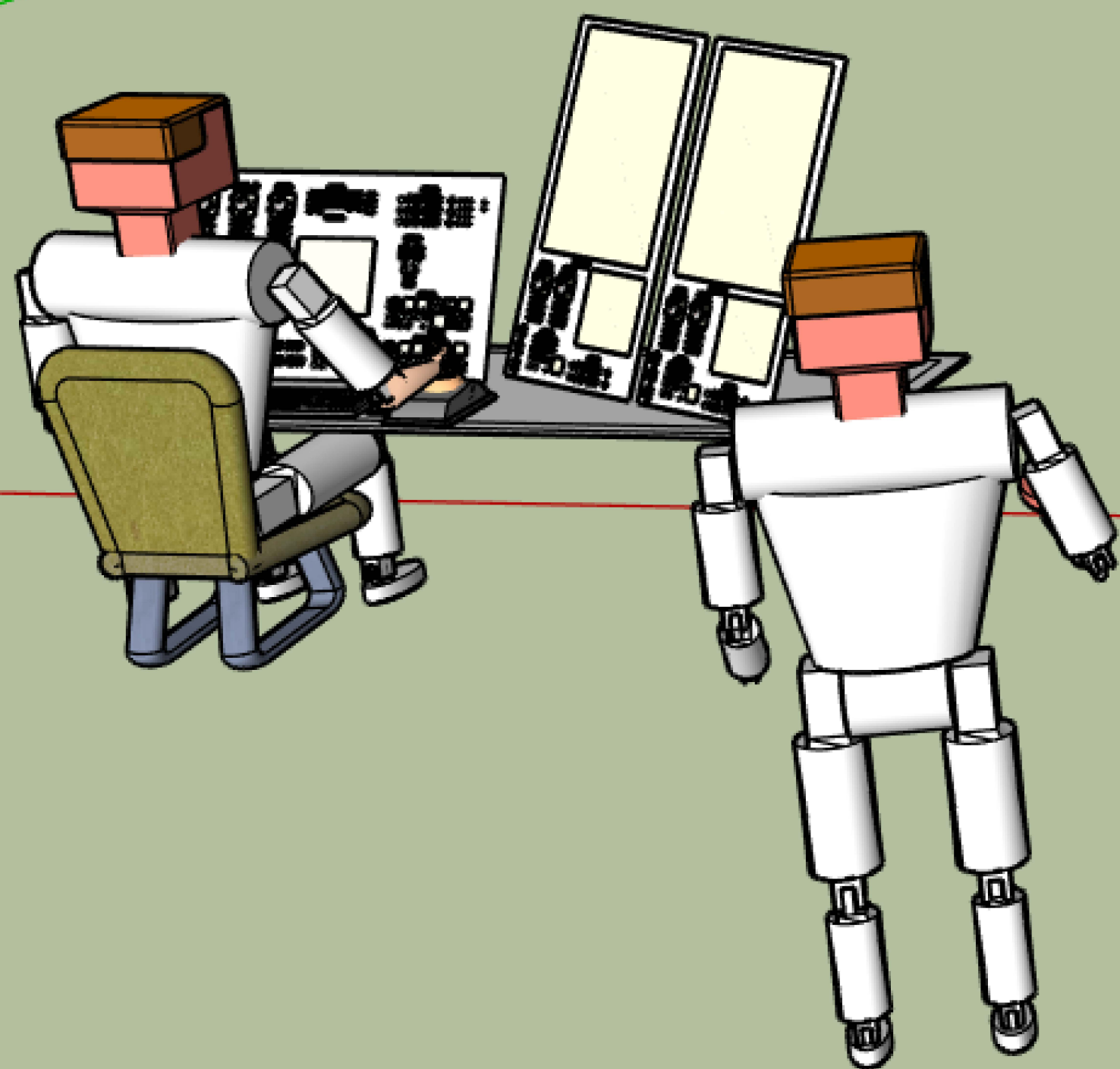












**Training Setup** this is sent as a package to the isolated outpost

The pilots go into the LED screen area and close the back rolling screen set  
They work in there in a manner where they can "sort of" see what flying is like

The ground crew group go to the desktop setup. Their job is to  
monitor the situation of the drone to notice "little problems" and  
to do activities to keep "little problems" from becoming "big problems"

Ground crew would go into the LED display "box" to learn:

- 1) how to look for notice and see the drone as it arrives
- 2) how to learn how to make comms to the pilot about the drone
- 3) how to learn how to help soldiers being helped to comm to the pilot where is the drone and what flying is needed to get it to land where they want it to land
- 4) how to help the pilot to land the drone back at home base including in situations where there is a drone problem or bad weather

The pilots and the ground crew have the sort of programmable display screens to their right. What is on these screens can be chosen by the person.  
Ground crew (example) dense data about an engine they are worried about.  
Pilot (example) navigation showing their drone superimposed on a satellite image

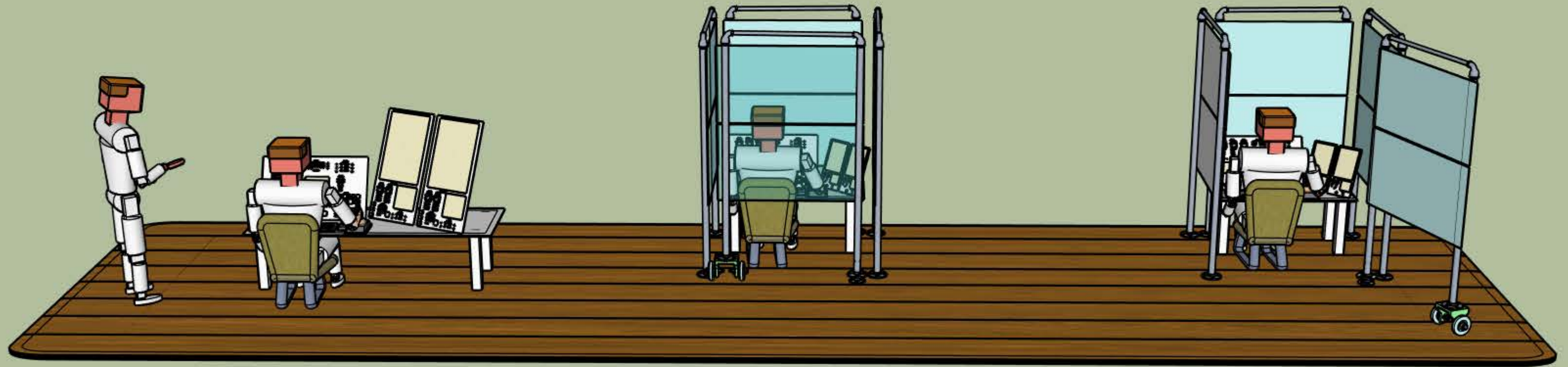
The servers that come with this training setup include programming for:

- 1) normal ground crew activities
- 2) normal pilot activities
- 3) management of preflight activities
- 4) management of issues and how the cpu displays its messages about issues
- 5) example real world scenarios for training pilots and ground crew

Of note: I lowered the opacity of the LED screens in one of the views so folks can see what it looks like inside the sort of "simulator"

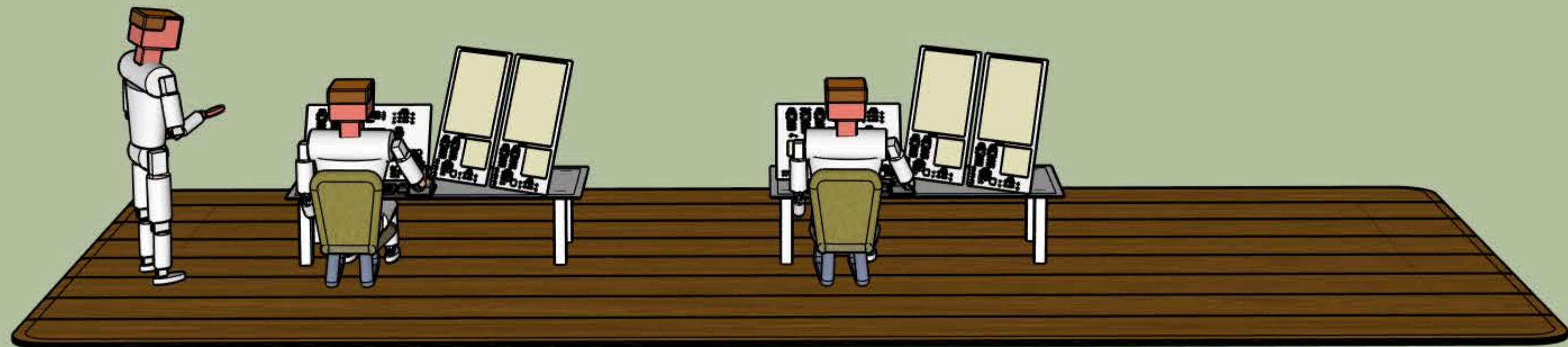


**Of note: I lowered the opacity of the LED screens in one of the views so folks can see what it looks like inside the sort of "simulator"**



**This is what a real (this is not a drill) mission would look like:**

- 1) pilot on the right running the mission**
- 2) chief of ground crew on the left present to provide help as needed**
- 3) the standing person might be the commanding officer or perhaps someone from the take off/landing area who came in with info**
- 4) of note, almost always with very few exceptions all comms go first to the chief of the ground crew, then he relays comms to the pilot this is to allow the pilot to maintain a close focus on the mission and the flying of the drone**



# Commanders Eval the Small Cargo Plane

This is the story of a type of “roll out” for these small cargo plane drones. The company that makes them has completed its technical and safety evaluations and testing with good results, and the military acquisition Command that is purchasing them for the military has also completed its technical and safety testing, again all with good results.

The military has brought in a group of Base Commanders, Commanders for small outpost bases located as isolated capabilities, these bases are small and there is not much U.S. military presence near these bases otherwise. These bases are, of course, in contact with Central Command and they can request help, supplies, reinforcements, air support, etc. whenever they need this kind of help and support.

The purpose of this “roll out” was to give these Commanders access and control to a set of these small cargo planes (drones) for these Commanders to watch and eval and control these drones to see how these drones operate and what capabilities these drones have.

The setting is there are 3 drones on the tarmac, a table, chairs, and a control panel set up so one of the Commanders could sit at the control panel and the other Commanders are nearby to look and comment. The reps from the military are there, as are company reps from the company that makes these drones, and a safety officer. The instructions are a request the Commanders speak out loud of what they are planning to request these drones to do so the reps and most importantly the safety officer have an ability to understand what is about to happen. Otherwise the Commanders can ask questions to the company reps, and the company reps will help if the Commanders are not quite sure how the drones work, but otherwise the Commanders have been told, “Do pretty much whatever you want with these drones.” This is how the Eval by the Commanders began.

The Commanders seemed to defer to James, he was the most senior officer and they all knew, in addition, he had a lot of experience with drones in active combat areas. James told Nick “You go sit at the control panel, at least at the start, and we will see what is next.” One drone had been placed on a wagon and rolled out about 40ft from them. The rep said, “We

will start with this one.” One of the Commanders, Thomas, it seemed he would be the one they let do their speaking for the group. Tom said “I see that drone out there, is it ready to go?” The rep replied, “Yes” Tom, “Ummm, well it doesn’t seem to be doing anything, is it even on?” Rep “Yes, look at the control panel, it is listing as ready for use.” Tom: “But is it on or off?” Rep: “At the control panel, toggle the engine on enable and it will start its engines” James looked at Nick, and Nick found that toggle and toggled start engine. After a few seconds the panel indicated Engine On, at idle setting. The Commanders were looking back and forth at the drone and the control panel. Tom: “We are not sure if anything happened, are you sure it is working?” Rep: “Look at your engine status (of note the images I have are the control panel for the deHavilland and its two Rolls Royce CTS-800 turbo shaft jet engines. The control panel for this drone, at its engine section, will have data for these two free piston engines, examples:

- a) Combustion chamber temp, pressure
- b) Air charge chamber temp, pressure
- c) Output hyd fluid from accumulator temp, pressure
- d) BPM (beats per minute) of the engine
- e) Oil pressure, Oil temp
- f) Fuel flow rate, fuel remaining, time remaining at current fuel flowrate

Etc.

The rep noted “combustion chamber temp is 140 deg F, and bpm is at 0.01, accum pressure is at 20 atm. This is for both engines, so the engines are on.” Tom said “Well I don’t hear anything, nothing is moving, it looks like it is sitting there.” Rep “You haven’t requested the drone to do anything.” Tom: “I thought it ran hotter than this” Rep: “It cycled a few times, when accum pressure went to 20 atm, the cpu set bpm from 4 to 0.01, it is just sitting there, the combustion chamber is slowly cooling off”

Tom “I am not yet sure what we are seeing here” James: “Let’s get it to do something” Rep “the control panel is waiting for you” Tom: “All right, we will make a request, I guess.” James: “Nick turn the alt knob to 2ft lets see if anything happens.” Nick turned the knob, the props spun up, the engine values and prop rpm values changed and the drone rose up 2ft off the ground. Fuel flow rate became positive. They watched it for about a minute. Tom: “Umm heading, currently south, what does that mean?” Rep: “In VTOL mode, heading is where the stomach pointed, so the stomach of the drone is pointed south (180deg), in fixed wing heading is where the nose of the drone is pointed.” James: “OK then, Nick, set

the heading to 90deg (east) we'll see if anything happens." Nick turned the heading knob, the alt was still set at 2ft, the drone remained at alt 2ft and turned so the drone stomach was pointed due East. Rep "Of note, we have setup airspace for you mostly to the south, so when you decide to fly it some, we are suggesting watch it and try to keep it south of here." James: "Airspeed is set to 0 ft/sec" Nick "Set at zero" James: "Hmm well turn the knob to airspeed ½ ft/sec" Nick turned the knob and the drone, still at alt 2ft, heading 90deg, began moving east (90deg) at what looked like slowly or about ½ ft/sec. "Ok heading to 180 lets see what happens." The drone made a rotation to the right stomach now pointed south and the 2ft alt and ½ ft/sec translation pace kept going. "Ok how about alt 20, heading to 270, and airspeed 2 ft/sec." Knobs were turned and drone put itself in that status. "Ok, Nick, tag you're it, use the knobs get it pointed back to the take off (the rep had moved the wagon a good safe distance away) then stop it and land it and right before you land it get the heading back to 180 deg. Nick worked the knobs, it was a little non-polished, but he got it back to near the take off point and 2 ft off the ground airspeed now 0 and heading 180deg. Tom: "So how do we land this thing" Rep: "Turn the alt to 0" Nick did this and the drone was sitting on its feet on the ground. Tom: "Alt to 300 and airspeed to 30 ft/sec" Rep: "Whatever you want, we are watching, we'll let you know if we don't like your flying" Nick put this in and the drone flew off rising to alt 300 and leaving them at 30 ft/sec. Rep: "We have binoculars for all of you, our zone of airspace is about 6000 to 8000ft away, use your judgment, you can always turn the heading around and head back, so not have it close by and headed toward us at airspeed above ½ ft/sec, close by is about 500ft out from us here." Tom: " Ok get it 1400ft south of us, then, alt to 1800ft with continuously changing heading knob go to 270deg, the ease it to heading 90 deg then heading back to 270 deg then heading back to 0 deg and bring it back to us, we will see how good you are at flying it in a circle. At 800 ft out alt to 12 ft and airspeed to ½ ft/sec and heading that will bring it home to us." Nick started working the knobs. The Commanders had their binoculars out and were following the drone, the safety office also had his binoculars out.

James: "Well how about that toggle for fixed wing enable" Rep: "Cpu of the drone will want you at 400ft alt with +vert vel of 40ft/sec. It will get your airspeed raised to its algorithm setting everything will start happening much faster as it will go to at least 48 to 53 mph (10 to 15% above your predicted stall speed), you can do this but you and Nick need to consider some at first, is our suggestion" Tom: "How to get + vert vel at 40 ft/sec" Rep: "Algorithm is the value of change is related to how fast you turned the knob and how great the requested value is away from the current value. Example at 12 ft alt a good quick turn to 400ft alt and cpu will default to max vert thrust as allowed by algorithms and will hold that until it begins approaching the alt request. Thus, example, alt quick turn to 550ft and at 390

or 400ft or so, toggle fixed wing enable. The cpu will put you into fixed wing, give you a message about need to up the airspeed, and cpu will do the nose pitch down rotation to get you to level flying planning to get you via excess power climb to that 550ft alt. You will get better and better at this as you do it more. Our suggestion” Tom: “Wow, so take a deep breath Nick, and don’t embarrass us.” James glanced at the safety officer and then glanced at Nick, “Keep us headed South Nick” Nick put his hands on the knobs. Tom: “Get the heading to 180 first, Nick” Rep: “To your right there Nick is an auxiliary display screen, it is now not configured for anything, you can enable it and select nav, it will show you a satellite imagery of here and show your drone location. At fixed wing everything is going to be happening quickly, we are not opposed, but keep it to the south away from here, you can follow where you are on the nav. Nothing wrong with having one of the Commanders watch the Nav screen for you while you try to fly whatever is the flight path you have in mind.” James: looking at the safety office, “So Nick why don’t you tell us your planned flight path before that pop up to 400ft alt and enabling of fixed wing. Alt, how far away from us you are planning to keep the drone, and I am guessing you will try flying a circle?” Nick: “Umm, ok I was not seeing it that way, but you are correct, Mike if you will watch nav, and, hmmm, I will set the drone on the ground for a moment and Mike and I will work out a proposed flight path.” Safety officer: “I would like to see or at least hear about that proposed flight path, if ok with you.” James: “Nick you and Mike run it by me and the group first before getting anything started” Nick “Let me setup a landing and Mike and I will start thinking” Nick was working the knobs he brought the drone back to 12ft alt heading back toward the group, airspeed to ½ ft/sec at 300ft out, flew it to the group, reversed the heading back to 180deg, airspeed to zero, and then alt to 0, the drone settled down sitting on its feet, the drone was about 20 ft out from the group about due south of the group.

Tom: “Hey Nick, how are you going to get that thing back to VTOL, sedate flying, and headed back to us without flying right through us? For fun, let us keep it boring.” Rep: “Nick you and Mike (the rep glanced first at the safety officer then at James) at fixed wing settings and we will suggest not staying that close to your stall speed, so up airspeed to 60mph, that is the design cruising speed of the drone. Is ok to fly it at us but this becomes dangerous quickly. Suggest at end of whatever your flight plan is to try out fixed wing flying, then fly south until you are 2-3 miles south of us, bring yourself around to be pointed at us adjust your turning circle so when you are pointed at us your heading is also at or near 0. You should consider to be at 1900ft alt. With the knobs reset airspeed to 35 mph and alt to 300ft you will get notice from cpu that 35mph is under fixed wing flying algorithms, acknowledge, but keep 35 mph. Cpu will “pancake fly” you level wings and mostly level fuselage you will be headed at us at 35mph and dropping alt. You should have a flight path

of about 45 60 deg down angle. At 1000ft out and 300ft alt, disable fixed wing flying. Cpu will tell you your airspeed is above algorithm for VTOL, acknowledge and set airspeed to 20mph. You will be flying VTOL at 20mph towards us. Use Mike and Nav to ease that airspeed down as you get closer. Our suggestion.” Nick looked at Mike, then looked at James. James looked at the safety officer. James: “OK gang, let that drone cool its jets for a moment, we need all the Commanders to be sure we understand this plan and all is cool. Nick you and Mike will need to be aware and confident.” James looked at the safety officer. The Commanders gathered around the table and began talking quietly amongst themselves.

Of note, Nick and the group flew fixed wing to about 2-3 miles out and 2500ft alt 60mph. Did some circling in a 3000 ft radius circle at 2500ft alt. Got the drone headed back properly eased off alt and airspeed and event of disabling fixed wing flying. All a little shaky the first few times, but the whole Commanders group did a few evolutions of this fixed wing side of evaluating the drones. Fuel was becoming low, rep advised land this drone. The ground crew/facilities services group got that drone on the wagon, eased it away to cool off, there was no need to go through the event of refueling a “hot” drone. They brought the next drone out, spun up its engines and more flying VTOL and fixed wing kept up. They did more of this the next day. Their success at following their planned flight paths increased well as they did more flying.