

Some Principles of Contact Analysis

For *Command: Modern Operations*

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Introduction:

This is an essay for newer players of the wargame/simulator *Command: Modern Operations*. Its purpose is to go into some nuanced detail on what players can expect when faced with contacts picked up by their units that they cannot immediately identify or classify.

In many circumstances, the player's forces cannot gain a positive identification on unidentified contacts in a timely manner and/or without significant risk to their own assets, so understanding how to interpret information from incomplete contact reports can give the player an important advantage as they search for and engage the enemy, as well as avoid causing collateral damage (which can affect scenario score) and minimize risk to one's own forces.

This is NOT intended as a comprehensive guide for every possible situation, as the best experience is actually gameplay.

NOTE: Throughout this essay, I will be using the units of measurement Nautical Miles (nm), feet (ft) and knots (kts) when describing contact properties.

Before going into the generalities and nuances one can expect in *Command*, it is worthwhile to have a look at a real-world instance when Contact Analysis went wrong, with tragic consequences. *Command* players are unlikely to be faced with a situation as chaotic as the one below, due to factors inherent in a pausable computer wargame, but I still believe that historical examples are an important part of the learning process.

Contact Analysis in the Real World: USS *Vincennes* Incident, 1988

Within the time frame that *Command* covers (post 1945 to the present day), arguably the most important case study for understanding the importance of Contact Analysis, particularly the decision of whether or not to engage, is the *Vincennes* Incident in July 1988.

During the latter stages of the Iran-Iraq War in the 1980s, the United States embarked on Operation Earnest Will, an effort to protect neutral tanker traffic through the Persian Gulf, as both belligerents in the war sought to hurt one another by attacking their respective oil exports. This led to a number of smaller skirmishes and engagements involving US forces, primarily against Iran, culminating in a major battle in April 1988 (Operation Praying Mantis) in which US naval forces launched retaliation attacks against Iranian naval and coastal forces in response to the frigate USS *Samuel B. Roberts* having been crippled by an Iranian naval mine. Despite the overwhelming US victory in Operation Praying Mantis, the threat to merchant traffic and US

forces remained, and a few months after the battle, a tragic incident would occur that would contribute to the eventual resolution to the conflict.

On July 3rd, 1988, the US Navy guided missile cruiser USS *Vincennes* was on its way out of the Persian Gulf after having been relieved of tanker escort duty, passing through the narrow Strait of Hormuz. During this period, a helicopter launched from *Vincennes* claimed to have come under small-arms fire from Iranian patrol boats, and as a result *Vincennes*, supported by two other US warships, engaged in a pursuit of the boats in question, eventually straying into Iranian waters.

During this engagement, *Vincennes* fired a pair of surface-to-air missiles at an air contact that was approaching their position. These missiles hit the target, but this aircraft was a civilian airliner, Iran Air Flight 655, flying a short route from Bandar Abbas airport in Iran to Dubai in the UAE. All on board the aircraft perished.

Outside of Iran, this incident is generally accepted to have been a tragic accident, with the crew of *Vincennes*, at the time of missile launch, believing they were firing at an Iranian warplane coming to the aid of the patrol boats. However, the *exact* reasons for this mistaken identity are subject to interpretation and debate, with explanations ranging from faults with the Aegis computer software, possible over-aggressiveness by *Vincennes*'s captain, psychological stress among the radar crews from the combat situation, confusion of Identification (IFF) signals, among others. The real answer is probably some mixture of all of these.

What is certain is that the aircraft was flying out of an airport that was also being used as a base by Iranian combat aircraft, specifically F-14s. Additionally, the crew of *Vincennes* were well aware of the dangers posed by surprise aircraft attack. A year earlier, also in the Persian Gulf, the frigate USS *Stark* was attacked and seriously damaged by an Iraqi aircraft firing a pair of Exocet anti-ship missiles. 37 crew members of the *Stark* perished.

While it was another case of mistaken identity (Iraq firmly apologized and eventually paid reparations), part of the reason for the defensive failure was the slow reaction among the crew of the *Stark* to the threat, since they did not believe they were necessarily in a dangerous situation. This painful lesson was no doubt in the minds of the personnel in the Combat Information Center of *Vincennes* when they tried and failed to identify this air contact on the morning of July 3, 1988. It was perfectly reasonable for the crew to deduce that Iran may have been sending air support for their patrol boats then being pursued by *Vincennes*.

Finally, the radar receivers on-board *Vincennes* were picking up signals that matched both civilian IFF signatures, as well as signatures matching Iranian F-14s, from the same direction that this air contact was approaching. It is up for interpretation as to how much of this confusion was software, psychological stress, or actual multiple signals.

Command players have the luxury of real lives not being on the line when making their decisions, as well as the luxury of pausing their operations to take their time, but this incident is

a good example to look at when learning to think about how to interpret contact reports that have incomplete information. Sometimes civilian assets are in a dangerous battle space, and engaging a neutral ship or aircraft can occur.

While in *Command*, as said above, no real lives are at risk, one should still strive to not kill civilians, and in some scenarios this could affect player score or even cause a 'defeat' outcome, and it's also a waste of valuable ordinance.

Contact Analysis: The important questions

When trying to interpret an unknown/unidentified contact on your screen, there are some important questions you should be asking yourself:

What TYPE of contact is this? The basic types in *Command* are: Air, Surface, Subsurface, Land, Space and Weapon. This should nearly always be clear from the outset, but there are some subtypes within these, such as helicopter vs fixed wing aircraft, mobile land vehicle vs fixed installation, and immobile offshore structure (i.e. oil rig) vs moving ship. Weapon contacts (such as incoming missiles or torpedoes) are usually identified as such quickly.

HOW did I detect this contact? What sensor, from which platform, did this contact originate? This is always readily available from selecting the contact in question. If a contact was picked up by active radar alone, it may give you very different information than if it was detected using a passive ELINT receiver picking up emissions from the contact (if any).

How "solid" is this contact? What I mean by "solid" is how much ambiguity there is in the contact's position relative to your forces, especially the unit that detected the contact. A contact that is intermittent, rather than consistent, or that is detected by only one unit or sensor may not display as clearly as one that is picked up by multiple sources or a capable sensor. Another factor in this is whether your unit's sensors are being jammed while reporting on this contact.

What is the contact DOING? Assuming you have a contact strong enough that you can at least approximately track its course, you should try to deduce what it is doing. What direction is this contact heading? What is the contact's speed? Is it heading toward your forces or somewhere important? Does it seem to be searching for something, or is it just following a consistent course? If you change the speed or direction of one of your nearby units, does it move in response?

Is the contact alone or in a distinct group? This can have different meanings depending on the type of contact. Groups of aircraft and surface ships are probably military rather than civilian, whereas groups of land contacts could be military or civilian, and a group of subsurface contacts are in all likelihood biological or false contacts, as submarines almost always operate independently.

If the contact is military and (potentially) enemy, is it within detection or striking range of your forces? This may involve more guesswork on your part than the other questions above, if you are able to determine enough about a contact that it is a military contact that might belong to the opposing side. For instance, if you are able to determine that an air contact is military, but it is over 100nm away and your enemy does not possess any air launched cruise missiles, then it would be safe to assume that the contact cannot engage your forces. However, such a contact, based on any detected radar emissions, could be within range to *detect* your forces, and therefore could vector a strike by other units onto your position.

How much risk can/should you expose your assets to in order to more clearly identify this contact? Consider things like: Is it worth sending a scouting/intercepting aircraft forward to get close to this contact to visually ID it? Will turning on my radars tell my position to the enemy before I want to or am ready? If I engage this contact and I am wrong in what I think it is, can I afford the lost time/ordnance?

How does this contact fit within the larger scenario context?

There's a couple different sides to this question: briefing intelligence, and general situation.

Some scenario briefings will give you some intelligence on projected enemy dispositions and intentions, so if, say, a scenario tells you that enemy submarines are expected to be operating in a given area, a subsurface contact in that area would be more likely to be an enemy submarine.

As for the general situation, this mainly relates to contacts you really shouldn't shoot at, chiefly civilians, but sometimes neutral or unfriendly military forces that you are not at war with.

Consider the wider (possibly fictional) context the scenario is in, as well as what part of the world you are operating. For a couple basic and rather common examples:

-Operating in the Norwegian Sea during a major global conflict would make it very unlikely that an air contact would be a civilian aircraft, due to the dangers involved in civil air travel in that area as well as the general lack of trans-polar flights until rather recently in history. Additionally, there would be fewer (but not zero) civilian ships around.

-Operating in the vicinity of the South China Sea and Malacca Strait in peacetime highly increases the amount of civilian traffic in the area, so in such scenarios you can reasonably expect to encounter civilian ships and aircraft.

Answering any or all of these questions for yourself is critical in Contact Analysis. Now for some specific considerations and common conditions in analyzing contacts within the specific basic categories

Surface Contact (SKUNK) Analysis:

Contact Size: As of writing, *Command* does not model showing radar returns of a large ship vs a small ship or piece of floating debris, so keep in mind that you will probably not be able to immediately tell the difference between an oil tanker, a destroyer, and a small fishing boat based alone on the size of such vessels. However, the range at which you detect a contact may give a clue as to its size, as a smaller ship may show up at a shorter range than the theoretical max range of the radar set in question.

Contact Speed: The following are some general rules of thumb to consider on how to interpret a detected speed of a surface contact:

-A surface contact that is stationary (0 kts), is generally one of the following: An oil rig or other platform; a piece of floating debris; or a stationary ship. The latter can be the result of either a ship being at anchor for a number of reasons, or the ship may have taken damage to its propulsion system.

-If a surface contact is moving faster than 20 or 25 kts, odds are pretty high that it's a military vessel moving fast. Civilian ships in *Command* typically move between 5 and 15 knots, but sometimes as fast as 25, depending on the vessel and context.

-Surface contacts moving between 1 and 20 kts are where things can get tricky, and you should usually not make solid determinations based on these speeds alone

Contacts in groups:

Usually, if you see a distinct and tight group of surface contacts, it's one of two possibilities:

- 1) A group of surface warships or a convoy in formation.
- 2) An anchorage of ships, which may be civilians if just off the coast of a port.

However, enemy ships *do not* always operate in formations. In fact, scenario designers may deliberately disperse enemy ships to confuse the player as to what vessels may be enemy, or even to deceive which enemy vessels are which. Two strong examples of this are the scenarios: "Fleet Action" in the *Falklands* DLC, and "Midway" in the *Red Tide* DLC

Contact Emissions: Assuming you have detected a surface contact's emissions, there can be a few possibilities depending on what is being picked up.

-If the emission is simply "Generic Navigation Radar", odds pretty high it's a civilian ship, but it's not a 100% guarantee either.

-If you detect a form of "Search" radar, odds are much higher that it could be military, but there are occasions where civilian vessels use search radar

-If you pick up Tracking Radars, Fire Control Radars (FCR) or Jammers, they are definitely military, and in most situations are probably hostile or at least unfriendly.

-If you have a submarine or other underwater sensor that detects an Active sonar emission from a surface contact, then it's certainly military, but could either be an ASW platform or a minesweeper.

Air Contact (BOGEY) Analysis:

Contact Size: As of writing, *Command* does not model showing radar returns of a large aircraft vs a small aircraft directly, so keep in mind that you will probably not be able to immediately tell the difference between an airliner or a fighter based solely on the size of such aircraft. However, the range at which you detect a contact may give a clue as to its size, as smaller aircraft may show up at a shorter range than the theoretical max range of the radar set in question.

Contact Speed: The following are some general rules of thumb to consider on how to interpret a detected speed of an Air contact:

- If the contact is stationary (0 knots) it can really only be a hovering helicopter or some kind of aerostat or balloon
- In most circumstances, you shouldn't expect anything other than helicopters or some UAVs to be flying slower than 100 or 150 kts
- You can typically expect a cruising propellor driven aircraft to be flying at between 200 and 320 kts
- You can typically expect a cruising jet propelled aircraft to be flying up to about 480 kts.
- If an air contact is moving faster than 500 kts, odds are VERY high that it is military, and depending on what kind of maneuvering it is doing, it could be moving to engage something, taking evasive action, or egressing following an attack run. Always remember that fast aircraft like fighters don't use their maximum speed often, due to fuel efficiency and range considerations. Typical Afterburner speed is 920 kts or higher.

Contact Altitude: The height of an air contact can help you determine its nature and intentions. Typical cruising altitude for jet aircraft is approx. 36k ft, whereas you can probably expect cruising altitude for larger propeller aircraft to be between 18k ft and 25k ft. An aircraft flying low (between 2k and 10k ft) could be of concern if they are aircraft searching for something or strike aircraft en route to a target. If an air contact is at 1,000 ft or less and it is not a helicopter, go on alert, as you will typically only see this as being ASW aircraft searching for submarines, or strike aircraft preparing an attack run. Finally, changes in altitude when not on takeoff or landing patterns are good signs that the contact is military, as Civilian aircraft in *Command* typically hold on consistent courses.

Contacts in groups:

In *Command*, it would be very unusual for a group of civilian aircraft to be flying in a distinct formation group (unless someone threw in an air show as part of a scenario), so groups are almost certainly military aircraft, so you should be on high alert upon detecting an air group, and prepare accordingly.

Contact Emissions: Assuming you have detected emissions from an air contact, there's a few possibilities:

- If the emission is simply "Generic navigation or weather radar", odds pretty high it's a civilian aircraft, but it's not a 100% guarantee either.
- Any "Search" radar is very likely to be military, but there can be situations where neutral emergency services aircraft may have search radars for search & rescue work.
- Any emissions other than the two above are virtually assured to be military aircraft.

On the flip side, no emissions *could* also be from military aircraft that are trying to minimize detection.

Subsurface Contact (GOBLIN) Analysis:

NOTE: When it comes to searching for things underwater, everything is dependent on sound, either what sound the contact is making, or what your active sonar searching is reflecting back to you. This is all massively affected by oceanic conditions that may vary wildly. This makes Anti-Submarine searches the most challenging of Contact Analysis, both in *Command* as well as in real life. Some scenarios may have submarines but no biologics or false contacts. This makes identifying submarines easy, but it's also very unrealistic. Most scenario designers would agree that if there are submarines involved, then biologics/false contacts have to be added as well. They always have to be added by the designer just like all other units.

Contact Size: Unlike with Air and Surface contacts, size does play somewhat more of a role in *Command* when it comes to underwater contacts. There are such things as large, medium and small "false" contacts that may be present in a scenario. Additionally, smaller submarines will probably be harder to detect with the same means than larger submarines.

Contact Speed: If an underwater contact is moving faster than 5 kts, it's absolutely a submarine. False contacts typically are stationary, while biologics, such as whales and orcas, don't go faster than 5 kts in *Command*. These creatures *can* move faster in reality, but the way they are depicted in *Command* are as if they are not doing anything special, just normal undersea movement. That being said, 5 kts is typical "creep" speed for a submarine, so around that speed is a grey zone for contact analysis.

Contact Depth: This can get tricky, as biologics in many circumstances can be at the same depth as what submarines normally operate at. That being said, common periscope depth for a submarine is -66ft, and common "shallow" depth is -131ft.

Some biologics and especially false contacts can be deeper than even a submarine, which in *Command* commonly won't be able to go deeper than -1,000 to -1,200 ft.

Additionally, Subsurface contacts CAN be detected on the surface, but if one is spotted, there's really only a couple possibilities if it isn't immediately identified:

- A surfaced submarine or submarine periscope/snorkel sticking up.

- A 0 ft depth false contact that must have been put in by the scenario designer for extra challenge, as they can be used to model small debris or fish being mistaken for periscope feathers and wakes

Contact Emissions: Biological emissions are not directly modeled in *Command*, so if you see anything from Contact Emissions, then it's certainly a submarine. Consider yourself lucky, as subs typically don't emit except for two reasons: Active sonar to get a last minute range to a target; or surface radar at Periscope depth or on the surface to find targets.

Special Case- MAD: Many submarine hunting aircraft have equipment for what is known as MAD (Magnetic Anomaly Detection). These sensors are able to detect a fluctuation in the earth's magnetic field in a small area caused by a large metal object (i.e. a submarine). While there are such things in *Command* as Magnetic false contacts (such as shipwrecks), it's a very strong indicator of a submarine. The downside of MAD is that it has a VERY short detection range, typically only working at up to around 1 nm and from low flight altitude. So it's best used for confirming an already detected contact and lining up a firing solution.

Land Contact Analysis:

Land Contacts are typically only detected, let alone positively identified, visually with the Mk1 Eyeball or sensors like Night Vision, Thermal Imaging, and Electro-Optical imaging. However, some more advanced radars can detect ground targets, and to a certain extent identify them (i.e. a moving vehicle vs a stationary structure). Many scenarios have certain land contacts, like buildings, ports and airfields, already pre-detected and identified for you, as they are known quantities that would not need to be detected.

That being said, within *Command*, there is some Contact Analysis to contacts on land, but it's primarily with regard to Emissions. All things being equal, if you are detecting a land contact based on emissions it is making, it's VERY likely to be military, as you will most likely be detecting Search Radars (Air and Surface), Fire Control Radars, and Jammers.

The one exception to this may be that you could detect generic traffic control or even weather radar, which could be civilian. And these would almost certainly be originating from known sites that would be pre-identified as hostile or not.

Space Contacts:

Space operations in *Command*, as in real life as of writing, are primarily just orbiting satellites that are used by one side or the other. In scenarios, the satellites are mostly always pre-detected and identified for you, as their orbits are known (and really impossible to hide). The only times you should concern yourself with an out-of-atmosphere unidentified contact in *Command* is an incoming ballistic and/or hypersonic missile, which is usually auto-defined as a threat once detected, since they stick out very easily if you've got the means to detect them to start with.

Weapon Contacts:

In *Command*, contacts of launched weapons pretty much always are identified as such very quickly, if not immediately, upon detection, though you will not know what *exact type* of weapon, only the basic type. Typically, you may be able to infer some more information based on the contact properties (i.e. speed) combined with scenario context.

The following are names used by *Command* to label different weapon contacts:

Torpedo- self explanatory, as virtually all moving underwater weapon contacts will be some form of Torpedo, be they guided or straight-running.

SAM- stands for Surface-To-Air Missile, pretty self explanatory

Vampire- This is primarily used to label anti-surface cruise missiles, launched from aircraft, ships, land-based launchers, or submarines, but may also apply on anti-land cruise missiles as well

Missile- A more generic label but is often used on air-to-air missiles

Fireball- A relatively recent addition that is used on ballistic missiles and some hypersonic weapons like hypersonic glide vehicles (HGVs)

GuidedWeapon- This is a sort of "catch all" for every type of weapon not covered with the above names, so you can expect this with such weapons as laser guided bombs and glide bombs.

As for "dumb" weapons like unguided iron bombs, unguided rockets, and artillery/gun shells, they won't appear as distinct "contacts" with labels, but rather as simple images on the map, assuming your forces have visual ID on them. They would appear exactly the same as similar weapons launched from your own side. In the case of naval mines, they are also simple images, but they would need to be detected by units with dedicated minesweeping sensors, unless they are floating mines, which might be visually seen on the surface.

Conclusion:

Contact Analysis is vital to playing *Command* effectively, but there's only so much that any one text can teach you. When playing scenarios, even ones you may have played before, pay close attention to what you can learn about unknown contacts before your forces identify them. Different scenario designers may also try to mix things up by setting certain unit behaviors to hide within civilian traffic, or even make some civilian ships and aircraft vaguely appear to be military, making Contact Analysis even more challenging.

Thank you for reading, and remember to hold your fire if there's any reasonable chance that a contact is civilian.