STEALTH

Stealth 0:

Aircraft has no special features or anything about it's design conducive to reducing RCS. This the design of almost all of the world's aircraft, helicopters, and UAVs.

Stealth 1:

An aircraft with Stealth 1 characteristics has some amount of reduced RCS by accident of its design, small size, or in some cases, non-traditional construction material. Examples include the Horton Ho 289, most cruise missiles, many UAVs, and aircraft which are primarily wood, such as the British Mosquito multirole aircraft, and small aircraft like the BD-5. Radar operators have their chances of detecting the aircraft reduced by 2, and radar-homing missiles track their targets at -2.

Stealth 2:

This Stealth Level is characterized by aircraft that are not necessarily designed with stealth in mind, but do have some RCS reduction due to their design or planform. This includes blended wing-body designs like the F-16 Fighting Falcon, B-1 Lancer, or Tu-160, or designs which are relatively flat, such as the F-15 or Tu-22 series. Radar operators have their chances of detecting the aircraft reduced by 3, and radar-homing missiles track their targets at -4.

Stealth 3:

These are aircraft which are made of good portions of RAM (Radar-Absorbent Materials} in an otherwise conventional Gen 4+ or 4++ designs. Examples include F/A-18E/F/G., Rafale, SR-71, or Su-47. Radar operators have their chances of detecting the aircraft reduced by 5, and radar-homing missiles track their targets at -4.

Stealth 5:

This is essentially what is referred to as 1st-Gen Stealth, the primary examples being the YF-12, SR-71, and the MQ-12 reconnaissance drone. They are specially-shaped to enhance their stealth profile. Radar operators have their chances of detecting the aircraft reduced by one difficulty level, and radar-homing missiles track their targets at -5, with an additional chance (rolled against the pilot's level; Impossible Pilot or Difficult Electronics, at a -3) that the weapon's lock on is broken.

Stealth 6

This is 2nd-Gen Stealth, such as that of the F-117A Nighthawk, the Stealth Hawk (probably), the fictional MiG-37 Ferret, and some of the new Stealth unmanned vehicles and some surface ships. They gain most their by shaping their planforms in a faceted profile, augmenting this shape with RAM and radar-absorbent paint and level-sunk screws and rivets, and retractable elements like antennas and air data probes. Such aircraft also normally carry their ordnance in internal bays, with doors that practically snap open and shut. Radar operators attempting to track the aircraft do so at two levels more difficult, and radar and radio-homing missiles track their targets at three levels more difficult. The protected aircraft may automatically roll to break lock-ons at the time they are established, and every turn they are maintained (Difficult Pilot or Average Electronics).

Stealth 7:

This is exemplified by aircraft like the F-35, J-20, Su-57, and stealth UAVs like the X-43A. They have their detection chances reduced by two levels if scanning from the front or back of the aircraft, or one level if scanning from the side,

bottom, or top, Missiles operate at three levels below normal. The protected aircraft may automatically roll to break lock-ons at the time they are established, and every turn they are maintained (Difficult Pilot or Average Electronics).

Stealth 8:
These are high-standard Stealth aircraft – All are Generation 4++, and most are Gen 5 aircraft. They are composed primarily of curved surfaces and have most of their surfaces covered in RAM or RAM paint, and flush-fitting fasteners and joint panels. Examples include the F-22A, B-2, and the fictional F-19. Radar operators operate at a three-level deficit when scanning from the front or rear, two levels deficit if scanning from the side or angles, or one level if scanning from the top or bottom. Missiles targeting these aircraft do so at a three-deficit penalty. The protected aircraft may automatically roll to break lock-ons at the time they are established, and every turn they are maintained (Difficult Pilot or Average Electronics). They do so at a +2 bonus.

Heat Signatures and Stealth

In most cases, the heat of an aircraft's engines or from air friction with its airframe can reduce or obviate the otherwise-Stealthy aircraft's undectability. This is especially true if the searching source has a tactical heat sensor of some sort, or, to a lesser extent, if the searching source is armed with heat-seeking missiles (including some ATGMs, although ATGMs do not normally have the agility or speed to take out aircraft). Tactical heat sensors have a variable rating depending on the sensor and the operator; being armed with HSMs gives you a flat detection bonus of +1.

Note that "tactical heat sensor" includes passive and active IR, thermal imagers, and FLIR. It does not include image intensifiers, as they work using ambient light rather than heat signatures

IR Stealth 0
This is the rating most jet-powered aircraft have. The tactical heat sensor operator has normal chances of detecting the aircraft in an arc 270 degrees from the tailpipe, and -1 to his chances when trying to detect the enemy from other arcs around the enemy aircraft. Most ground vehicles also have an IR Stealth rating of 0 under most circumstances, and most ground installations are detected at +1.

IR Stealth 1
This includes aircraft with shrouding or extended tailpipes such as the Israeli variant of the A-4 Skyhawk, It also includes most UAVs, including jet-powered UAVs, and ground vehicles with shrouded or cooled exhausts. Such aircraft are detected at -2 from a 270 degree angle off the rear, and -1 from other arcs. Ground vehicles are detected at -1 from front or rear or one side, depending where the exhaust is, and normal chances otherwise. It also includes unarmored vehicles, which are detected at -1, except for a 30-degree arc from front or rear, depending where the engine is located. Vehicles with center-mounted engines are detected at normal chances, Ground vehicles powered by engines developing 250 horsepower or less also have an IR Stealth rating of 1. Vehicles shrouded by form-fitting camouflage nets also have an IR Stealth rating of 1,

IR Stealth 2
These are vehicles which have cooled exhaust and an insulated engine, such as the Warrior 2000 and the Stealth Leclerc. It also applies to aircraft like the Gripen, Eurofighter, Apache, Ka-52 series, and Rafale. Ground vehicles normally accomplish this with a combination of shrouded exhaust, insulation for the engine, APU, and air conditioner, along with form-fitting camouflage netting over the thermally-emitting portions. Note that firing a gun of over 60mm somewhat spoils this; see below. Vehicles and aircraft cause detection and missile detection to be at -3 from the

direction of engine, and -2 if observing or launching from the front are at -4. Launching a missile or firing a weapon spoils this for aircraft for one phase, and drops the vehicle down to -1 if the weapon is 60mm or larger for as long as the weapon is being fired.

IR Stealth 3

IR Stealth 3 generally refers to aircraft, usually generally Generation 4+ and 4++ aircraft, though it can refer to Generation 5 aircraft that are supposedly have IR stealth, such as the Chinese J-20 or Russian Su-47. It can also refer to early stealth, such as that of SR-71, These aircraft usually have some modicum of cooled engine exhausts and have critical surfaces protected by small amounts of RAM or carbon fiber construction, or RAM paint. In many cases. These aircraft can be detected and tracked by conventional aircraft or radar installations.

IR Stealth 4

IR Stealth for these aircraft is found in the F-22, B-2, and the X-43 UAV. These aircraft have their exhausts cooled by refrigerated "bricks" as well refrigeration in the leading edge of the wings and nose (partially for the nose). IR detection against these aircraft is at -2 levels from the anything but from the rear, and -1 level from the rear.

ECM & ECCM

An ECM-equipped vehicle (usually an aircraft, though some ground vehicles and ground installations have it), is equipped pods or internal devices that degrade the effectiveness of radar and missiles to guide them. They will be listed by level, with a medium range of their jammers. Jamming with ECM or counterjamming with ECM or ECCM is a Difficult: Electronics or Impossible: Pilot task.

ECM 0

The aircraft, ground installation, or ground vehicle has no native ECM capability, though it may have the equivalent of ECM based on an incidental by-product of their electronics. Most Generation 3 and 4 aircraft can use this to jam gun radars, and aircraft, gun installations, and ground vehicles with minor stealth shapes can jam radars at -1 effectiveness; however, this effect is intermittent and require an Electronics: Difficult or Pilot: Impossible roll every phase.

ECM 1

This category is for aircraft, vehicles, and ground installations that do have a modicum of actual electronics capability. Many older aircraft (those that have not been upgraded, that is) such as the MiG-21, A-4, F-100, etc, have this level of EW protection. Like ECM 0, this ECM level also jams gun radars. Some ground vehicles (other than ground radars) also have this level of protection, mainly to defend against radar and radio-guided missiles, or spoof aircraft search radars or ground surveillance radars. Radar detection against these vehicles or equipment is at -1; guiding a weapon against the protected vehicle is at -2. The protected item may also attempt to break a lock-on; this has normal chances and may be attempted once per phase.

ECM 2

These are found on newer Generation 3 or Generation 4 aircraft, some ground installations such as Hawk or Patriot batteries or semi-older Eastern air defense systems. They have most of the characteristics of ECM 1, but jam detection at -2 and weapons at -3. Some ground vehicles have this level of protection. They also can jam radios at normal chances.

ECM 3

Found in Generation 4+ and Generation 4++ aircraft, these are usually internal to the aircraft and highly miniaturized. Aircraft such as the EF-105, B-52, F-15, and MiG-29 have this level of protection. It is also the standard of EW aircraft such as the F-4G, and EA-6B of course generally carry several pods driving extra ECM capability, jamming which covers friendly aircraft in a 60-degree arc from the jammed aircraft or installation, and extra ECCM capability, which is equivalent to ECCM 3. Large bombers such as the B-52 generally carry two ECM level 3 pods internally as part of their defensive EW suite. Many of this type of aircraft also carry ARMs to take out discovered ground vehicles and ground installations. ECM 3 have most of the capabilities of older pods, but jam detection at -4 and weapons at -3. They can jam radios in range at a probability of +2.

ECM 4

This level of protection is carried by the most protected aircraft, such the MiG-31, F-14, and aircraft such as Air Force One and AWACS-type aircraft. Some special operations aircraft are also so protected. The EA-18 Growler also has this level of protection, depending upon which pods it carries (they normally carry ECM 4 pods, but sometimes carry older pods or a mix of older and newer pods. Some stealth aircraft also carry this defense internally, such as the F-35, F-22, F-117A, Su-57, and the fictional F-19 and MiG-28. They do not normally carry radio jamming gear, as it causes decreased RCS. They jam radar detection at -4, and weapons guidance at -5.

ECCM

ECCM-equipped vehicles (rare on ground vehicles, uncommon on ground installations, common in aircraft) use part of their EW suite to counteract the ECM emissions of opposing aircraft, ground installations, and ground vehicle radar installations. ECCM is usually built into the aircraft's, ground installation's, or ground vehicle's electronics; however pods may be carried to increase ECCM capability.

ECCM 0

The aircraft, ground installation, or ground vehicle has no ECCM capability.

ECCM 1

The aircraft, ground installation or vehicle degrades ECM capability by +2.

ECCM 2

The aircraft, ground installation or vehicle degrades ECM capability by +3.

ECCM 3

The aircraft, ground installation or vehicle degrades ECM capability by +4.

ECCM 4

The aircraft, ground installation or vehicle degrades ECM capability by one level.

Flares & Chaff

Flares are essentially shat they sound like, small flares. However, they burn much hotter than a standard flare as you might hold in your hand. They also leave a pronounced smoke trail when fired. Emitting flares makes thermal imaging, Image Intensifiers, FLIR, and Passive and Active IR two levels more difficult when fired and for the time that they burn.

They also spoil night vision, making it one level more difficult to observe anything within range. They can decoy IR-guided missiles, making them one more difficult to hit a targeted aircraft.

Ground-launched flares, such as launched by a vehicle, may be fired from standard smoke grenade launchers, rocket launchers, by howitzers, or hand-tossed using a hand grenade. They may be launched singly or in salvos. Aircraft can also fire flares; these are not as bright as ground-launched flares, but burn hotter. They are generally launched in groups three or four and, unless dropped from aircraft or helicopters at 250 meters of altitude or less, do not affect night vision on the ground (unless you are foolish enough to directly look at them).

ELINT and Radio Jamming

ELINT (Electronic Intelligence) and Radio Jamming (more commonly known in the US Army and Marines as MIJI or signals intelligence, are related activities that deal with jamming and/or gathering information from enemy transmitters, along with computers and intelligence experts breaking codes. MIJI stands for Meaconing (breaking into an enemy's radio network and impersonating an enemy transmitter in order to listen in to enemy transmissions, Intruson (breaking into enemy radio nets with the express purpose of transmitting false orders, data, and plans), Jamming (Brute-force interference with the enemy's use of their radio nets), and Interference (redirecting enemy radio transmissions so they get the wrong orders, or overlaying them with static, white noise, or even music or simple babbling).

ELINT is used to find, identify, and fix the positions of enemy transmissions so that MIJI can be applied, or the transmitters targeted for destruction by air or ground forces, or even UAVs or cruise missiles. It is the step taken before MIJI is applied to the enemy transmitter, as one needs to know the enemies' frequencies, the transmitters' locations, the strength and nature the transmitters (so methods of transmitter destruction may be determined), and the best means of applying MIJI measures.

A third component of ELINT is radar detection. This aspect of ELINT determines radar strength, radar type, radar operating frequencies, and location, as well as the target is using active jamming measures and using EW to eliminate these countermeasures.

ELINT 1

This level of ELINT is carried by most combat aircraft as well as some helicopters and even fewer ground vehicles. This essentially provides the third aspect of ELINT, which is successful on a roll of AVG: Electronics or DIF: Pilot. These rolls must be made once per 10 minutes to remain successful, and ECM can affect the success of these rolls. If the WSO or Pilot's roll is unsuccessful, he may then make another roll every minutes until it becomes successful or the aircraft, vehicle, or ground station crew give up. This capability first became available in the late 1960s in the Vietnam War, and in the 1968 Arab-Israeli was, with the first employment of Wild Weasels (specialized ELINT and radar-attack aircraft) and ARMs. By two decades later, most combat aircraft have ELINT 1 capability as part of their internal avionics, and they are becoming more miniaturized with time. RWR, IWR, and missile launch warning receivers are a variant of ELINT 1.

ELINT 2

ELINT 2 includes upgraded ELINT 1 (ESY: Electronics or AVG: Pilot). ELINT 2 also includes part of the MIJI equation, such as the Intrusion and Interference aspects, which are successful on a roll of DIF: Electronics or IMP: Pilot. These rolls otherwise follow the rules of ELINT 1. Many aircraft, a few EW vehicles, and some ground installations of the 1990s or later have ELINT 2 capability.

ELINT 3

ELINT 3 capability is typically carried by dedicated EW and ELINT aircraft, ground vehicles of the same nature, and

ground stations of the same nature. They have the same base capabilities as ELINT 2, though rolls are made at +1. They are also capable of the full spectrum of MIJI (with the same success rolls as the base MIJI that earlier ELINT-capable operators worked under for each aspect of MIJI). Computers are employed that can break simple radio codes such as CEOIs or OTPs in two hours or less (the computer must make a roll of 8 every ten minutes to break the code), electronic encryption such as AES (the computer makes a roll of 10 every ten minutes), and even frequency-hopping radios (computer must make a roll of 14 every 20 minutes). This may be augmented by human experts, with either their Electronics roll adding +1 per 6 points of the expert's Electronics roll. ELINT 3 capability is generally found only in ground stations, dedicated EW vehicles, or aircraft capable of doing serious ELINT work like AWACS and some special operations aircraft.

ELINT 4

ELINT 4 mimics much of the capabilities of ELINT 3, but success rolls are made at +3. They are also able to jam GPS signals (requires a dedicated computer and emitter, and a computer roll of 15, with modifications for operator skill, and the same rolls to keep up the jamming). The friendly station may also jam a UAV's control signals on a computer roll of 14, again with modifications for operator skill. UAV control signals may be hijacked and control passed to the jamming station on a computer roll of 4, augmented by operator abilities, and with the same rules as above to continue or meaconing (in the case of UAV takeovers). GPS jamming becomes feasible in the 2000s; jamming UAVs becomes possible in the mid-early 2000s, and taking over UAVs was first noted in Russian arms sale literature in 2008.

Note that ECM and ECCM can affect the success of ELINT.