

# Command Professional Edition

## Release Notes – February 23, 2023 - **Version 2.2**

*(changes from v2.1)*

### INTRODUCTION

Command PE v2.2 is a substantial update, incorporating all of the changes in the commercial CMO v1.05 update.

### USER INTERFACE & MISCELLANEOUS

- **General infrastructure & OS:** Command PE is now based Microsoft's .NET Framework v4.8.
- **Amphibious Planner & Operations Planner:** Ever wished you had an ATO-like overview of all missions and operations planned or currently executing, their status and hierarchical priorities and dependencies? With units or even entire task forces automatically switching from one mission to the next as objectives are achieved. The brand-new Amphibious and Operation planners make this, and much more, a reality. The amphibious and operation planner, together with the serial editor, form a set of common-oriented tools that allow you to orchestrate complex, multi-layered operations (including, but not limited to comprehensive amphibious landings) and execute the different phases of an operation at different time points or based on customized conditions. For details, see Appendix 3 on the CPE v2.2 manual.
- **Multi-Domain Strike Planner:** Coordinate massive, complex strike missions with time-on-target, complex flight plans (incl. in-flight refueling), multiple attack patterns and multi-domain strike combinations. For details on how to use this, see the section "Strike Mission" on the CMO v1.05 manual.
- **"Double-flame" mode (5-sec sim timeslice):** Command until now has been using two distinct time-slice settings for simulation fidelity: 0.1-sec (aka. "Finegrained mode") and 1-sec (aka "Coarse mode"). Some of our users have asked for an additional "very coarse" 5-sec timeslice in order to achieve even greater simulation speed; this has now been added.

To avoid simulation issues from cropping up as a result of this setting, the simulation will automatically "throttle back" the timeslice setting to 1-sec whenever something that requires this precision happens or is about to happen, and restore the 5-sec setting afterwards.

- **One-click License Revoke:** The license-revoke procedure has been further automated, allowing you to revoke the license on any existing machine, and re-apply it on another system, without any intervention by Matrix personnel. For details on the process, see the section “License revoke” on the CPE v2.2 manual.

- **Benchmark mode:** If you are familiar with Monte-Carlo analysis using CPE, then this new feature can best be described as “Monte-Carlo without any data export”. This provides an objective way to measure & compare a system’s performance and suitability for CPE, by repeatedly running any selected scenario in headless mode. (By default, the execution is run using fine-grained pulse mode (i.e.. 0.1-sec pulses) in order to stress-test the simulation engine and the hardware resources; however, “coarse” and “very coarse” options are also available.

- **Barks & slug-trails:** Barks are short text notifications that can be set to appear, briefly, anywhere on the map. The appearance and “styling” of the barks (color, text, duration etc.) is fully customizable through the Lua API, so you have full power to add them on any action performed.

“Slug trails” are a UI/map feature familiar to anyone with past experience with air-traffic control radar screens, sonar tactical consoles etc. They essentially display the past known locations of a given unit or contact in order to provide better context for their movement.

## **SIMULATION & MODELING**

- **Cargo 2.0:** Command’s existing cargo system was hitherto geared more towards the transfer of combat forces & personnel rather than materiel. This changes radically with Cargo 2.0. You can now transfer both combat units and also weapons, stores, fuel and any arbitrary material. Place your cargo on a multitude of different container types, from standard ISO-blocks to specialized boxes, each with its own peculiarities. Transload cargo at airbases, ports etc. in order to haul it over even transcontinental distances. Automate all this through cargo and (new) transfer missions. Set up complex logistical chains from mainland factories all the way to the front line. For details on how to use this, see the section “Cargo 2.0” on the CMO v1.05 manual.

- **Intermittent EMCON:** This band-new feature allows controlling the behavior of emitting sensors so they emit in intervals instead of only continuously or never. For detailed instructions on how to utilize this, consult the section “EMCON Tab” on the CMO v1.05 manual.

- **Custom Environment Zones:** Using this new feature, you can define a zone where you can tailor the environment & weather properties. This can be useful if you want a “controlled environment” for sensor checks, mobility & damage tests etc., but can also be used as a localized

“weather override” for scenario purposes. For details on how to use this, see the section “Missions + Reference Points Drop-Down Menu” on the CMO v1.05 manual.

- **3D signature splat:** This brand-new mechanics override allows precisely specifying the per-angle signature (any type) of any given platform, both on azimuth (horizontal plane) and elevation (vertical plane), offering a true 360-deg signature sphere. Furthermore, it can directly use AFSIM-format signature tables. For details on how to use this powerful new feature, see the paragraph “3D signature splat” on the section “Mechanics Overrides” in the CPE v2.2 manual.

- **IRST/FLIR improvements:** IRSTs and high-mag cameras are no longer near-magical counter-VLO sensors. They may still be your best bet for detection, but you won’t be volume-scanning for stealth fighters at >100nm anymore. (You can still spot/track them pretty far enough IF something/someone else first cues you there).

The relevant sensors now have a dual value in the search range listing in the DB value, to make it more explicit where their volume search extends to. Visual and IR checks are now also susceptible to look-down clutter. For example, it is easier for an IRST (or the plain MkI Eyeball) to pick out an aircraft over the horizon line than against the surface background.

- **Radar & IR signature modifier improvements:** Sensor improvements come coupled with a massive overhaul of signature modifiers in the DB, which significantly improve the realism of the VLO modifiers by drawing clearer distinctions between shaping and RAM generations.

Prior to the v494 DB releases, we could classify an aircraft as having “light,” “medium,” or “heavy” stealth shaping ... and that was it. These modifiers were applied always in all aspects (no ability to define e.g. a frontal-only reduction modifier). Modeling of IR signature suppression (IRSS) techniques was even more limited.

Beginning with the v494 DB release, we completely overhauled our existing VLO modifiers to account for shaping and RAM generations. In addition we also added several special flags to indicate the presence (or lack thereof) of certain stealthy design features. This allows us to model not only general, whole-craft stealth but also context-specific or aspect-specific features such as S-shaped intakes, exposed fan blockers, active cancellation, and stealth pylons. For example, S-shaped intakes reduce the likelihood of being detected head-on, while LO pylons reduce the impact of externally-carried stores.

This overhaul also extends to IR modifiers. As with radar stealth, we completely rewrote our “general” modifiers to represent whole-aircraft IR signature suppression techniques (distributed vs. conventional fuel tanks, low-E coatings etc.) and added several additional aircraft codes to represent specific IRSS features. These codes include shielded “anti-Strela” exhausts, masked exhausts, heavily masked / slit-shaped exhausts, and peak temperature reduction or “cool-air mixing”. Note that certain IRSS features come with downsides and limitations: slit-shaped exhausts, for example, will make you harder to spot but paradoxically easier to lock on to with IR weapons due to back pressure penalty; in another example, anti-Strela exhausts are most effective against someone trying to get a lock from below.

The full list of added signature modifiers is:

- o RCSS – Active Cancellation
- o RCSS – S-Shaped Intake(s)
- o RCSS – Exposed Fan Blocker(s)
- o RCSS – Stealth Pylons
- o IRSS – Shielded Exhaust (Anti-Strela)
- o IRSS – Masked Exhaust
- o IRSS – Heavily Masked / Slit-Shaped Exhaust
- o IRSS – Peak Temp Reduction (Cool-Air Mix)

We have backfilled all LO/VLO aircraft in both DBs with these features as best as we could determine. (Naturally, in many cases and especially with contemporary stealth fighters, exact details are sometimes hard to come by.) These changes mean that various LO/VLO aircraft are now much harder (or easier) to detect than you may be used to. Comparisons with known real-world RCS & IR data yield accurate numbers. As always, CPE users can of course manually input their precise classified figures as before.

- **HGV improvements:** Hypersonic Glide Vehicles (HGVs) can now have a waypoint/dogleg course assigned when launching them, with one or more waypoints. This reflects one of their core advantages compared to ballistic missiles. The trajectory profiles of HGV has also been improved, with updated information assembled from public sources about the typical boost, re-entry and glide portions of HGV employment.

- **Revised reaction times:** The differences in reaction times, and their effects, are now more critical than ever. All units use common-reference “Combat System Generation” (“Cockpit Generation” for aircraft) to model the modernity of their combat systems, combined with an “Ergonomics” value to handle intra-generation differences (*the atrocious switchology on early missile-age aircraft will most definitely get you killed now*). Older, WW2-era ships may take up to 5 minutes to engage a target, while Aegis cruisers fire in <20 seconds. For more details see the paragraph “Overhauled Reaction Times” on this post: <https://command.matrixgames.com/?p=5500>

- **Degree-definable sensor arcs and vertical scan limits:** This is a seemingly small but important improvement to our sensor modelling: at last, sensor arcs can optionally be defined in degrees, rather than just in “pie wedge” set sectors. We have also implemented vertical sensor arcs, which were especially important during the Cold War. Older air-to-air radars were often limited to a small chunk of vertical space (20 degrees or so), which meant that fighters would struggle to detect aircraft far below or above them. For air planners, this meant “Low CAPs” and “High CAPs” were necessary.

*(Note that current DBs do not have vertical sensor arc data backfilled, so this won't have an immediate effect on gameplay until we can do a bit more research. Expect to see an RFI in the public Github for arcs and scan limits.)*

- **Palletized weapons:** This is a new capability that has been making the public rounds lately, as a result of a series of videos by AFRL on the “Rapid Dragon” concept. Using pallets packed with guided weapons, aircraft not usually associated with frontline attack operations (such as transports) can contribute to the firepower volume allocated at enemy forces.

As usual, there are caveats. The fact that weapons are fired from released pallets, rather than individually fired from the parent platform, means that weapon allocations must happen in batches; if a single missile in say a 12-pack is allocated, the full dozen has to be allocated either on the same target or others. (There exists of course the theoretical option of allocating only the desired amount of weapons and just sacrificing the rest of the pack, but the cost of the majority of modern weapons makes this an unlikely scenario).

- **Ground logistics improvements:** As part of the Cargo 2.0 changes, both the UI and underlying mechanics for the replenishment of ground forces have been improved. Distinct ground units are now fuel-limited and will stop dead in their tracks if they are not properly refueled. Both fuel and munitions can be replenished by dedicated resupply trucks included in the database, and the unit-context menu (aka right-click menu) includes a host of new options for

selecting which stores to restock in priority, as well as to select which provider to actually use for the replenishment rendezvous.

- **Improved/parallelized salvo evaluation:** Until now, the creation of attack salvos was done purely sequentially: Unit-1 examines if it can attack (both doctrinally and physically) a contact; if yes, it creates a new salvo or adds its weapon(s) to an existing one for the same target with same weapon ID. Then Unit-2 does the same, etc. etc. until a suitable salvo for the given target is filled to capacity. This presents a number of issues:
  - o Because of the sequential nature, a potential “Unit-3” which perhaps is better located to attack the same target, or perhaps has a more suitable weapon for it, may not be considered at all (if a suitable salvo for the given target is filled-to-capacity by previous units). This can lead to problematic situations like this.
  - o Again because of the sequential calculation, this process does not exploit multiple CPU cores and can significantly slow down a pulse execution in a large/busy scenario.

Units now perform the salvo evaluations in their own individual threads and submit “firing proposals” to their side. The parent side groups firing proposals per-target and selects the most promising one, based on criteria that depend on the nature of the target (e.g. for aerospace targets an important factor is time-to-impact). Once selected, the salvos are executed as usual.

- **Improved torpedo evasion:** Ships & submarines now attempt to evade incoming torpedoes more realistically, following [these guidelines](#). Submarines will additionally alter their depth to avoid the torpedo(es) if appropriate.

- **Weather effects for surface ship speed:** This is an optional new feature. When enabled, deteriorating weather conditions (and especially increasing sea state) has an adverse impact on the maximum speed that ships can travel. This effect is particularly acute on small-displacement ships. Depending on sea state and ship size, a ship may be forced to run at 3/4, half, 1/4 speed or even heave (effectively remain stationary). The information about the weather-related limitation is shown in various ways: On the ship datablock, on the “Unit Status” panel and on the throttle/altitude window.

Because this feature can potentially unbalance existing scenarios, it is optional (can be toggled on the “Scenario Realism Features” window) and is “ON” by default when making a new scenario, and “OFF” by default when loading an existing scenario.

- **Aircraft maximum airborne endurance:** This fixes the “aircraft may stay up indefinitely by multiple A2A-refuellings” realism flaw. Aircraft are now limited in their total airborne endurance depending on their size, type and crew complement. The information about current airborne total time and maximum endurance is listed on the fuel panel and is color-coded for at-a-glance evaluation (dark red is bad). If an aircraft reaches its max endurance limit, it enters an “RTB – Exhaustion” state, turns straight for its home base and will refuse any manual orders to change course or engage in any other activity.

## **ANALYSIS & EVENT EXPORT**

- **New event-export event type - Cargo transfer:** The event-export framework can now track and export all cargo-transfer operations being performed during a simulation. For details see the “Event Export” section on the CPE v2.2 manual.
- **Complete sensor detection reports:** Perplexed as to why a given sensor detection failed? CPE now offers the ability to deep-dive into the detection process and examine each step and factor individually, to better understand which steps succeed and which fail into any detection attempt. A powerful but also CPU-expensive new feature that definitely demands wielding with caution. Get the full rundown on it on Appendix 4 of the CPE v2.2 manual.

## **CONNECTIVITY / INTEROPERABILITY & MECHANICS OVERRIDES**

- **Expanded Lua event hooks:** More hook types related to sensor checks and contact updates (in both on- and off-grid communications states), offering even greater mechanics-override functionality through this powerful framework. For details see the “Lua Event Hooks” section on the CPE v2.2 manual.

## **CONTENT UPDATES & ADDITIONS**

- All official scenarios (incl. DLCs) have been rebuilt in the latest DB releases and tweaked. This includes various fixes for reported issues. In all the scenarios the WRA firing ranges for AAW missiles have been adjusted to No-Escape Zone (NEZ) by default. Practically this means that units will delay their AAW shots until they estimate that the target cannot outrun the missile.
- Includes numerous new and updated .inst (facility installation) files by Kushan.
- Numerous additions and modifications to Tacview 3D models; credit goes to all original model creators.
- Includes the latest (v498a for the DB3000 and v498 for CWDB) revisions of the official databases,