CLEARING THE FUZZ: UNDERSTANDING ELECTRONIC WARFARE

Written by – Friedrick Psitalon

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WARNING: This is a really LONG guide. It's worth either printing out or bookmarking. Trying to read it all in one sitting has been proven by the surgeon general to make your eyes bleed, your nose run, your teeth to grow hair, and possibly even cause male pattern baldness.

Clearing the Fuzz: Understanding Electronic Warfare

Even for older players, Electronic Warfare (EW) are the subject of a great deal of controversy and a good bit of misunderstanding as well. As a new player, one of your greatest assets in neutralizing the advantage of older players is to understand precisely how these modules work, and utilizing them correctly to counter the advantages of your foes.

EW refers to any of the following:

Tracking Disruptors
Remote Sensor Dampeners
ECM-Jamming units (Jammers)
Target Painters

Each race has an EW unit which it specializes in using; there are ships of that race which have special bonuses to make that EW module more effective than it would be otherwise. This isn't to say that an EW module used in another race's ship won't be effective - just that they won't be as effective as they might be otherwise. (An Amarr ship COULD fit a Sensor Dampener - it just wouldn't have the same impressive effect it has with the Gallente.)

Each EW unit also has specific advantages and disadvantages, and while many pilots would argue the case, the position of this article is that all of them are relatively balanced. (Yes, I'm aware that some readers have just clicked away in a fury, and have absolutely no interest in reading further. No great loss there - for the rest, read on.)

The most important lesson about EW is that you should recognize what they are (and are not) good for - using them poorly will do you no good at all, and using them well will move mountains.

Tracking Disruptors, Joy of the Amarr

The Tracking Disruptor is probably the most underestimated of all the EW modules, but this may be partially due to the demographics of the game; TD's ruin a turret-user's day, but do nothing to missiles or drones. Arguably, missiles and drones are the most popular, given the number of Caldari (missile) and Gallente (drone) vessels, and the fact that both other races can also dabble in these weapons.

What It Does...For what they are designed for Tracking Disruptors can be devastating:

- Reduced turret optimal range
- Reduced turret tracking ability

Why That's Bad... For a turret user, the above can completely devastate their attack strategy. Long-range sniper vessels that operate at 85km with a 90km ideal range, struck with even a single Tracking Disruptor, will find himself totally unable to strike his target, as it will be out of range. For someone using short-range weapons, tracking will become an issue; short-range pilots tend to move swiftly around their target to avoid being hit and take advantage of the fast tracking of their weapons - and they will find their own guns are now unable to track fast enough to handle their own

movement, thanks to a Tracking Disruptor. (Also some short range weapons will find their range reduced so low that the pilot will have to quickly change their preferred orbit distance or be useless - and that takes time to do, and may force the pilot so close that they are easily countered with NOS, etc.)

Limitations of the Module... The biggest limitation of the Tracking Disruptor is that while it wreaks utter havoc on turrets, it does absolutely nothing to Missile and Drones. As a result, a Tracking Disruptor is a wasted slot, should you face most Caldari ships and a few Gallente ones as well. There are very few pure-turret ships, even amongst the Minmatar and Amarr, so while a Tracking Disruptor is very nearly an "off" switch for some modules, it has no effect on others. Using more than one version of this module DOES increase the effect, but stacking them incurs a penalty. After the third Tracking Disruptor, the effectiveness is drastically lessened. (On the other hand, there are exceedingly few ship designs that have turrets which will manage to hit with three Tracking Disruptors interfering... and only the Caldari fly ships which frequently have no turrets at all, so you can be nearly certain of stopping at least one turret.)

Countering the Tracking Disruptor... The antithesis of the Tracking Disruptor that no turret-heavy ship should be without is the Tracking Computer. This gives the player bonuses to precisely the same categories a Disruptor weakens: Optimal Range and Tracking Ability. Although the bonuses are not precisely equivalent to the penalty, this is the best option you have, and can give you a fighting chance to deliver damage with your turrets.

*Tracking Disruptors Are More Effective On...*Typically, a TD will be most effective on a slower ship that relies on long-range combat. While short-range boats can have their tracking ruined, a short-range boat can also counter this effect by simply slowing down. Snipers, on the other hand, typically are not built for speed, and cannot rapidly close the distance in order to fight you at their "new" range. When you rush them, if you do so with a reasonable transversal, their long-range (now shorter), slow-tracking (even slower-tracking!) guns will be unable to hit you. Any ship set up for sniping (esp. Megathron, Apocalypse, Moa) will be very unhappy to find themselves target-disrupted. Frigates, however, are typically capable of countering a TD with good flying, a web to slow their target down, and short-range combat.

Tracking Disruptor Modules
(in order from least to most effective)
Tracking Disruptor I (lowers range/tracking to 67.5% of normal)
'Abandon' Targeting Disruptor (64.1% of normal)
F-392 Baker Nunn Targeting Scrambler (60.8% of normal)
DDO Photometry I Targeting Interference (57.4% of normal)
Tracking Disruptor II (54% of normal)
Balmer Series Targeting Inhibitor (54% of normal, but much easier to fit/less cap use)

Preferred Racial Ships... The Amarr race prefers the Tracking Disruptor, and the ships which grant TDs a bonus are the Crucifier (Frigate), Arbitrator (Cruiser), and Pilgrim/Curse (Recon Cruiser.)

Skills to maximize Tracking Disruptor effectiveness:

Weapon Disruption (less cap use - requires Electronics III)
Turret Destabilization (Even lower optimal range and tracking speed- requires Electronics V, Weapon Disruption IV)
Long Distance Jamming (Increase optimal painting range - Requires Electronics IV, Electronic Warfare III)
Frequency Modulation (Increases falloff range - Requires Electronics III, Electronic Warfare II)

Tracking Disruptors are effectively on one end of the "EW spectrum." They always work, and work very well on any turret they meet, but don't work on ships that have no turrets. The next module to be discussed works a little less well, but works on a few more ships.

Remote Sensor Dampeners: The Gallente's Love From Afar

Remote Sensor Dampeners work very similarly to Tracking Disruptors, but instead of working on Turrets, they work on sensors - which everyone relies on. This makes them considerably more useful for dealing with all kinds of opponents, but just like Tracking Disruptors, there are specific types of combat which Remote Sensor Dampeners are less effective in defeating.

What It Does... Remote Sensor Dampeners ruin opponent sensors by:

- Lowering Maximum Targeting Range
- Lowering Sensor Resolution

Why That's Bad... No weapon system functions ideally if it cannot lock on to its target. Turret users are absolutely out of luck and cannot even fire. Missile users can only use friend-or-foe missiles, which target erratically and do less damage. Drones will react to a sensor dampener by attacking, but only if they are already deployed - targets which are dampened before the drones are released will find drones useless. In short, a ship which is outside of its targeting range is almost powerless to fight back. Additionally, even when a ship does reach its new, crippled targeting range, the lowered sensor resolution means that the ship will take much longer than normal to actually achieve a target lock; when fighting frigates and interceptors, the difference can be jaw-dropping.

Limitations of the Module... Ultimately, when a target finally achieves a lock on you, that lock stays. The only way to break that lock is to actually retreat out of the new maximum sensor range - which isn't always possible. Unless you have some means to keep your opponent at a very specific distance, Remote Sensor Dampeners only buy time. (That can sometimes be quite a long time, but eventually, locks will be had.) Many players use enough of these modules to push their opponent's range under 20km, where they can be warp-scrambled, or in some cases, 10km, where they can be webbed and scrambled. While multiple Remote Sensor Dampeners CAN be used, like Tracking Disruptors, they do have penalties associated with stacking them up on a single target.

Countering Remote Sensor Dampeners... The foil to this system is the Sensor Booster, which increases maximum targeting range and sensor resolution. These are quite popular modules for players to use on larger ships to lower lock times and use long-range guns, so there is a good chance that you could be working against some defenses right from the start.

*Remote Sensor Dampeners are most effective on...*Ironically, these modules are possibly the most brutal on ships that already have short targeting ranges - frigates, especially interceptors. These ships typically do not have the module slots to fit sensor boosters on their own, and since they already have quite short targeting ranges, interceptor pilots can find themselves with such short targeting ranges so as to whip past a target and be back outside maximum targeting range again! (Interceptors also rely on very fast locking times, which can be spoiled as well.) RSD's are good on cruisers as well, which tend to have medium targeting ranges and speeds, but are probably not packing sensor boosters. Battleships often utilize sensor boosters, but enough RSDs can still be fairly effective in cranking their lock times up. Pushing battleship targeting range lower than they can fire will only work with snipers, though, as close-range battleships typically have more than enough targeting range, even dampened.

Remote Sensor Dampener Modules
Remote Sensor Dampener I (Lowers Targeting Range and Sensor Resolution to 65% of normal)
Kapteyn Sensor Array Inhibitor (61.75% of normal)
Indirect Scanning Dampening Unit (58.5% of normal)
Low Frequency Sensor Suppressor (55.25% of normal)
Remote Sensor Dampener II (52% of normal)
Phased Muon Sensor Disruptor (52% of normal, and much easier to fit than a RSD II)

Preferred Racial Ships... The Gallente have the ships with the bonuses for these modules; specifically the Maulus (Frigate), the Celestis (Cruiser), and the Arazu/Lachesis (Recon Cruisers.)

Skills to maximize Sensor Dampener effectiveness:

Sensor Linking (less cap use - requires Electronics III)
Signal Suppression (Lower target range and resolution - requires Electronics V, Sensor Linking IV)
Long Distance Jamming (Increase optimal painting range - Requires Electronics IV, Electronic Warfare III)
Frequency Modulation (Increases falloff range - Requires Electronics III, Electronic Warfare II)

Remote Sensor Dampeners are the next step in the direction away from the Targeting Disruptor. They are more effective against more targets, but have more potential to fail altogether beyond a certain level of effect. (Whereas a Targeting Disruptor has less targets it can effect, but really ruins their day.) These modules are somewhat popular, as indicated by the price they tend to run. Clearly, the most popular EW modules, however, are ECM-Jammers.

ECM-Jammers: The Caldari Juggernaut

Easily the most controversial and most popular of the EW modules is the Jammer. Like the RSD, the Jammer works on any type of ship that it comes across. There are actually two varieties of Jammer; Multi-spectral (moderately effective against all), and Race-Specific (Effective against a specific type of ship.)

What It Does... ECM have a random chance of simply turning OFF enemy targeting abilities for 20 seconds. This chance is based on two factors:

- Target's ship sensor strength
- Jamming strength of the ECM module

(Many people think that the sensor strength of the jamming ship comes into play; this is simply untrue - a frigate mounting an ECM is just as effective as a battleship mounting one, unless the ship using it has a specific bonus to ECM.)

Why That's Bad... A successful jam means your targeting simply turns off; you can actively target zero ships. That means anything currently running stops - NOS stop draining, guns stop firing, standard missiles stop shooting. Drones will continue firing at a target, but if they destroy it, they'll decide on their own what to attack next. This condition lasts for twenty seconds per successful jam, and can "cycle jam" if the target is unlucky enough - repeated successful jams can make the jamming time last even longer!

Limitations of the Module... While many people will tell you this type of module is unfairly broken, it too has limitations. If the ECM fails to jam sensors, for 20 seconds the jamming ship gets absolutely no benefit from its modules at all - none - except wasted capacitor. Also, players who use the multispectral module are going to be using a healthy chunk of capacitor, and while the racial-specifics are cheaper to use, they affect one of four races. After the release of Kali, Jamming will be harder to pull off for any non-Caldari, and the Multispectral, which many argue is too effective currently, will be noticeably less potent in non-Caldari hands.

Countering ECM... There are a variety of ways to counter jammers, both directly and indirectly. Directly countering them can be done by fitting ECCM (Electronic Counter-Counter Measures) which fit in medium slots and use capacitor, and Sensor Backup Arrays, which fit in low slots and use no capacitor, but are less effective. Both of these modules increase sensor strength significantly, making the chance of a successful jam lower. (Admittedly, though, the chance of a jam is never zero.) These modules tend to be a bit less popular because they do absolutely nothing if the fitted ship is not being threatened with ECM. (Ironically, the same players fail to realize that ECM which are being thwarted have the same problem! Perhaps with the slight

weakening of ECM in Kali, this will become less of a problem.) Some players choose another route to help counter the effects of a Jammer - Sensor Boosters help a player who has been jammed reacquire their lock more quickly, cutting down on the total time wasted.

Some players take a much more aggressive approach to countering enemy Jamming, though: they either Jam or Damp the other vessel themselves! Although this is not always effective (many Caldari vessels have high sensor strength and fit Sensor Boosters to utilize Jamming at long range) it is another option.

A final alternative is Projected ECCM. While this will not work on your own vessel, there are modules that work very effectively to improve the sensor strength of another vessel. If you and a companion think there is a very high chance you will be jammed, projected ECCM is one possibility for greatly bolstering your defenses - if you both P-ECCM each other, you can double your sensor strength; something neither one of you could do with a single module by yourselves.

ECM is most effective on... Ships with low sensor strength; particularly tech-1 vessels of smaller sizes. Any ship that is faced with the specific anti-race jamming that matches their race is going to have problems, but smaller ships tend to suffer more. ECM-Multispectrals can be effective against all races, and part of the reason they are being weakened is due to the fact that while one Multispectral may fail, if you fit five, odds are fair that at least one will work, and that's all that is needed . Even Battleships (especially those not fit with anti-ECM) suffer from this threat.

ECM-Jamming Modules

Multispectral
ECM-Multispectral Jammer I (4.0 Jamming Strength)
Initiated Multispectral Jammer I (4.2 Jamming Strength)
Induced Multispectral Jammer I (4.4 Jamming Strength)
Compulsive Multispectral Jammer I (4.6 Jamming Strength)
ECM-Multispectral Jammer II (4.8 Jamming Strength, but hideous fitting/cap use)
'Hypnos' Multispectral ECM I (4.8 Jamming Strength, much easier to use)

Anti-Gallente, A.K.A. Magnetometric Jammers
ECM-Ion Field Projector I (6.0 Jamming Strength)
Initiated Ion Field ECM I (6.3 Jamming Strength)
Induced Ion Field ECM I (6.6 Jamming Strength)
Compulsive Ion Field ECM I (6.9 Jamming Strength)
ECM-Ion Field Projector II (7.2 Jamming Strength, but hideous fitting/cap use)
'Hypnos' Ion Field ECM I (7.2 Jamming Strength, much easier to use)

Anti-Minmatar, A.K.A. LADAR Jammers
ECM- Phase Inverter I (6.0 Jamming Strength)
Faint Phase Inversion ECM I (6.3 Jamming Strength)
Languid Phase Inversion ECM I (6.6. Jamming Strength)
Halting Phase Inversion ECM (6.9 Jamming Strength)
ECM - Phase Inveter II (7.2 Jamming Strength, hideous fitting/cap use)
Enfeebling Phase Inversion ECM (7.2 Jamming Strength, much easier fit)

Anti-Amarr, A.K.A. RADAR Jammers
ECM- White Noise Generator I (6.0 Jamming Strength)
'Penumbra' I White Noise ECM (6.3 Jamming Strength)
'Gloom' White Noise ECM I (6.6. Jamming Strength)
'Shade' White Noise ECM I (6.9 Jamming Strength)
ECM - White Noise Generator II (7.2 Jamming Strength, hideous fitting/cap use)
'Umbra' White Noise ECM I (7.2 Jamming Strength, much easier fit)

Anti-Caldari, A.K.A. Gravimetric Jammers
ECM- Spatial Destabilizer I (6.0 Jamming Strength)
FZ-3 Spatial Destabilizer ECM (6.3 Jamming Strength)
FZ-3a Spatial Destabilizer ECM I (6.6. Jamming Strength)
CZ-4 Spatial Destabilizer ECM I (6.9 Jamming Strength)
ECM- Spatial Destabilizer II (7.2 Jamming Strength, hideous fitting/cap use)
BZ-5 Spatial Destabilizer ECM I (7.2 Jamming Strength, much easier fit)

ECM- Burst, Effects all races out to a certain range, but very high cap use
ECM-Burst I (6.0 Strength vs all races, 5000m range)
'Rash' ECM Emission (6.3 Strength, 5250m range)
'Deluge' ECM Burst I (6.6 Strength, 5500m range)
1-Z3 Subversive ECM Eruption (6.9 Strength, 5750m range)
ECM-Burst II (7.2 Strength, 6000m range, hideous fitting)
'Cetus' ECM Shockwave I (7.2 strength, 6000m range, good fitting)

ECM-Burst can be very tough to use, since it has the serious drawback of hitting anyone nearby - including friendlies. It does provide a nice "all races" option, however, to someone with a great deal of capacitor to spare, or a high capacitor-stealing rate.

Preferred Racial Ship The Caldari have all the bonuses when it comes to ECM. They have ships with bonuses to ECM strength, ships with bonuses to ECM distance, and ships with bonuses to ECM capacitor usage. They are: Griffin (Frigate), Blackbird (Cruiser), Scorpion (Battleship), Falcon/Rook (Recon Cruisers.)

Skills to maximize ECM-Jammer effectiveness:

Electronic Warfare (less cap use - requires Electronics III)
Signal Dispersion (greater Jamming strength - requires Electronics V, Electronic Warfare IV)
Long Distance Jamming (Increase optimal painting range - Requires Electronics IV, Electronic Warfare III)
Frequency Modulation (Increases falloff range - Requires Electronics III, Electronic Warfare II)

ECM are by far the most controversial of the EW modules, because of their ability to simply "shut off" an opposing vessel. Of all the EW, though, Jammers have the highest ability to fail: they are an all-or-nothing module. Many players find that too random, and very frustrating. Players tell stories of entire fights where they never got off a shot, and so they are infuriated. What they may not realize is that there are other

fights where they were never jammed once, and their opponent was churning away with ECM. Those fights, unsurprisingly, never get made into news. The strength of all Jammers is being lowered somewhat in Kali, and jammer-bonus modules available for the lows, though, in response to the problem of ECM - that any single successful module is all it takes. What will the fate of jamming be in Kali? Time will tell, but if you're not flying Caldari and you like jamming, be worried.

Target Painters - Building a Bigger Bang, Minmatar Style

The least used of all the EW modules is the Target Painter, though it is by no means a useless module. Target Painters work on the principle that weapon systems - all types - only see so well, and a Target Painter brightens up that target to make it that much easier for the weapon system to see, with the effect Minmatars love to see so much: boom.

What It Does... Target painters work by increasing the signature (target size) of an opposing ship. That means:

- Bigger guns which normally fire near a small ship but miss will start hitting (and doing lots of damage.)
- Missiles which usually explode near a target for small damage will explode ON a target for big damage.

Why That's Bad... Battleship guns do battleship-sized damage. Part of the reason frigates don't need to be as afraid of battleship guns is that the sensors on battleship guns are built for other big targets - they don't see frigates very well. As a result, they tend to near-miss a frigate a decent amount of the time. Target Painters light smaller ships up so that bigger guns can see them much better - and so a frigate will suddenly have to endure battleship-sized amounts of damage... which it won't do for very long! The same thing goes for missiles - heavier missiles have a harder time closing with small targets; target painters help with that.

Limitations of the Module... The big limitation of a target painter is that they usually only do any good with big guns vs. small targets. A frigate's guns will always see a frigate, a cruiser's guns will always see a cruiser, and so on. Battleships don't tend to run into frigates in combat (frigates often run away) and so target painters aren't helpful. Bigger ships often have drone bays or missiles, which can both do enough damage to repel a frigate, even if it is not the "ideal" solution. As a result, this is a less commonly used form of EW. It does counter small ship size as a tool of defense, but many other options exist. The other problem with target painters is that their effectiveness is somewhat limited: a target painter might move the effective signature of a frigate from 33m to 44m, but that's not going to be much help to a battleship whose guns see in blocks of 400m! The best target painter only increases a target's size by 30% - which isn't going to be enough to see major returns for the expended module slot. Again, though, missiles always enjoy a benefit.

Countering Target Painters... Here's the good news for Target Painter users: you can't be countered. Someone can jam you, damp you, or disrupt you as normal, but otherwise, you're gold. There is no module which lowers signature radius, and some

of the smaller, faster ships really hate being painted. (How much good it'll do, we've discussed above.)

Target Painters are most effective on... Ships being hit by missiles. More so than with turrets, missiles really enjoy the benefits of a target painter, as it only cranks their damage upward. (The only target that is not going to suffer more damage from a target painted missile is one that is already quite large and quite stationary.)

Target Painting Modules...

Get ready for some long names...

Target Painter I (25% sig increase)
Partial Weapon Navigation (26.25% increase)
Peripheral Weapon Navigation Diameter (27.5% increase)
Parallel Weapon Navigation Transmitter (28.75% increase)
Target Painter II (30% increase, worst fittings)
Phased Weapon Navigation Array Generation Extron (30% increase)

Preferred Racial Ship... The Minmatar Vigil (Frigate), Bellicose (Cruiser), and Huggin/Rapier (Recon Cruisers) all get a bonus to this module, but none of these ships are terribly popular. Huggins and Rapiers are not unheard-of, however, because they also get an impressive bonus to webifier range. (Painted and webbed ships are seriously endangered.)

Skills to maximize Target Painter effectiveness:

Target Painter (less cap use - requires Electronics III)
Signature Focusing (higher sig increases - requires Electronics V, Target Painting IV)
Long Distance Jamming (Increase optimal painting range - Requires Electronics IV, Electronic Warfare III)
Frequency Modulation (Increases falloff range - Requires Electronics III, Electronic Warfare II)

And there you have it....

While most players understand ECM (at least well enough to use it) few players understand the true potency of all the EW modules; especially when they are most and least useful. Fully understanding when a Tracking Disruptor is better than a Sensor Dampener, and when you really don't need to gamble on an ECM-Jammer, because a better option is open... well, that can make the difference between winning a fight, or taking a trip home in your pod. Like drones, missiles, and gunnery, EW is something that requires a great deal of dedication to be good at. While EW may be far less glamorous because it causes no damage, a winning team will never ignore it. Think of it this way:

EW will never win a fight all by itself - but it sure can make sure who loses.

Good luck!