JUMP POINT

OVR   WEAP   PWR   SHLD   CLSN FUEL GFRC

LAT   0 G
LON   0 G
VRT   0 G

Class 2a Mount
DMG PWR HEAT AI
1   1500

C4-160f Hornet Ball Turret
DMG PWR HEAT AI
2   99%   99%

N4-160f
DMG PWR HEAT AI
3   99%   99%

MaxOx NN-13 Neutron Cannon
DMG PWR HEAT AI
99%

Talon Dominator FF Quad
4   UNARMED

Talon Dominator FF Quad
5   ASIM-09/cN Marksman I

6

CrossSection
ReadyToFire
100%

Anvil Hornet
RobIrvingCIG2013

— M

0:17

GREETINGS, CITIZENS!

Let's start with the top news: no Idris for the third month in a row. And, to forestall the complaints, probably not next month either. (Which doesn't mean Absolutely Not, but it may keep the complaints down in the meantime … :))

The team has been very focused on getting the DFM ready to go, and we tend to go with what the team has been working on, in **JP**. What that means this month is that we're taking a look at HUD developments, and also containermania. No, that isn't a word. Or at least it wasn't.

Meanwhile, let's talk **JP** theory and practice. I intentionally don't tell you what the upcoming JP will have in it, because I think the majority of you enjoy speculating about it. However, I try to keep an eye on the forum to make sure no one's seriously going off the rails. But … we made a mistake on this end last month. Actually two mistakes. First, someone official said something definitive (and definitely wrong) about what the March **JP** would feature. And second, I was so crammed last month, that I didn't pick up on the threads (as several of you correctly noted that I should have) that were discussing it. It didn't help that the someone official thought he was responding to a totally different question; you didn't know that, and without any rebuttal on my part, you reasonably assumed he was correct.

I can see two or three ways to avoid this in the future. One, I can post a month (even two months) ahead of time what each **JP** will include. Of course, it'll change … this month's issue had a significant content change about a week ago, so anything said before that would have been wrong … but at least you'll have the official word from me.

Second, I can coordinate with everyone at Cloud Imperium (including all the associated companies), so that they always know exactly what's in the next **JP**, and so that no one ever says anything wrong about the content. But given that I often don't know myself what the next issue will include, I doubt my ability to keep everyone else up to speed.

Or, we can fly blind. (Well, you'd be blind; I'd be following my normal meandering joyride.) You don't believe what anyone says about **JP** unless I'm the someone. And I'm not gonna say; you have to wait to see. Those are the options; tell me what you think.

Meanwhile, in this issue, we've got the new HUD (plus an interesting look back at the history of HUDs and interfaces in general), Stor-All (the preeminent container source), a Behind the Scenes look at how cargo works (at least at the moment), a glimpse at Corel, where all good containers end up at least once in their lives, and the conclusion to Robert Waters' *Hunter & Swan*. Next month, a new story begins … but you'll have to wait till then to find out what it is!

And here's another acronym definition: **ITTS = Information, Targets and Threat Simulators**. Very useful for a cockpit HUD (Heads-Up Display).

Hold on, it's gonna be a wild ride!

David

David.Ladyman@cloudimperiumgames.com

The HUD

Lots of folks have been crunching on lots of things as we work on the Dog-Fighting Module (DFM), aka Arena Commander. Here is what Zane Bien put together for the Hornet HUD. Most of this is explanation from him, which we'll run in white. Chris Roberts' comments will be in black. Here's Zane:

Ever since we showcased the initial exploration and concept for the ship user interface (UI) created by John Likens last year, we have been busy designing functional iterations of the HUD & UI, using that initial concept going forward as a general style guide.

So we started out brainstorming what exact data would need to be represented in the ship UI given the gameplay mechanics of the Dogfighting Module, and how it should all be laid out intuitively to the player. In a very broad sense, what Chris had envisioned was a distinct separation between data pertinent to your own ship, and data pertaining to your target(s). He also envisioned the UI being dynamic and modular, in that players should be able to configure and swap elements in the UI to better fit his or her preferences in what information would be displayed.

Most of the UI in the Hornet was to be included in the player's helmet mounted display (HMD) when flying the ship. Since the Hornet is more purposed toward military combat, an HMD-based user-interface provides the advantage of being able to quickly track your targets through your ship's hull using your headlook, as well as having vital information front and center in the middle heated combat.

LIKENS HUD

LEY HUD

Given all of this direction as a starting point, we flew CIG-UK concept artist Andrew Ley to Santa Monica to roughly sketch out interaction concepts for the helmet-based UI using Maya.

Here in this early mockup, we see pertinent information on your ship can be displayed on the left. The boxes that run down the side might represent various modes in dealing with ship subsystems (e.g., weapon and energy management). On the right, you have the primary target as the larger ship at the top, with subsystem targets running down the side.

CR: I like how the primary 3D models sit near the top of the visor … would be great to have these use Okka's new holo-shader. Also, we should have some kind of rezz-in effect when you initiate a scan on a target so that it "pieces together" as part of the scan progress indication. I would almost think that the boxes on the left side could actually act as "docking" slots where you would dock certain parts of your ship to keep track of their status (i.e., weapon, configuration preset, wingman, etc.). Think of it like a shortcut menu that you can configure. This could also be replicated on the right side, where locking onto a target would dock that target into one of the slots, then you could shortcut to any one of the slots to switch the focus to that target. I'm also thinking that more advanced targeting computers could have more slots, and thus more targets you can lock onto and keep track of.

Once we got a good idea of what the layout was going to look like and how it was going to be implemented on the technical side, it was time to flesh out the actual detail and art that would be used in the final HUD.

Here is a first pass at a fleshed out UI. I aimed to keep everything clean, concise and aligned using a grid that could serve all of the other various helmet mode user-interfaces. The first thing to note is that the entire UI outside of the very top navigation bar is considered to be in the "combat" helmet mode which serves the current context (which in this case would be heated dogfighting). Since you will be wearing the same helmet in different contexts (e.g., in FPS combat, EVA, navigation, etc.), I think it would be a good idea to make the UI able to switch out to something completely different, displaying different sorts of data when appropriate. Subsystems management (weapons, power, shields, etc.) would all happen on the left pane and would be accessible through the Own Ship navigation menu. The rest is mostly self-explanatory and is outlined in greater detail in the doc I sent out.

CR: Looks good, though the message queue looks like it could be toned down a bit so as to not disrupt your view as much. The UI should eventually be warped to conform to the shape of the helmet that you're currently wearing. Also, the helmet UI needs to feel like it's slightly detached from the camera in order to achieve a more immersive effect when you look quickly in another direction or sustain a hit, high G forces, etc. It should move at a very slight delay to your actual camera look so that it feels like it's actually part of the helmet rather than plastered on your screen.

Here's another version of the combat HUD, and a mock-up for a Power Management UI.

3D RADAR SPHERE

CR: A 3D "holosphere" is what I want for the radar that all ships will have (and sits in the center of the display in the Hornet). Make sure it's not too busy, and give it the ability to zoom in / out (scope the radar radius range) and actually be able to discern the target ship's form if you've zoomed in close enough (and of course this ship will appear in the target slot on the top right if you select it).

I decided to take a shot at a quick visual mockup of what it might look like (focusing on the radar).

The mockup shows the currently locked targets and all other unscanned objects (blue glowing dots).

Only targets that you've locked get diamond reticles, as well as a ring on the ship's horizontal plane. The diameter of each ring is affected by the target's distance from your ship. Glowing bars traverse the ring to make it easier to quickly discern which targets are in front or behind. When a target becomes the primary selection, the ring becomes a solid line, and the reticle is emphasized.

Clicking on a locked target other than "1" in the radar would switch the primary selection to that target, in which the ship model of the previously selected target would "fly" down and fade into dock item "1", while simultaneously the model of the newly selected target would fly from the radar into your selected target panel (this model would probably duplicate the radar model since you'd still want it shown on the radar).

The same would happen for an unscanned object, except that the model of the unscanned object would shapeshift into the actual shape as it's being scanned.

Ideally, you would also be able to do a multi-selection, in which the nearest object in the multi-select becomes the primary selection, and all other objects would get auto-docked+scanned in the available dock ports (perhaps ordered by distance at time of selection).

Looking forward to thoughts / suggestions on this.

CHANGING THE RADAR SPHERE

CR: I think this will be pretty cool!

Several thoughts / notes –

1) In "Radar Focus" mode (when you've brought the radar holosphere from its default position floating above the dash to be front and center of your view, possibly by hitting "Start" on the gamepad), you can select possible targets by cycling the target selection or by looking at them. I figure when you look close enough (determined by a ray-cast) to a target on the radar (both in Radar Focus and Normal mode), that target maybe glows and perhaps expands in size and gets a little flash info readout next to it. Hitting the "Action" key ("A" on the gamepad) when this is happening will move the target you are focusing on to the top right target slot,

where you can lock it if you want.

2) We should have the center ship be the holo version of the ship you are flying (a clone of the holo-ship that is used to display your status).

3) The ships in the radar would be actual 3D holo-ships and maintain the orientation of the actual ships they represent.

4) I like the detail of going from dotted to solid line, plus the highlight bar. Question is how would we implement these circles? In Flash (can you draw a vector circle in 3D?) or with a 3D mesh object?

Pretty sure this would be possible using Scaleform 3Di (and maybe also use for the vertical sphere rings).

5) What do the vertical circles that make up the boundary of the sphere represent? Is this aligned to the world (well, really the system) axis? I.e., if you rolled 90 degree in the illustrated situation would the circular lines now be horizontal (I think this could be useful and cool). Perhaps the frequency / density of these circles is proportional to the zoom of the radar (if you pull out more, they're more dense?)

The vertical rings were simply a visual element to make clear the shape of the holosphere. I made them vertical so as to distinguish them from the horizontal target rings, though I could definitely see them being used as markers for distance (where they would scrunch up as you zoom out, and expand as you zoom in) – like each line would represent every N meters. Here's a second mockup, without the vertical rings.

Another interaction bit that would be interesting to explore in this "focused-in" mode is being able to quickly assign orders via drag and drop onto the radar: pull up your wingmen on the left side of your visor (or docked wingmen), and drag a line from the wingman image to any target in the radar to contextually assign an order, such as:

if enemy -> attack

if friend -> defend

if unknown -> make selection & scan

This would be great! Especially for the Command and Control station on a cap ship or the radar op on the Hornet tracker (folding in the UK design leads).

TARGETING RETICLES

I've been working to flesh out a new design for the targeting reticles in the HMD Visor. My goal for the design was to make the targeting elements intuitive and functional, while remaining as minimally invasive as possible. Here are the break-downs for each of the various reticle states:

Uncertain Object

An uncertain object is an object that may or may not exist, as it could be a ghost contact or a contact that lies on the very edge of your radar signature threshold:
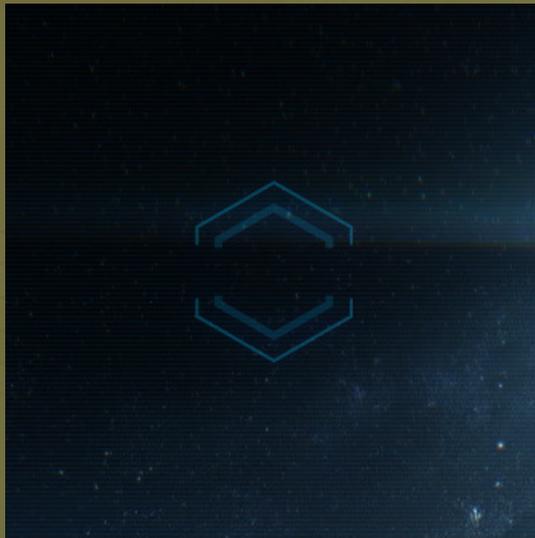
The element is shaped as a cut-through hexagon and is fairly transparent. This reticle will scale up as you get nearer to the location it's marking, based on the greatest possible range.

Certain Object (unscanned or not locked)

This element is kept very clean and simplistic in shape, since this will usually be the most common type of contact occupying your screenspace. You'll notice a small dash protruding from the border: This indicates the direction in which the object is moving in relation to you.

Selection Reticle

567m

The selection reticle indicates your current selected target, and also gives an absolute value of distance beside it. The reticle is made up of four segments (which will play a role in your ITTS markers, explained further down). In this example, you are about to initiate a scan on a certain object.

Acquiring a Scan

Once you've initiated a scan on an object, a series of 10 3D segments (each segment indicating a +10% scan completion) will begin to compose a thick ring surrounding the target. The segments will appear to fly out from the origin point of scan which, so far, can be one of two things: a scan initiated by your headlook on the actual target object, or a scan initiated via headlook on your radar.

If the scan was initiated via your radar, the segments will spawn and fly from the target point on your radar toward the corresponding object in actual space. This opens up a very interesting visual effect whereby if you've selected a target directly behind your ship, you would see these segments fly toward you from the radar and past.

If the scan was initiated from looking at the target itself, the segments would appear to fly out from the edges of your helmet – all the way around.

The final image on the previous page shows a scan taking place with the origin point for the segments being your helmet. When the scan is finished, the segmented ring will be complete, indicating the target has been 100% scanned.

The image above shows that the object we just scanned was detected as an enemy, so the color has switched to the "enemy/critical" color space. When the scanning ring completes, it then transforms into the locked target reticle.

Locked Target Reticle

This shows a locked target that is also the primary selection. The reference number for the target sits above the distance readout, and corresponds to the dock number on your target pane.

Let's unselect this target for now (keeping a lock-on):

The locked target reticle features some very useful information that's tied directly into its elements.

First, you'll notice the inner ring acting as a kind of radial progress meter that fills along a dotted line. This indicates the target's distance relative to the maximum range of your radar. When this radial approaches 100%, this means the target is on the edge of your radar's range and is about to go out of range. Likewise, as the target comes closer, this radial will wind down towards 0%. This is useful for visualizing not only how in-range the target is, but also how quickly the target's distance is changing in relation to your ship without having to look away from it.

The second piece of information is tied to the nine dots surrounding the outer ring. These dots function as an indication of the target's direction of flight in relation to your ship. Here's how it works:

The dots can sit inside or outside of the outer ring, depending on whether the target is moving toward you or away from you. If it's moving away, the dots run outside of the ring. If it's moving toward you, the dots run inside of the ring. These dots can then gravitate in the direction that the target is flying relative to your ship. In the example above, you

can see that the dots run on the outside, and the dots are evenly spaced from each other, not really gravitating in any direction. This means that the target is heading directly away from you.

The image above shows the dots gravitating toward the right, meaning the target is heading right relative to you, but still away from you.

The image above shows the target is now heading toward you, but is flying a bit upwards relative to you.

The image above shows the target is now heading directly toward you.

ITTS

Now, switching it back to your currently selected target, it's moving right relative to you, and you can see the ITTS marker show up:

In order to prevent the ITTS marker from overlapping other elements, one segment of the selection reticle is opened up and this opening rotates to follow the angle that the target is heading relative to your ship:

If the selection reticle rotates far enough, the information text beside it would then rotate to remain readable.

You'll notice there are now two ITTS markers. The triangular marker represents your laser weapon ITTS, while the square marker represents ballistic. You'll also notice they are somewhat dimmed out, which means none of your weapons' fire would intercept the target.

Here we now see our weapon pips. The solid triangular pip represents laser weapons, while the cross-hair pips represent ballistic weapons. You can see that the laser weapons have lined up with the laser ITTS marker (which then illuminates), which means a laser beam is likely to intercept the target.

Thinking forward, this could potentially get a bit visually overwhelming if there are more ITTS markers that stack up, like maybe if you had 6 different guns each with a different projectile speed … aiming could become clunky, so it may be worth exploring the reversed method, whereby your gun pip icons lag behind their pointed direction, with the angle and distance changing based on the target's speed and direction:

In the image above, you're aiming for the lagged ITTS pips to be on top of the target itself, but its actual pointed direction is represented by the inner dot on the line. With this, fewer elements are needed to aim your guns at the target,

and you don't have to match up with corresponding ITTS markers, just get your pips on top of the target reticle and fire!

So just throwing that out there as a suggestion … maybe it could be a feature of a different targeting computer.

Missile Locking

If you have a missile armed and a selected target is within range, a red diamond will appear within the locked target reticle, as shown in the image above. If a missile requires time to lock, the red diamond can blink until it's locked.

The image above shows a heatseeking missile firing and its estimated flight-path. The missile reticle is indicated by a hollow triangle that spins counter-clockwise as it approaches the target.

That's it so far for the first pass. I've attached a quick cockpit mockup which shows all of the reticles in context (and probably the most cluttered situation possible).

Let me know thoughts and feedback on the reticles or if there's anything I missed or am not accounting for. I'm sure there will be some tweaks to be made!

CR: There's some good stuff here, but there's still too much flat 2D stuff in areas that could benefit from 3D.

For instance, it's nice that the scanning will be segments that fly in, but the current proposal is the obvious way.

I would prefer that we fly in various segments (which aren't all a perfect 1/10th of an arc) to form a "scanned" disk by having them tumble in, then rotate to "click" into place much like some cool

locking animation on a puzzle piece in *Uncharted* (or any film).

The missile lock should be the same approach – you have the scanned piece assembled, but the "missile lock" is another piece that needs to be formed on the scanned piece (and they all fit together at the end to form a bigger or visually different target reticle) – so have pieces fly in and rotate and lock into place, creating a more complicated or interesting final reticle that would vary depending on the difficulty of the lock. A missile with a complex lock requirement may need 6 pieces, but a simple heat seeker may only need to add 2 pieces to the basic reticle. I would think that the "scanned" and "locked" assembled reticle discs would also maybe have some Y depth (-/+ Y is depth in CryEngine), so if you looked sideways at the reticle the missile lock

part would be floating ON TOP of the scanned piece.

Additionally, while I like the idea of the dots to indicate direction of travel relative to you, why do we need to use a 2D concept to impart information that I think you would more naturally understand in 3D? (The current design is cool, but until you have it explained to you, you won't know what the dots mean.)

Why can't a piece of the "scan" puzzle that builds up the basic 3D reticle be a 3D arrow (or some similar graphic element) that, once tumbled from the radar or our POV and has assembled itself onto the target reticle, it will be rotated in 3D to always give an indication of the target's direction of travel relative to YOU? That would be much more instinctive. A big question for this would be placement – does this piece sit in the middle of the reticle, or off the side?

On the ITTS side, I like the proposed solution (this part needs to be simple & elegant and in 2D projected into 3D or else everything will get too visually busy). I think you have to go with option #1 – if I'm flying a ship with fixed guns (with convergence), it's much more intuitive for me to line up my cross hairs (which will be fixed to the forward direction of the ship) to an ITTS "hit box," than to do the extra mental step of leading my heading so the cross hairs fall on the target reticle.

I've folded in Martin @ BHVR and the UK guys (who may do the targeting reticle) for visibility … and Forrest who was playing around with some 3D reticles.

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
4 Segments	8 Segments	12 Segments	16 Segments
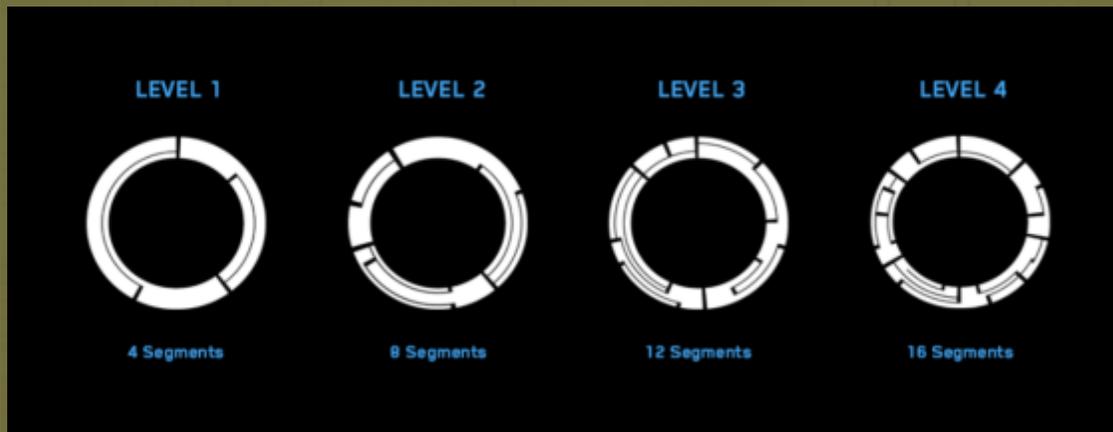
So here is how I imagine the 3D locking reticles specifically working:

There would be multiple difficulty-of-lock levels (whether it's a target tracking lock, or a missile lock), with perhaps 3 or 4 different levels.

Each difficulty level constructs the same shape of reticle in its final state (straight ring), but depending on the difficulty level, there would be more or fewer segments that would need to fly in in order to compose this particular shape.

Each level's reticle segments would be divided differently, but the exact segment shapes would be predefined. Depending on some kind of threshold that says if the lock is going to take between x and y seconds -> then spawn the reticle for lock level 3, or if the scan/lock is more complex than that threshold range, spawn the reticle for lock level 4, and so on. Within each threshold range, you would dynamically scale the speed of the reticle animation for a particular level to match up exactly with the time it actually takes to complete the scan/lock on the target.

The locking reticles I've designed are displayed above. You can see that each level gains 4 segments of complexity, and are divided into different "puzzle pieces."

In terms of how it animates within game, the reticle's segments would (as I described in my original proposal) fly out towards the target from the origin point of scan or lock. If you had initiated a scan on a target via your radar, these segments would fly FROM the radar towards the actual target (which means if the target was behind you, the segments would fly past you from the radar).

If the scan was initiated via a direct look at the target, then the segments would fly from the edges of the screen, all the way around.

In the case of the missile lock, the segments for the missile locking reticle would fly from the corresponding targeting dock on your visor or HUD (since you will have needed to first acquire a scan lock), and if that target is already your main selection, the segments would fly from the main selection pane on your visor or HUD.

In the animation sequence, there would be two main events to convey:

The first is when the lock first initiates: the segments fly in to form the reticle shape as shown here (showing just when a lock completes — using level 2 difficulty for demonstration):

You can see the reticle is sized to fit just within the 2D selection reticle. The exact nature of motion in the flying segments animation should appear as if each segment is being magnetically whipped into its final position. This may include some segments having a mix of rotation and spin as they fly toward the target. The locking reticle remains large at this point in order to better clarify the segmentation and the fidelity of the locking sequence. Also, in terms of the perspective of the reticle at this point, it should always face directly towards you, as shown above.

WORK IN PROGRESS

Once the scan completes and the segments have composed the shape, the second event would be to indicate that the target is then currently being tracked:

At this point, the reticle would simultaneously size down, recolor and rotate to become parallel with the longitudinal axis of the target ship. This is to indicate the direction the target is currently heading in. The Y depth of the reticle would help to illustrate the direction it's facing. If the target is selected (as in the above image), the selection reticle remains flat (since it is a 2D flash element), with the locking reticle rotating within it.

In the image at the top of the next column, the locking reticle follows parallel with respect to the target's longitudinal axis.
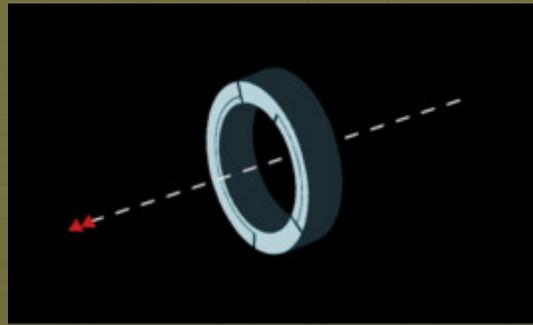
The next locking stage is when you initiate a missile lock on the target. The animation for the missile locking reticle behaves the same way:

The missile locking reticle also has various difficulty levels, but always prominently features arrows pointing in towards the center, and is always colored red. Once the missile locks on, it would snap to be in front of the scan lock reticle:

The missile locking reticle should be sized just ever so slightly smaller than the scan lock reticle as you see above, but be in front of it as if it's extending/building upon the depth of the reticle as a whole.

The concern here is where the missile locking reticle would lie should the target suddenly shift from heading toward you to away from you, or vice versa. I would say that you would always shift the missile reticle to be on the side facing you. So for example, if you've locked a missile onto a target that was originally heading toward you, and it suddenly started heading away, the missile lock reticle would shift from the front of the scan lock reticle to behind it (animation would be it shifting through the scan lock reticle – and would be very quick).

So that's it for design. If anything is not clear, let me know.

One question I'm not sure on is how we handle the segments flying in from different places (while retaining the spinning and everything else that makes the segment animation look cool). When Forrest and I mocked it up in Max, we made it fly in from the edges of the screen (as if you were doing look-targeting). But is that inherently baked into the animation? Or can we programmatically set the origin point of where each individual segment starts to animate in from?

Also, will the notion of various scan/lock difficulties exist in DFM V1, or will it always be a fixed time? Just wondering how many reticle levels we would need to prepare and animate since each has its own unique segmentation.

Erin Roberts: Bone got the model from Forest, thanks for that. With this feedback, he can get it knocked out of the park. Cheers!

AVENGER COCKPIT CONCEPT

Thinking forward for the longer-term, I believe this foundational concept could be reused across all of the other ships but displayed in drastically different ways. A lot of ships, such as the Avenger for example, would host much of the UI on physical displays and screens within the cockpit. Using Scaleform 3Di, it should be feasible to repurpose the way each piece of data is displayed and interacted with across all of the various ships without needing to change too much of the backend code. Behavior, who developed the backend UI framework for the HUD, designed this in such a way that pieces of data can be pushed out to any UI component regardless of where it's positioned in the world, or what it looks like.

Considering that, I've done some UI exploration for some of the other ships (Avenger, Freelancer) that has pretty much all of the same data as what we've designed for the HMD-based UI, except displayed and positioned in different ways.

FREELANCER COCKPIT CONCEPT

I'm all for having this kind of variation in the HUD and UI across all of the different ships. I think it's really going to give the whole player experience so much more depth than you would otherwise have with the same UI plastered to your screen like in most other games. And with as much fidelity as we're pushing in all of the ship's cockpits and interiors, having all of these physical displays being fully dynamic, animated, and driven off of real in-game data is just going to push things to an entirely new level and really go toward bringing all the ships to life. That is what is really exciting me the most at the moment!

Heads Up!
Chris Roberts' Immersive Interfaces

Few know the history of Chris Roberts' games better than Ben Lesnick. As the Star Citizen interface is developed, Ben takes a look back at how Chris and his games have influenced the development of interfaces throughout all types of games.

18

TIMES OF LORE

Quaffing the potion, you feel restored.

You collapse, dead.

BAD BLOOD

For many games, the promise of unparalleled immersion is the ultimate empty buzzword. In a Chris Roberts title, it's the underlying design philosophy. While the advanced technologies available to PC gamers in 2014 are letting the *Star Citizen* team do things that previously were only distant dreams, Chris and his teams have been striving to increase immersion since the start of his career; a key element for bringing players further into the game experience has been perfecting the player's interface.

Chris has been experimenting with heads-up displays since well before he made a name developing space combat simulators. In the 1980s, roleplaying games developed a standard text-based interface. Whether you were playing an entirely

text game like *Zork* or a graphic adventure like *Ultima IV* (1985), you were expected to interface with a parser: L-O-O-K at a knight, T-A-K-E a bejeweled egg and the like. With the game that started Chris' career at Origin Systems, *Times of Lore* (1988), he changed that by introducing an icon-driven interface. Instead of L-O-O-King at something, players instead clicked an eye on the object. Richard Garriott went on to adopt the system for future *Ultima* titles and it became an industry standard. *With Bad Blood* (1990), his second game for Origin, Chris looked for similar ways to bring the player into the game using the interface. Instead of a health percentage, for example, the game displayed a bottle of water next to the interface with a changing water level.

WING COMMANDER

SECRET MISSIONS 2

On *Wing Commander* (1990), Chris worked overtime to fig-
ure out how to make players feel the impact of the game as
though they were actually in a cockpit rather than sitting at
a keyboard monitoring statistics. The first decision, one that
leads directly to *Star Citizen*'s interface, was to put the player
in the seat of a fighter instead of looking at a tactical map
of battleships. Though first-person space shooters are famil-
iar today, the genre did not exist at the time, and the 'you
are there' looking forward experience was largely limited
to hardcore aircraft simulations. *Wing Commander* brought
arcade action to a then-reserved viewpoint and intrigued
audiences like never before. Chris charged his art team with
creating cockpit graphics that would make players believe
they were really behind the stick of an advanced space
fighter. More advanced ships were awarded as the game
went on, letting the player feel their rewards not just in how
the game played, but in how it looked.

Most important on *Wing Commander* were the little touches.
Instead of seeing that a ship was 25% damaged, players
would see sparking wires exploding around them and hear
the smash of mass drivers impacting on their hulls. And
most celebrated of all was the 'hand,' a graphic of your hand
on the fighter's flight stick that would move as you moved
your own hand on your mouse or joystick. This small touch,
seemingly insignificant today, was referenced in dozens of
reviews as an example of just how immersive *Wing Com-
mander* was. In *WC*'s second mission disk, *Secret Missions 2:
Crusade* (1991), cockpit graphics went even further in ad-
vancing the story. For the first time, you saw inside an alien
spacecraft, with radically different control surfaces. Players
were made to feel like they were doing something strange
and different as they traveled behind enemy lines in a stolen
fighter.

WORK IN PROGRESS

WING COMMANDER II

STRIKE COMMANDER

Technology quickly evolved the *Wing Commander* interface. One blocker to the original experience was the text-based communications: players needed to read their wingman's conversation and their enemy's taunts. That changed with *Wing Commander II* (1991), which introduced full speech into the experience. No longer would players need to glance down at text while hot on the tail of an enemy, and they could be snarled at by enemy pilots in real time!

On *Strike Commander* (1993), Chris Roberts premiered a 3D engine called RealSpace featuring textured polygons. A radical departure from the 2D bitmaps of the *WC* series so far, *Strike Commander* allowed a new innovation: the virtual cockpit. Instead of simply looking forward, or hitting an F-key to look sideways or behind you, you could now control the movement of your own head separately from the control

of your aircraft. Your eyes could now follow targets without having to point your fighter in their direction. The technology was the first nod to what would become *Star Citizen*'s Oculus Rift interface (*Wings of Glory* (1994), a World War I flying game from Origin, actually used *Strike Commander's* virtual cockpit with mid-1990s VR headsets!)

Wing Commanders Armada (1994), *III* and *IV* advanced cockpit interfaces in an unexpected fashion, by introducing the invisible cockpit. Players were given an option: those with high powered PCs who wanted to see more of the action at once could 'turn off' the cockpit graphics and see only a HUD. The option was popular for showing off the game's top-of-the-line 3D effects, though ships became more generic without their frames. "Cockpit versus no cockpit" became a hot debate among the game's fans!
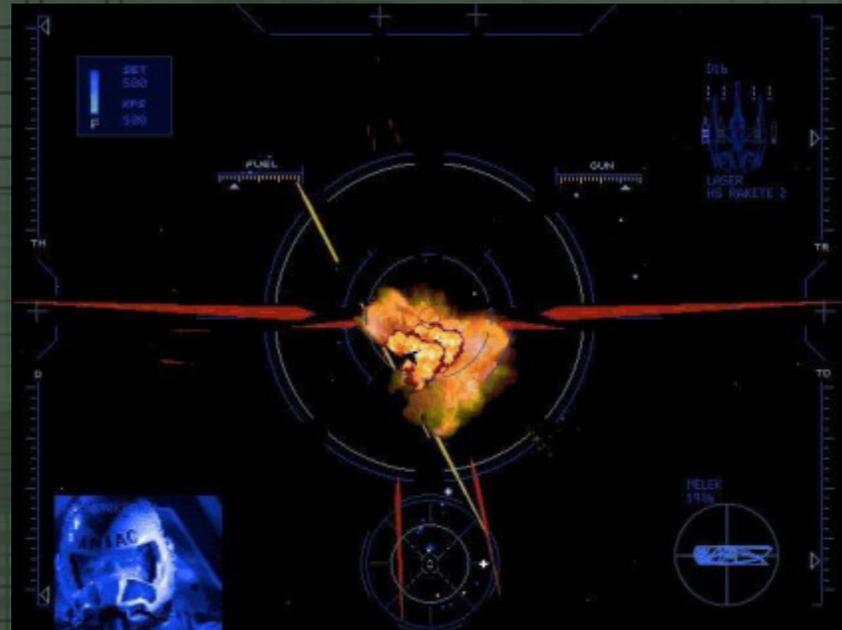
WING COMMANDER ARMADA

WINGS OF GLORY

WING COMMANDER III

WING COMMANDER IV

WORKINPROGRESS

DESCENT: FREESPACE

PRIVATEER 2

While *Wing Commander III* (1994) featured fully rendered spacecraft cockpits that could be kept on, *Wing Commander IV* (1996) did not. The demands of a nine-month development cycle dictated by Electronic Arts meant that the art simply couldn't be done in time. Origin's playtesters reported that most players turned off cockpits, and the team reluctantly chose to focus on making the virtual HUD unique with distinct colors and voices instead.

Chris' games were such the standard, though, that the rest of the industry took this time-saving change as an innovation and dropped cockpits from their own projects. Games like *Descent: Freespace* (1998), *Privateer 2: The Darkening* (1996) and *Tachyon: The Fringe* (2000) were also made without cockpits! Meanwhile, Chris developed the Wing Commander movie, which featured an actual aircraft cockpit with an elaborately devised holographic HUD. His first game for Digital Anvil, *Starlancer* (2000), styled after the movie, did the same.

TACHYON: THE FRINGE

STARLANCER

FREELANCER

Finally, there was *Freelancer* (2003). Designed as a radical departure from standard space games, the goal was to give players unlikely to purchase a joystick an interface they would care about. The solution here was a third-person 'behind the ship' look aimed at letting players feel more connected to their spacecraft. It was unlike anything else in PC gaming at the time, in both control mechanism and overall look. While *Star Citizen* will focus on first-person gameplay, the desire for players to "own" their ships has lead to much of the extreme detail put into the game's ships.

STOR-ALL

You would need to be living under a rock not to be familiar with Stor-All's famously garish commercial broadcasts, which feature a cartoon animal of indeterminate origin (popular theories range from Terran badger to deep asteroid fur crab) explaining to a hapless transport captain that Stor-All Big Box series cargo containers can meet his every need. The captain offers example after example of item that surely can't be transported in deep space, followed by the cartoon's grating refrain "No worries, it'll STORE ALL!"

And like their commercials, the products of the Stor-All corporation have become a seamless part of the background noise of everyday life in the modern Empire. Any individual UEE Citizen would be hard-pressed to go a day without somewhere coming into contact with its product, and the prospect of somehow going without goods that were at some point shipped inside a Stor-All container is unthinkable: nearly 50% of all items transported between two atmospheres will make their journey in a Store-All unit, a truly amazing market share given the simplicity of the product's design.

Stor-All was incorporated in 2745 on Lo as a Corel Limited Liability Corporation. The company was originally known as TransGo and underwent nearly a dozen marketing-oriented name changes (including both "STUFF-IT" and "Shiploads") before finally finding success when coupled with the utilitarian image that comes with the Stor-All brand. Investors settled on Lo as the headquarters in order to take advantage of the then-burgeoning trade between the UEE and the Banu Protectorate.

The company has been notoriously litigious, both on the offense and the defense. Stor-All has filed hundreds and hundreds of patents with the UEE government, running the gamut from deserved ("nano-molecular impact pad weaving mechanism") to wholly unreasonable ("cube-shaped cargo area for spaceflight purposes") and is quick to defend them from any potential competitor. One look-and-feel lawsuit against Alliance-Conway Shipping Goods has dragged through the courts at a glacial pace: after eight years, it shows no sign of pending resolution.

Another ongoing legal issue is the company's enthusiastic protection of its name. Fearing that the term will become commonly applied to any space transport unit, Stor-All puts hundreds of thousands of credits each year into a parallel advertising campaign aimed at reminding consumers that what they sell are Stor-All® brand containers and not "Stor-Alls." (This has the added benefit of enforcing the idea that a Stor-All unit is of superior make to anything else on the market.)

More often than not, however, Stor-All's legal department makes the news for their tendency to target unrelated businesses with similar names. In recent years, they have shuttered everything from Sammy's Sure Haul Diner on MacArthur to Terra's fashionable ALL STORE clothing importer. (As unsurprised onlookers are quick to point out, ALL STORE just happened to ship goods using exclusively branded Conway containers.)

Mini-Container

Production & Business Model

One of the most common questions asked by those not involved in the intricacies of interstellar trading is: where do Stor-All containers come from? Stor-All containers are the odd product that can appear throughout every hangar, dockyard and factory floor in known space without actually having a clear owner. The perhaps surprising answer is that every Stor-All container is actually a rental unit. Containers are rented for a small fee when goods are approved for off-world shipping; this fee is nearly always taken into account as part of the price of the goods themselves. The economics of this process are practically invisible to the naked eye: the trading system has evolved to the point where container rental is fully institutionalized.

The standard Stor-All container is rated for 500 jumps and

the company takes quality control extremely serious in this regard. Vast quantities of expired containers are sold at low prices to less reputable shippers for permanent use. Sometimes called "ghosts," these can typically be identified by blotches of newer paint covering the Stor-All logo. Stor-All has no liability for containers shipped in a "ghost," and most insurance companies refuse to compensate users who suffer a loss while making use of the retired containers.

Product Line

While Stor-All's corporate presence (and associated advertising) thrives on a sense of the ridiculous, their product does not. The standard Stor-All Big Box cargo container is more than an empty crate for transporting goods: it's a high-tech container solution with thousands of man-years of engineering behind it, a rock-solid piece of equipment that genuinely is built with the goal of storing everything possible.

Stor-All produces thousands of different container SKUs, everything from half-meter rad-shielded valuables containers to twelve-meter climate-controlled shipping crates used on larger MISC Hull ships. While there is a unit for every possible shipping need, the containers most commonly used by private enterprise spacers today are Stor-All Mini Cargo Pods and Stor-All Big Box Cargo models.

Big Box (called Tough-Guy before 2935) is the standard expandable cargo series from Stor-All. Big Box units are tough, with a Titan-grade metal exterior, a ribbed body skeleton and a cushioned super-reinforced ablative rubber interior. The original Big Box Model A is perhaps the most familiar 'cargo container' within Human space, used for everything from the standard attach point on the Aurora CL to makeshift enclosures on hostile planets (upon retirement).

Variant Big Box units have been designed for individual spacecraft; for example, with the rise in popularity of civilian Hornet models, Stor-All has designed the Big Box Model H using the same protective technology but with a form factor that allows it to slot into a Hornet's turret system.

One step down from the Big

Box, the Mini Cargo Pod is a five-rating shipping container useable by small craft, including and most notably by the standard model Roberts Aurora. Capable of shipping a modest quantity of bulk goods on long distance runs, MCPs are extremely common. As they are frequently mounted externally, MCPs have a layer of radioactive shielding not present on internal models and can be equipped with additional hardware such as scan dampeners. MCPs are frequently transferred in flight, and they can safely be left in orbital pickup yards for long durations.

BIG BOX MODEL H, FOR HORNET TURRET

Making Cargo Fit

We're going to take a different approach this month. Our Behind the Scenes article is a design doc by Calix Reneau, Technical Designer in our Los Angeles studio. Also working on the cargo team are David Hobbins and Dan Tracy, on art and design, respectively. Here's what Calix had to say, along with a few comments from other designers at the end.

Cargo moves physically through the world, disappearing only when inside closed containers or upon entering a warehouse. The cargo can be moved by NPCs or by the player character, carried in hand, on levitating pallets, or in self-propelling containers. Once inside ships, cargo exists freely and is subject to G-forces until locked down using hooks in the cargo bay. Cargo can be placed inside any larger container.

A good cargo system should:

- be interruptible

- be opt-in (only as much contact with the cargo system as desired by the player)

- facilitate cooperative play

- be real / physical (have presence)

- take time / be an investment

- allow players to excel or struggle; allow them to demonstrate mastery

Allowed Sizes

Cargo is measured in meters, with warehouses, hangars, and cargo bays measured in cubic meter capacity. This is where the measurements are most standardized. Cargo containers can be as large or small as needed, allowing the player character to stack and arrange cargo to better fit the space available. As such, combinations of containers stacked can always add up to a whole number: for example, four 0.75m tall containers stacked in 3m of space. The actual dimensions of cargo containers can vary between manufacturers, but they all fit a step variation. (This means that every container will be xx.00, xx.20, xx.25, xx.40, xx.50, xx.60, xx.75, or xx.80 meters in all three dimensions. For example, a container can be 1.25m x 3.6m x 2.5m, but it can't be 1.7m in any direction.) As a consequence, containers will naturally group into 2s, 4s, and 5s, prompting players to consider the shape and volume of their cargo space and pack for efficiency.

Item

Container

Tank

Types of Cargo

There are three kinds of cargo — items, containers and tanks.

Items are all the individual physical items of the game. **Containers** hold other items. **Tanks** hold loose materials, particularly fluids and gasses, that are the product of mining, refining, salvaging, or whatever other sci-fi alchemy exists in the game.

When trading, or during salvage missions, cargo must be physically maneuvered into the cargo bay. Self-propelled cargo will fail to navigate beyond the cargo hold, and will naturally come to a rest along the internal cargo grid. Handheld cargo can be placed anywhere, but can only be locked into place in the designated cargo zones (and with-out locking, they can bounce around, subject to G-forces). Unlocked cargo can add a bit more cargo capacity, but at a risk of damage to the item, ship or passengers.

Cargo Capacity

A ship's cargo capacity is defined by the maximum volume of cargo that can fit into the designated cargo zones (the area that can be locked down).

As an example, the Freelancer main cargo bay capacity is: 2m x 3m x 7m = 42 cubic meters.

A few examples of possible container sizes include:

- 0.8m x 0.5m x 0.5m
- standard container (1.8m x 0.8m x 1m)
- largest carry-able container (2m x 1.2m x 1.2m)
- pallet crate (smallest self-propelled cargo; 0.5h x 0.2)
- smallest tank (1h x 0.5)
- largest carry-able tank

Inside containers, items are held in a rigid grid by a stasis field, visible from certain angles. This allows items of any shape to stack on items of any shape without conflict. Containers have a standard thickness of 0.125m to accom-

modate geo variation and internal systems, with 0.25m for reinforced cargo containers. When a container closes, it fills with a packing foam to provide added protection, and also to prevent other items from accidentally dropping into the container when it's opened. Upon exposure, the foam begins to decay, turning into particles as the player removes items.

Damage

When containers take damage, they absorb it all until they become destroyed and the container enters a fractured state, in which further impact will split off pieces of the cargo box, revealing the items inside (covered in foam). As items get revealed, they can start taking damage.

Other Considerations

Premium Features. Premium cargo containers can come with added features, including:

- internal shielding (protects against scanning)
- encrypted code lock (a PIN that can be set by the player)
- anti-theft beacon (lowjack in space)
- radiation shielding (allows you to transport dangerous substances with reduced risk)

- impact dampening (reduces the chance of explosion from volatile contents)
- etc.

Propulsion. Self-propelled cargo uses an array of anti-gravity pulsers to navigate safely through any environment.

Manifest. The manifest allows you to check cargo contents without opening the container, and self-reports to the ship's cargo manifest.

Pallets. Pallets allow for groups of items, tanks and containers to be transported together. Pallets can be locked in place, the same as cargo. They are pulled along by hand, floating at waist level. They work in space.

Jacks. Jacks provide power and flight computation to self-propelled cargo containers, allowing them to be moved around with ease. Smart Jacks are upgraded to allow the container to navigate towards any beacon — usually held by you.
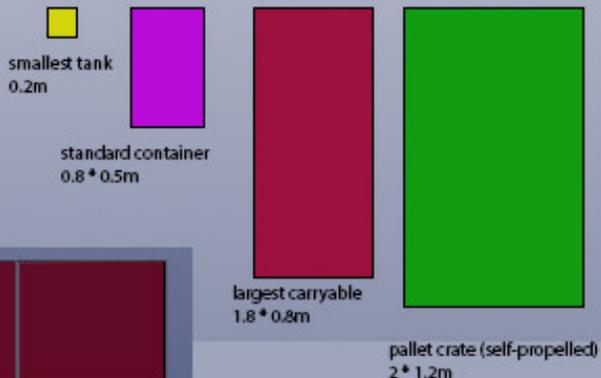
Ship Containers. Ships can have containers built into them. These containers cannot be removed, but otherwise function exactly like any other container.

Loading / Unloading. Cargo is manually moved into and out of the ship, either by PCs or NPCs. If it's small enough, the cargo can be carried by hand or atop a pallet. If not, the cargo is carried by a jack and its own propulsion system. The size and shape of the cargo door will restrict what can and cannot be loaded or unloaded. This process can be done in space or on the ground.

Pallet Crate — 1.2m / 1.2m / 2m
0.8m / 1m / 1.75m — Largest Carryable
0.5m / 0.5m / 0.8m — Footlocker

Sample container footprints (right)

A possible "floorplan" for a fully loaded Freelancer cargo hold, given its current specs (below)

smallest tank
0.2m

standard container
0.8 * 0.5m

largest carryable
1.8 * 0.8m

pallet crate (self-propelled)
2 * 1.2m
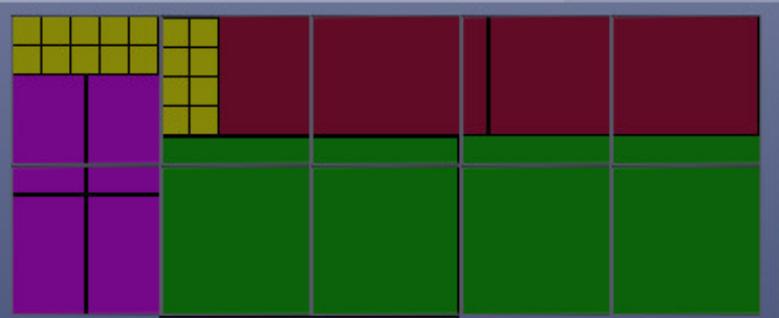
interaction, it locks again. (Moving items around in your cargo hold doesn't require turning the lock off and on every time.)

Still to be Determined

- NPC direction (giving NPCs instructions for moving or handling cargo)

- Possession (transfer of ownership and permissions for handling cargo without it being considered theft — and how to detect when it should be considered theft)

- Opening from the inside (putting PCs in cargo containers)

Locking. Items are locked when placed on the designated cargo surface, or on cargo containers that are locked on the designated cargo surface. Nothing can stack atop items or tanks. Containers give visual feedback to let the player know they are locked — a light or texture on a screen, depending on the design of the container. The locking mechanism is attached to the cargo bay manifest, and can be shut off there or under full power loss. Interacting with a locked object unlocks it; if it is still in position to lock after the

A loaded Freelancer (again, based on current, changeable stats)
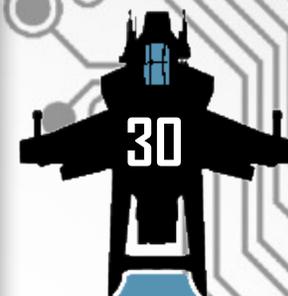
Example Scenarios

The following scenarios describe a few different player experiences with the cargo system, and is intended to illustrate the general use of the system as well as the variety of experience that can come from it.

Scenario 1: Simple Trader

You land on a planet, walk into a store, and turn to your trusty MobiGlas to sell 2 cubic meters of spacemilk and purchase 8 cubic meters of spacepants (what a steal!) and also a Mk VI Behring Badass, which is just the Mk VI with a

WHAT IS YOUR NAME?
Calix Reneau

WHAT IS YOUR QUEST?
My quest is to make games that tell stories through their systems — so I've taken on cargo, repair, salvage and so forth, to make these systems that could have just been fluff and filler into meaningful experiences, no matter which play path you choose.

WHAT IS YOUR FAVOURITE COLOUR?
My favorite color is the number 9, followed closely by Drive-By City Rollers colors, black and gold. Purple is pretty ok, too.

coat of paint and some disco lights if we're honest. Upon e-signature of the contract, a door opens at a warehouse and a pallet of spacepants and one totally nondescript box truck out, driven by NPC Bob, who might be a robot, you don't know. You having not elected to Make It Snappy(™), Bob is in no hurry, and will arrive at the ship in 3 minutes. You wander around to do some more shopping, but nothing really catches your eye.

Making your way back to the landing pad, you see Bob playing Aurora Crash on his MobiGlas, having unloaded the spacemilk from your ship. You sign off on it, and the credits transfer instantly. Bob smiles weakly, wondering what the hell it is he's doing with his life, where did it all go wrong, and you get in your Freelancer and kiss this two-bit planet goodbye.

Lessons Learned

- The AI can handle loading and unloading for you.

- You can grant access to your cargo hold if you're the trusting sort.

Scenario 2: Skeevy Smuggler

You land on a spaceport, walk to a shady common area, flip on your MobiGlas, check the local Craigslist (which is just as sketchy as ever), and see that someone is in the market for SmokeEm's brand sugar sticks ("SmokeEms: If you got 'em!"), and they might have some MysteryMeat brand jerky sticks to trade ("MysteryMeat: Stop guessing!"). You set up a contract, which prompts a hooded figure to shamble slowly towards the ship bay. Having smartly selected Same Time Homie, I Don't Know You, you find him uncomfortably shuffling near a crate that looks Totally Legit You Guys.

You open the cargo bay doors to go get the SmokeEms for the man, when suddenly he pulls out his oversized handgun and demands you just unload everything, actually. You dive quickly behind your Crate O'Crates, 3 meters of reinforced fulmetal(™) jacket that can take anything the

Dan Tracy,
Lead Technical Designer

CRYENGINE 3

David Hobbins,
Concept Artist

'verse has to dish out, and you blind fire your disapproval at the would-be mugger. You make a break for the cockpit before he can gather himself for a second attack, and in moments you've got the burners on full to ditch this backwater spaceport.

Good thing you keep your cargo locked down, or you might have found yourself a bit lighter in the hold after a take-off like that …

Lessons Learned

- You can abandon contracts and change play at any point during the cargo management process.

- How you arrange your cargo will affect your movement, which could affect combat during boarding situations.

- Locked cargo won't fly out of the ship when you take off with the door open.

Scenario 3: Turbo-Merchant

You land on a planet, and you and your small crew of 2 lackeys ("friends") split to hit all the local stores simultaneously. You find a good deal on miniature giant space hamsters, and a buyer for all those cakes you have. It's only a few minutes before you're all back at the ship waiting

for your junk to come. This not being your first rodeo, you know that it'll be a few minutes more before the NPCs can unload your cargo for sale, so you go ahead and pull that out yourself. When Bob arrives, dopey as ever, you and your crew each just pick up a CakeTank and drop it on the pallet, and you can sign off and get your credits. Bob offers to help load your cargo for you, but no offence, Bob, you'll take care of this yourself.

You truck out your PalletPal cargo pallet, only half full from your last shopping spree, and your crew neatly packs your hamsters and a barrel of space sea monkeys (sea space monkeys?) upon it. They truck it back into the hold — it's faster this way — and you set the cargo bay into lockdown.

Lessons Learned

- You can work together to speed up the process.

- You can take over for the AI at any step.

- Manually loaded cargo can be stacked more efficiently than letting the AI handle it.

Ship Cargo Hold Sizes

(none of this is final)

Some examples of some of our smallest cargo holds. The dimensions below represent the current volume of available, usable space for cargo containers (W x L x H).

Aurora Series: 4 to 18 cubic meters
- 1m x 4m x 1m
- 1m x 6m x 1m
- 2m x 2m x 1m
- 2m x 4m x 1m
- 2m x 9m x 1m

Hornet F7C: 4 cubic meters
- 2m x 2m x 1m (lower cargo hold)
- Smuggled goods only (upper cargo hold; not big enough to hold a 1m x 1m x 1m cargo box)

Avenger Series: 8 cubic meters
- 2m x 4m x 1m
- 1m x 4m x 2m

300i Series: 4-6 cubic meters
- 1m x 4m x 1m (attached to underbelly; same container that Aurora uses)
- 1m x 6m x 1m (attached to underbelly; same container that Aurora uses)

Comments

Rob Irving. I think that Chris R. mentioned during our discussion here that he'd prefer something that moves the crates, rather than the crates moving themselves. While that does make the system more complex, we might want to modify this to include that.

Nathan Blaisdell. But he also said that instant transfer of cargo was his initial expectation, so should we deprioritize this for the time being?

Rob Irving. One other note from yesterday's discussions: Chris was thinking that 1m x 4m x 1m would be our smallest discrete cargo size, but looking at this list, that wouldn't work for the Hornet. So maybe 1m x 2m x 1m is the smallest? (Never moved in 1m x 1m x 1m cubes ...)

Evan Manning. From this it seems like it would make sense to state the dimensions of the cargo area in the ship stats and let players figure out how many canisters/crates/etc. they can cram in.

Chris Roberts. This works for me. We still need to work on the in-space loading /unloading (dumping?) and salvage scenarios. If I'm a pirate, how does my prey dump his cargo (or get blasted)? How do I recover it (we considered EVA and having remote drones. Issues are:

- loading things into a hull
- getting cargo in
- door size
- airlock or any other way of handling a vacuum in space while retaining air inside (bigger ships / stations probably have a force field to hold in the local atmo; do smaller ships have the same, or do they need a bulkhead between the hold and crew area?)

I had a good chuckle at the stories. They were fun and it makes me think about how we can add elements of FPS gameplay to the planetside experience (note for Dave R and BHVR). Also I like the idea of limited combat in places (which we've already promised). Maybe this is limited to PvE NPC style combat (mugger out to jack your cargo) and we don't allow you to pack heat in a player area, but we'll have everything in place for some combat (firefight, even fisticuffs) so we could think about ways to throw it in occasionally to add more color.

On a semi-related note, I think we can do this on other cases: exploring a space hulk you could get attacked by a creature(s), or exploring a space ruin on a planet (an explorer / Tonya Oriel kind of set-up). Key would be how to template this kind of stuff so they aren't always specific scripted encounters (of course we'll do that too) but can be a random-style encounter based on crime level, planet danger, etc.

COREL SYSTEM

LO

Gateway to the Banu Protectorate! Corel is a standard type G main sequence star with six largely unremarkable planets located on the border between the United Empire of Earth and the Banu Protectorate, with a key jump line connecting the two. First discovered in 2449 and initially settled shortly thereafter, Corel has become the de facto customs checkpoint between the two states.

The system itself was discovered in the decade following mankind's first treaties with the Banu, as part of a concentrated effort to map this inhabited region of space. The inhabitable third planet, Lo, was developed first as a casual trading post between Humans and Banu and then ultimately developed into the port of call for all interspecies shipping traffic. The culture of the Corel system is an interesting mix of Human frontier and Banu bureaucracy, something that has not evolved elsewhere in the galaxy. Corelians today are an unexpected combination of efficient and laid back. Beyond that, in nearly five centuries since the system's settlement, little has changed save the scale of what passes through the jump point.

TRAVEL WARNING While Corel is the most direct route to the Banu Protectorate, it is also the most well-inspected. Merchants seeking to make their living outside the law are advised to make transit at another point on the border.

Inner Planets (I & II)

The first planet of the Corel system is little more than a flare-lashed iron core. Originally a rocky worldlet close to the system's sun, Corel I's crust and mantle were blasted away through a series of unknown impacts. The result was the exposure of the planet's iron core, which has since cooled to a solid state. No development has taken place on Corel I, as there are far easier to reach sources of simple iron in the known galaxy. The planet does make for an attractive picture, though, with a bizarre smooth landscape resulting from the metal having rapidly cooled into its current form when exposed to space.

Where Corel I is now entirely a planetary core, **Corel II** lacks one entirely. A dead planet with no magnetic field, Corel II's atmosphere has been blasted away by solar winds. The surface of the planet is, however, extremely rich in minerals, and the planet is a likely candidate for future mining expansion. It is officially UEE government territory today, although a mineral rights auction is anticipated in the near future. Corel II, on the inner edge of the system's green band, is also technically a terraforming candidate, although not a good one.

Corel III – Lo

Behold, the pulsing heartbeat of interspecies commerce! Corel III, known only as "**Lo**" around the galaxy, is the system's inhabited world and serves as the physical handshake between the Human and Banu governments. The planet itself is an interesting mix: sparsely populated plains, lazy border towns and massive shipping/customs complexes through which pass everyone from freelance traders to corporate cargo crews.

Lo is, essentially, the last exit before the Banu protectorate, and it has all the qualities of both a massive transport hub and a distant frontier trucking station. The usual entertainments for long-haul transport crews are in good supply, although the sheer number of customs officials stationed here (as well as guard patrol crews) serves to mediate the more unsavory of these developments.

The center of the station is New Junction, a town built up around the largest customs house on-world. Lines of ships can wait for up to twelve hours on a bad day to pass through the detailed inspection screening required by both the UEE and Banu governments. Roughly one in ten cargoes is given a full visual inspection, and all others are subject to an array of scans and a mountain of paperwork.

New Junction is located on a natural landing area: the sprawling plains of the equatorial Qoph (pronounced "koff") region. While Lo is a generally temperate world, New Junction is in one of the hotter regions year round, something which many traders dread experiencing during their layovers. Cool drinks and air conditioned habicube rentals sell for a premium in the area surrounding New Junction! Regular dust storms combined with the city's base of prefab buildings plus the vast quantity of shipping containers passing through make for something of an almost prehistoric 'wild west' vibe. But make no mistake, this is not the lawless frontier: a fortune in legitimate shipping passes through Lo every day, overseen by meticulous customs agents.

Market Deals — Lo

BUY:	BANU ELECTRONICS	+2
BUY:	BANU FOODSTUFFS	+1
SELL:	SCANNERS	+2
SELL:	SHIELD TECH	+1

Corel IV — Castor

While Lo is a prime example of man's efficient industry, Corel IV (called **Castor** by the natives) is an embarrassing example of his hubris. Castor orbits Corel with a 786 SED rotation, placing it just outside the star's green-band habitable zone. Made up of vast tracts of frozen desert, Castor is a foreboding world with no immediately apparent reason for Human development. Nevertheless, the world became a symbol of intended progress during the Messer Era, another target in a dictatorial march towards new levels of science and industry. Billions of credits in terraforming technology later, the once-frozen desert planet had become a frozen desert planet with a barely breathable atmosphere.

Today, almost no one lives on Castor and few of those could tell you why. A handful of settlements dot the globe, primarily centered around deep ice-mining operations.

Market Deals — Castor

BUY:	SILICA	+2
SELL:	LUXURY GOODS	+3
SELL:	BASIC FOOD	+1

Quantities of bad-ice have been discovered far beneath the surface and it is sometimes collected for scientific purposes. Beyond that, miners subside on occasional caches of desert-bound silica. Though rare, the discovery of a single cache is enough to make a mining operation profitable for several years. Mining contracts are the reason why the bulk of its inhabitants have come to the planet, and very few of them choose to renew for a second year. Traders looking to make a quick credit, though, could not find a more captive audience for luxury goods!

Outer Planets (V & VI)

Corel V is a standard gas giant. A massive red and brown planet frequently used as a fuel stopover by merchants heading to and from the Banu Protectorate, it is otherwise unremarkable. **Corel VI** is an uninhabitable ball of rock rarely encountered by anyone passing through the system. It features an odd orbit that is well off the system's elliptical plane. With a slightly less important transit point, Corel VI might have become a reasonable outpost for smugglers, but the quality and concentration of local patrol forces in the system have all but eliminated it as a venue for cross-border black market shipping.

Hunter & Swan

by Robert E Waters

Part 4

Bounty hunter Benito Redmoon is determined to deliver pop star Swan to Angus Barone, to be put on trial for the murder of his son. It is unclear what he will do once the delivery is complete . . .

"This is as far as we go, Benito," O'Van said over the comm. *"Good luck."*

The pirates had escorted them through Cathcart and Taranis, all the way to the Nemo jump point. "Thank you, Beddick," Redmoon replied, keying the comm and transferring a little financial support to the pirate king's account for his troubles. "I owe you one."

The trip had been uneventful, much to the satisfaction of them both. Swan had been able to get some much needed sleep, and even he had been able to find a few moments of peace and self-reflection. Redmoon rarely slept in the traditional sense while on the job; his lifestyle offered little in the way of a long-term, multi-hour rest. But Mirage had taught him how to find sleep throughout the day, fifteen minutes here, an hour there, just enough to keep the body and mind clean and healthy. Perhaps after all this was over, he'd find time for real sleep. Perhaps.

She was back in her cell now, strapped into the jump seat, quiet, calm. Redmoon was surprised and impressed with that. She had been through a lot, and it wasn't over yet. She seemed to accept her fate like a professional. She was a professional, at least in her own life. The job of entertainment was a tough one, just as rigorous as any other job; more so even. An entertainer's "office" was a stage for thousands of watchers, each with his or her own agenda, likes, dislikes, moods and attitudes. A good entertainer had to play to them all. A good entertainer had to be a good actor. Swan was a great actor.

Redmoon made the jump from Taranis to Nemo. It too was uneventful and relatively smooth. They came out of it in one piece. Swan didn't get sick and neither did he, despite the fact that his wounds from previous engagements were still healing and giving him pain. As O'Van had promised, his new jump drive had gotten him from Cathcart to Nemo in one piece. That alone was worth a small celebration. The question, though, was whether it would get him out of Nemo.

As soon as they emerged from the jump point, the *Ahagahe*'s sensors glared red. Redmoon had placed them on long range, and they spotted something immediately. An M50, probably one from his engagement at Nexus, picketed the point — typical for the UEE, especially while engaged in a heated manhunt. He wondered if Angus knew of this.

"Trouble?" Swan asked through her comm in her cell.

Redmoon watched as the M50 "quietly" scanned his ship, picking up his registration code. "Not yet. Just got scanned by an imperial picket. It won't move against us. It'll call in reinforcements first. But we don't have much time."

"Then let's get this damn thing over with," she replied, and slapped off her comm.

Redmoon continued inbound and began sending an arrival signal, per his agreement with Barone. An hour later, the signal was acknowledged.

"Benito Redmoon," said a nameless voice, *"you are to maintain this course until you reach Nemo II, at which point you are to dock with the* Maximus *in primary orbit, docking bay one."*

"That was not my agreement with Angus Barone," Redmoon replied, his voice teeming with controlled anger. "My agreement was to deliver the cargo to Nemo authorities planet-side."

"Mr. Redmoon," the voice said again with more authority, *"maintain this course to the* Maximus *and dock as specified. The cargo will be handed over to the proper authorities at that time."*

Sure she will, Redmoon thought, but sent the acknowledgement signal and set course as directed.

Redmoon dimmed the lights in the cockpit, then laid back in his seat. He took deep breaths and closed his eyes. He hummed one of Swan's songs to himself.

Showtime . . .

*   *   *

The *Maximus* had originally been the Barone family yacht, but even at its creation was more of an orbital platform than anything else. Nowadays, like Spider, it was a composite of ships, but only three, cobbled together over the years. Its design, of course, was far more elegant than a pirate's hangout, fully capable of supporting a corporate lifestyle, with impressive viewports and swimming pools, a fully stocked bar, a ballroom for parties, and six plush guest quarters for multi-day stays. It had two docking bays, the main for Important People, and a secondary bay for the help. At least Barone had considered Redmoon's service worthy enough to have them enter the main bay.

"Don't touch her," he said, pushing away the hand of a guard who tried grabbing Swan's shoulder. "She's my charge. I will deliver her personally."

Redmoon easily stared the guard down; he didn't seem willing or able to put up much of a fight. He asked only, "May I have your sidearm, sir?" holding out his gloved hand.

Redmoon had expected this. He handed it over, and they were escorted from the bay towards Barone's receiving room.

Swan walked in front of him, head down, her hands handcuffed in front of her. She shuffled along as if her leg hurt, limping every few steps. Her hair was messy, her forehead still cut and bruised from the pirate assault. Her shirt was wrinkled, and torn in several places. She even smelled of stale sweat. She looked weary, beaten, a prisoner who had given up. Redmoon maintained a dominant position behind her, making sure the guards acknowledged his authority.

They turned a corner and moved into what Redmoon called the 'gaudy hall.' Barone used it to display his abstract art collection and precious souvenirs bought (or stolen) from around the UEE. Every few feet, a multi-colored painting hung from the wall, or a precious gem or locket, an ancient firearm, or some piece of antique technology in a glass display inset into the wall. Each artifact was properly lit for effect, each piece displayed with a metal nameplate showing "legal" provenance. The most impressive, or some might say garish, aspect was the ballast lights in the ceiling. Between the fixtures of soft white light that cascaded down to the plush carpet lay stained-glass ballast domes, which Barone lit up when entertaining important guests. Green or blue or red rays, whatever fit the theme or mood of the moment, could cascade out of those domes and colorize the entire hallway. And they were glass, exquisitely thin antique glass, imported from Sol.

Finally, they reached the end of the hallway. A door slid open. Angus Barone was waiting for them inside.

They walked into the fully-lit receiving room, the guards moving aside to allow Redmoon and Swan forward. Barone stood looking out the floor-to-ceiling Plexi, his back to the door. Nemo II shone in widescreen below, a bright perfect marble to accentuate an even more garish room. Additional art pieces adorned the red, orange and yellow painted walls. There was a bar, of course, and plush throw pillows and couches randomly spread around the floor. In the center lay a glass table. On the table sat an open briefcase. Nested inside the briefcase lay a mound of brightly glittering diamonds, representing more credits than Redmoon had even seen. It was rare for anyone to deal in raw goods these days, but it was clear that Barone wanted Redmoon to see it, to know what it meant to walk away with two point five million. Redmoon's heart raced, his mind overcome with all the possibilities that such wealth could afford him.

"Leave us," Barone said, briefly turning to face his guards. They bowed and left. Redmoon and Swan stood in front of the table. Barone smiled and walked over to them. He eyed Swan with barely contained hatred, his face swelling with blood, his upper lip wet with nervous sweat. Redmoon could hear the old man breathe, could smell his excessive cologne. "Kimmy Swanson," he said, coming to stand right beside her. Swan didn't move a muscle; she kept her head down. "I'm glad to see that the murderer of my son has finally come home to face justice."

"This wasn't the deal, Angus," Redmoon said. "I was supposed to deliver her to Nemo authorities, not to your yacht."

"And they will be here soon enough," Barone said, "but first, I needed to look into the eyes of my son's killer."

Barone grabbed her head with both hands and forced it up. "One last time before they close forever."

He held her there for a few deadly seconds, looking straight into her face. Then he let her go. Swan fell back with a whimper, and a tear fell from her eye. She sobbed.

Barone laughed. "Thank you, Redmoon. I think our contract can come to a close now. You have fulfilled your duties well, and the Barone family thanks you." He motioned to the open briefcase. "You may take your reward and leave."

Redmoon shook his head. "No. Not until the authorities arrive. My duties are not fulfilled until they do."

Barone's expression turned serious. "It's over, Benito. You've delivered your charge to me. There is no need to linger."

"If you wanted someone with less concern for procedure, Angus," Redmoon said, "then you should have picked an assassin. I stay until they arrive."

"I picked you because of your hunger for fame and success," Barone said, "especially now that Mirage is dead. Regardless of what you may think of the situation, regardless of any concerns that you may have had with delivering her to me, I knew you would finish the job, because that's what Mirage would have done, and you are, to my benefit, a slave to his principles. Now don't suddenly turn foolish, Benito. Take your money and go. The Swan . . . *Kimmy Swanson*, is no longer your concern. Take the money, and go live the life you've always wanted to. The life Mirage would have wanted you to live."

Redmoon stared at the briefcase and briefly considered that alternative. *God, so much!* Two point five million could make a big, big difference in his life, and potentially in the lives of others if he used it in the manner that Mirage would have wanted him to. *The way Mirage would have wanted him to . . .*

Redmoon nodded. "You're right," he said, kneeling down to close the briefcase. He ran his fingers across the front of its display panel and sealed it with a private code. "I've done my job, and it's time for me to leave." He stood up, holding the case in front of him like a dinner tray. "Mirage would have wanted me to do this. But you know what, Angus? It's taken me a long time to realize that I'm no Mirage."

He tossed the briefcase hard into Barone's chest. The old man fell back at the suddenness of the attack, and Swan pounced, holding her handcuffs forward and wrapping their chain around his neck. Her weight brought him down onto a couch. Redmoon followed, pulling a small metal blade which he had taped down along the back of his waist. An old pirate's trick, and one deadly for the wielder if things didn't go as planned. But this did, and Redmoon drove his knee onto Baron's right arm to hold him down, while Swan pulled her chain deep through his fat neck and into his windpipe.

"You knew all along, didn't you?" Swan shouted the words into Barone's face. Her tears were real this time. "You let Garryn brutalize us, and you did nothing to stop him!"

Barone nodded through gasping air. "Yes, I knew. What was I supposed to do? He was my — my son."

"You should have stopped him! You should have protected us, taken us away!"

"He was my heir, my son." He coughed and sputtered spit down his face. "And regardless of what he was, you killed him."

"As an old friend recently reminded me, Angus," Redmoon said, holding the blade a centimeter from Barone's face, "there are murderers, and then there are murderers. Your *son* is the one who deserved to die, and as the son goes, so shall the father." He removed the blade from the eye, but kept his knee on Barone's arm. He looked straight at Swan and gave a nod. "Finish the job."

But as Swan dug the chain deeper into Barone's throat, the door slid open again. Three armed guards stepped in, drawn by the screams, rifles quickly leveled at Redmoon. Slowly, Swan released her stranglehold on Barone's throat. Redmoon released his arm, and the man crawled away, coughing and gasping for air.

"I didn't become a powerful man without having a plan B," Barone said, rubbing his throat. "And you've given me far more than I could have hoped for, Benito. This was the best return on an investment I've ever made. You've brought me my son's killer free of charge, and I have witnesses to an attempted murder. You're going away for a long, long time, *old* friend, and you, young lady, will suffer . . . suffer like you never have before. I have that on very good authority from my friends in Nemo's judiciary. Take them, and get them ready for transport to the surface. And search the bounty hunter more carefully. He had a shiv."

They checked Redmoon thoroughly this time, but found nothing more. The guards escorted Redmoon and Swan out, back toward the main bay.

Once again, Redmoon took note of the extravagant ballast lighting. "Such a pretty hall deserves pretty music, wouldn't you say, Swan?"

Swan, at the head of the procession, snapped her head toward him, and then slowly nodded in understanding. She began to sing in response, the same song she had sung at the end of the concert. Slow and quiet at first, then quickly building, building, until the guard behind her told her to stop. She didn't, even when he shoved her in the back with the butt of his rifle. She kept singing, her voice steadily rising in volume and pitch. Then, as she reached the far vestibule, her voice took one final leap into a scream, a long piercing note while Redmoon pulled his trenchcoat over his head. The fine ballast fixtures began to break, shatter, first the one closest to her, then the next and the next until a shower of multi-colored glass cascaded down like rain, eerily reminiscent of the concert's final staged effects. But this shower was much deadlier. The guards tried to protect their faces from the unexpected shards. Redmoon swung back and struck the rearmost in the face with his elbow, breaking his nose and taking him to the floor. He grabbed the man's rifle and yanked it away, turned the barrel around and fired two shots into the man's stomach. He died instantly.

In panic, a second guard tried to reorient his rifle on Redmoon. The bounty hunter ducked and sent a laser round into the man's neck, taking him down with one shot. Redmoon then turned his attention to the guard attacking Swan. She was still in her handcuffs, so it was difficult for her to fight. But she ducked and twisted and rolled away from every blow the guard delivered. He obviously refused to shoot at her, not wanting to cause her serious harm, for his orders were clear: take them to the surface. And no one disobeyed Angus Barone. Redmoon put two shots through the man's back. He was dead before he hit the floor.

Redmoon stepped over the dead bodies and helped Swan to her feet, and she quickly keyed in the handcuffs' release code. He picked up another rifle and handed it to her. "You know how to use one of these?"

She gave a quick nod as she inspected it.

"Then let's go."

They ran towards the bay where the *Ahagahe* was docked. "We're going to have to shoot our way through."

"I'm ready."

"And you're going to have to man the turret when we get on board," he said, stopping and peeking around a corner.

"I'll try . . . but don't blame me if I take out the cockpit with you in it!"

Red alarm lights flashed along the outer hall. Redmoon picked up the pace, Swan following. They turned the corner to the bay, and a guard stood in the doorway. "Stop!" he cried, but Redmoon knelt and fired. Swan standing over him, fired her rifle as well. One shot hit the man in the shoulder, the other in the hip. He went down screaming.

They ran, jumping the wounded guard, and entered the bay. Only the *Ahagahe* was there; no other ships were docked, and it didn't appear as if any further guards would delay their escape. Not right away at least.

They climbed the landing stairs and punched them closed, then made for the back of the ship, taking the narrow hallway past the cells and up to the gunner's rear turret station. He made way for her to pass and climb into the seat, then leaned over to light the monitor panels. He punched a few other displays, and guidance and tracking responded.

Swan strapped in and grabbed the turret. "I've fired this kind of laser cannon before," she said, activating the swivel, getting comfortable with its weight and motion left and right. She stumbled a bit, had to adjust her seat and retry. "It's been awhile."

"That's okay. Don't force anything. Use the tracking system." He pointed to the monitors. "Let it tell you when to fire, and when you get tone, lock on target and let it rip. You'll do just fine, and we'll be in constant contact. I'll monitor your activity. Are you ready?"

She looked at him, her expression a jumble of nerves, uncertainty. "Thank you."

"For what?"

"For . . . everything."

Redmoon waved it off, climbed down, and made for the cockpit. "Save that for later, bird. We're not out of it yet."

He returned to the cockpit and strapped in, gunned the engine, and readied for launch. His only concern now was how effective the repairs were that O'Van and his men had made to the ship. Would the missiles fire true; were the lasers fully charged and ready? And especially, would the turret (which hadn't been fired in a long time) work consistently and accurately? Like muscles in a body, ship weapons worked best if kept clean and used on a regular basis. But there wasn't anything he could do about it now. They'd do the job, or he and Swan would be dead. Just as long as they could reach the Rhetor jump point before his ship gave out. Then he'd release Swan and end this charade. She'd go back to her family, and he'd disappear until the tumult had died down. He had friends who could help him there.

He punched in the coordinates to the Rhetor jump point, turned his ship, and flew out the bay door.

They were on him the minute he cleared the yacht. Two ships, fewer than he expected, although that might be the capacity of the second bay. Perhaps more were coming from the surface, but he didn't intend on waiting around to see. The first ship was an old Aurora, sporting only a couple of laser hardpoints. It didn't even have missiles. Redmoon figured it was probably used to shuttle between the yacht and Barone's surface compound. The second ship, however, was loaded for bear.

It was an F7C Hornet, fully kitted out with multi-phase shields, neutron cannons, Badger repeater lasers, and a pair of missile racks. Barone had even sprung for a laser cannon in the ball turret.

"There are two of them." Swan said over the comm.

Redmoon nodded as if she were sitting next to him. "I'll try to focus on the Hornet. You take out the Aurora."

"I see," she shot back playfully, but not completely hiding the tension in her voice. "Keeping the big game for yourself, eh?"

"Show me what you can do first," he said, "then we'll talk."

The communication display on his cockpit lit up. He turned it on. *"I gave you a chance to leave with millions, Benito."* Barone's voice was scratchy, sore, but confident. Perhaps overly. *"Now you will both die."*

"I doubt you would have allowed me to leave with the payoff anyway," Redmoon replied, setting his laser for the first barrage. "That's the kind of businessman you are. Lousy businessman, lousy father. The two go hand in hand, apparently."

There was silence on the other end, then Barone said, *"This is your last chance, Benito. Give her up, and you can go free."*

Redmoon chuckled. "Shut the hell up, and fight."

He killed the comm to Barone and banked right, bringing the *Ahagahe* close to the Aurora. He fired an initial laser volley, pelting the ship's already weak shields, forcing it back and into Swan's targeting scope. "He's all yours," Redmoon said, but she was already swinging the turret left and tracking the damaged ship's movements. When it struck the center of her reticule, she fired, pelting its left side with short beams of light. It tried responding with its own fire, and it struck the *Ahagahe*'s turret shield, bringing it down by twelve percent. A minor hit, and one Swan responded to by rebalancing her chair, turning left again and laying on the trigger. The Aurora tried banking out of the way, but the laser fire ripped across its underbelly. It went black, disappearing from Redmoon's sensors. But there had been no explosion.

"That was easy," she exulted, almost giddy. "Where's the bigger target?"

 "You might have disabled its life support," he said, trying to get his sensors to pick it up once again. "Its electrical system could be damaged. But it's still out there. It may come back."

"Then let's get the Hornet!"

"Here it comes," Redmoon said, pushing his sticks forward hard and turning the nose of the Freelancer down as if they were conducting a bombing run. The heavy Gs of the move pushed him into his chair, and he could hear Swan's excitement turn sour as she groaned through the comm. He had experienced the move several times, but she would probably get sick again from its unexpected stress. It was necessary, however, for just as he expected, Barone fired his first missile. The cockpit lit up with warning lights. The missile was flying straight towards the rear of the *Ahagahe*.

He rolled the Freelancer 180° and passed beneath the Hornet as it tried gaining the advantage of position in front of Nemo's sun. Redmoon didn't fire his missiles, the usual move, but not necessarily the best in this situation. The Hornet was moving too fast and away for an effective shot. But Barone's missile was trying to acquire them, and he now launched a second. "Hang tight," Redmoon warned, rolling left, then bringing the *Ahagahe* back to its original orientation, swooping up and behind the Hornet. Swan's dissatisfaction with the maneuver stilled, and she reacquired with her cannon. "We can't get away from the missile," he said. "It's going to hit."

It did, right square in the center of the rear turret. Swan screamed as she was rocked back in her chair, the rear shields straining against the hit, some of the missile's impact penetrating and striking the armor. Redmoon looked at his monitors. The rear shields were nearly gone, and the hull had also taken damage. "Are you all right?" he asked.

There was silence for a few seconds, then her breathless voice came on. "Yes, I'm fine. Still here."

"Good. Now watch this."

He knew the harsh move wouldn't free them from the missile; the reason for it was to get behind the Hornet faster than it could respond. At full throttle, the Gs that the Hornet would pull in a turn were difficult even for experienced pilots. Barone was more experienced than Redmoon had given him credit for, but he wouldn't be strong enough to turn that craft around in time. The only thing to worry about was the ball turret.

It opened fire, sending laser rounds across the hull of the Freelancer, knocking his bow shielding down a few notches. Redmoon responded, firing all his lasers at once, trying to anticipate where Barone would go. He fired a volley of missiles as well. All of his shots tried to find vulnerability in the Hornet's backside, where it was weakest. The laser hampered the shields. The missiles penetrated, knocking the Hornet off course and sending it spiraling through the vacuum.

"Direct hit!" Swan said, her enthusiasm back.

Another ship appeared on the sensors; the Aurora was back. "Keep on the Aurora," he said, banking right in order to give her a good chance to strike. Her turret had been damaged by Barone's missile, so it was less effective. But it still worked, and she targeted the Aurora like a pro, swinging right and striking the Aurora again and again with laser fire until, once and for all, its internal systems ignited and blew. Swan yelped with glee.

"One down, one to go!"

The Hornet had recovered and was coming on strong, firing its neutron cannons. Those were the weapons Redmoon feared the most. Their energy, if taken in full barrage, could devastate his ship. He barrel-rolled, trying to deny Barone a clean shot. The cannon fire struck his hull anyway, rocking it left, right, pushing his ship off course. Redmoon fought to keep it in one piece, watching as the bow and port shields were knocked down to near ineffec-

tiveness until they could recharge. He returned fire, sending another barrage of lasers into the Hornet and watching as its own shields began to drop.

Barone's Hornet flew quickly overhead, clearly trying to position his ball turret in such a way as to once again hit Swan's turret. Redmoon knew exactly who was manning the rear gun.

He flipped on the comm. "Leave her alone, damn you!" he shouted at Barone.

"She killed my boy!" Barone shouted back. *"Are you prepared to die for a pop singer?"*

"Yes."

Before he realized what he was saying, the word slipped out of his mouth. It shocked him, but in his heart, he knew that this had been the case almost from the very beginning. It wasn't that he was willing to die for a simple pop singer; Swan was much more than that. She was his second chance, a way of redeeming himself for not fully protecting Mirage on that terrible, fateful day years ago when his mentor met his end. *I should have given my life to save you, Mirage,* Redmoon said once more to himself as the *Ahagahe* was rocked by another volley of neutron fire. *You should be alive, and I should be dead.* 'Decide what matters most to you, Benito,' Mirage would always say, 'and then defend it with your life.' There was a time when Mirage meant everything to him, but when it mattered most, Redmoon had failed him.

"I won't fail you again."

He turned the Freelancer in a hard G maneuver to the right, ignoring the sensor reports that most of his shielding was at critical levels. It didn't matter anymore. The only way to save Swan was to kill Angus Barone . . . before the son of a bitch killed her. "Get out of the turret," he ordered over the comm.

"No way. Get me close to him. I can take him out."

"You don't have enough power left, and your shields are down. One more strike, and you're dead."

"I'm not running anymore."

"Get out!"

She ignored him, of course, and whipping the turret to the right, put a meager barrage into the Hornet's port-side. It did little damage. Redmoon added another missile and fired his lasers, but Barone had turned and aligned his neutron cannons squarely towards the turret. He fired.

"Get out!" Redmoon screamed into the comm again, and this time, seeing the target lock on her station, Swan tried getting out of her chair. The neutron fire struck, and his comm link and monitors to the rear turret display fell silent. The *Ahagahe* was tossed end over end.

Redmoon screamed as he tried righting his ship, while the much-weakened IFCS worked double time. *I've failed you again . . . I've failed . . . she's dead . . . dead . . .*

The Freelancer stabilized, and Redmoon fired the rest of his missiles, followed closely by lasers, until his console lit with warning signs of overheating. He didn't care. He raced the *Ahagahe* towards its target, not caring any more about maneuver or position. He went straight towards it, letting its neutron cannons graze his hull, letting its last missile strike the front shields and bring it down total. He answered Barone's attack with everything he had, watching as his laser fire tore the ball turret away and knocked out the Hornet's left wing. Nearly at the same time, both ships fell silent, the devastation of their last barrages ripping through their ships, damaging electrical systems, life support, jump drives. Both ships hung in deadly vacuum, quiet and peaceful. But Redmoon had one laser left.

Five blips appeared on his damaged sensors. Five blips clearly marked as Advocacy M50s. They had arrived, and their guns were trained on the two ships.

"Captains of the Freelancer and Hornet," said a commanding voice crackling over the comm. *"You will cease firing and relinquish control to the Advocacy."*

Redmoon paused, waiting to see if Barone made a move. He did not. Perhaps his comm was out, perhaps he was unconscious. Perhaps he was dead. His Hornet floated in space, its IFCS working to keep the ship oriented. Redmoon activated the comm. "Angus Barone is a murderer."

"Stand down or we will be forced to open fire."

Redmoon moved to fire his laser, but a small, quivering hand stopped him. "No, don't."

It was her, next to him, on her knees, her face bruised, her lip cut. Part of her hair was burnt, her clothing black with smoke, scorched by fire. She was alive. Somehow, she had managed to escape Barone's last deadly attack, and had crawled through the ship to the cockpit. She was injured badly, but she was alive.

"Don't," she said again in her effortless tone. "It's over, Benito. There's nothing more for you to do. Whether he is alive or dead, I don't care anymore. I'm not going to let you sacrifice yourself for me. You've done enough. Just let it go. I'm not going to hide the truth. It's all coming out now. I'll confess everything and let the future unfold as it will." She let a tear drop from her bloody cheek. She leaned over and kissed his hand. "You've gotten me this far, now let me do the rest."

He put his hand on her head and stroked her hair. "Are you sure?"

She nodded. "Turn off your weapons, and let them board."

He did as she asked. Two of the M50s tethered themselves to the *Ahagahe*, and two Advocacy officers made the short leap through space to board. One began administering triage to Swan, while the other took Redmoon into custody, relieving him of a second hide-out knife and cuffing his hands behind his back. They were placed in jump seats, and the Freelancer was towed to the Corel jump point. There, they would be taken onto an Advocacy frigate, and Redmoon formally arraigned, and then on to Ellis, where the Swan would be reunited with her family. Redmoon could see the joy in her eyes at that prospect. He smiled, happy for her.

When they reached the jump point, the frigate bay door opened, and they were taken inside. The *Ahagahe* was secured to the hull. They were disembarked, but before her guards took her away, she broke from their care and flung her arms around Redmoon. She buried her face into his neck. "Can I thank you now?" she asked.

"You may, but thank yourself. I nearly got you killed."

"I will speak for you. I will tell them the whole story."

"Thank you. It may help. But more importantly, look to your own care. There will be tough days ahead for you. Many will second guess you, scorn you, want to tear you down. The Barones will continue to call for your imprisonment, if not death. But you have a strong family with plenty of good lawyers, and you have a good heart. Just remember: Every day is better than this day, and every day thereafter will be better than the last. You will survive this."

She pulled away, looked deeply in his eyes. "Are those Mirage's words?"

Redmoon smiled. "No. They are mine."

"Goodbye, Hunter." She kissed him on the cheek.

"Goodbye, Swan."

The guards pulled her away. Redmoon watched her leave, and as she slipped out of sight, a song came to him, a song that he had heard many times. A song about a Marine and a pirate's dance. The first song that she had sung to him. It was a marvelous song, one of betrayal and punishment, but also of courage, honor and duty, both beautiful and strong.

Just like her.

The End

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CHRONICLES