



THE THREAT

# Gunnery Crews Plugin

Version 3 (Release)

by  
Kurt Fitzner



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# 1. INTRODUCTION

**From:** Ban Danna & the Admiralty of the Argon Navy  
**To:** Argon Merchants  
**Subject:** Khaak Research

The tragedy at President's End was a terrible event. Many people - civilians and the military who were sworn to protect them - lost their lives there. The appearance of a previously unknown and militantly hostile race caught everyone by surprise. This surprise has fueled wild speculation and not a little panic. Rumors abound of Khaak super weapons and terrible military defeats.

I am here to tell you these rumors are false! The Argon Navy has not stood idly by in the face of this new enemy. We have significantly increased sector patrols in key areas. Pairs of heavily armed corvettes are a common sight in Argon sectors, helping to keep our space lanes safe.

We haven't stopped there. The Argon military has now completed a full analysis of the recent Khaak conflict. Specifically with respect to reports of a significant Khaak superiority in weapons technology.

While it is true that Khaak weapons are very effective, reports that they are vastly superior to Argon weaponry are simply not true. In fact, Khaak weapons are actually slightly less effective than ours. Where they have had an advantage up until now is in the "general purpose" nature of their weapons.

This information package is intended to give you the facts about the Khaak weapons, and to fill you in on new initiatives from the Argon Navy aimed at not only increasing our effectiveness against the Khaak, but yours as well.

Our brightest and best engineering teams at Omicron Lyrae have worked day and night in conjunction with the finest tactical minds in the Federation. I encourage you to take advantage of what they have come up with.

*Ban Danna*

# 2. WEAPONS COMPARISON

## 2.1 KHAAK WEAPONS TECHNOLOGY

The Khaak seem to have focused their weapons research in a single area - that of kyon particle emission. All Khaak weapons encountered to date have been based on this principle. Kyon emissions are extremely rapid - traveling over 8000m/s. The largest ship-mounted weapons encountered don't seem to be able to hold a kyon beam coherent for much over 4000m - roughly the same range as an Argon ship-mounted Gamma Photon Pulse Canon.

Probably because of their focus on a single weapons technology, they have developed their kyon technology to a high degree. Khaak weapons have two main areas of strength. One is their incredible speed - essentially instantaneous at their maximum range. The second strength is their





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that could increase the effectiveness of the weapons we have. What has resulted is a breakthrough in command and control technology we call the “**AEGIS Weapon System**”

This is not a weapon in and of itself, or even one piece of hardware. What it is is a series of interrelated upgrades to a ship's computers, tracking, sensors, human-machine-interface (HMI), and related infrastructure. In the past, many control systems on board ship have been operated independently of each other. The AEGIS system is essentially the unification of many disparaging and independent systems into a cohesive, linked whole.

It allows for the tracking of multiple targets, while assigning each a threat level. It automatically assesses the best engagement order for ships and feeds that data to the crews at the local gunnery control rooms.

It offers command personnel choices of broad targeting options, then breaks that down into the necessary goals that each gunnery team needs to accomplish to obtain the overall objective. Incoming threats are automatically assessed, tracked, and assigned to a weapon system independent of operator control, or in an operator-assisted mode.

## 4. HOW TO USE

You will have three new commands appear on your turret menu. These commands (described in detail below) need actual crew in order to work. These commands are the command-system representation of the updated military doctrine taught now to the Argon Navy and being made available through the merchant marine initiative.

The number of crew you must have to implement the new training doctrine depends on the class of ship you have:

<i>Class</i>	<i>Crew per Turret</i>	<i>Support Crew</i>
Heavy Fighter (M3)	1	0
Small Transport (TS)	2	0
Personnel Transport (TP)	2	0
Corvette (M6)	3	0
Large Transport (TL)	5	0
Teladi Albatross (TL)	10	0
Carrier (M1)	5	20
Destroyer (M2)	10	50

*Table 1 - Crew Requirements*

The needed "Military Personnel" are, as mentioned above, now allowed to be hired out to approved organizations as they become available. Availability is short, however. You will find “**Military Transports**” flying through argon territory. These are converted civilian passenger ships used as troop transports. These transports provide all the available Military Personnel to equipment docks and trading stations throughout Argon sectors.

When a transport lands, you had best snap up any crew available quickly - they are in short supply and demand is extremely high.

Once you obtain the crew, you will of course have to pay them. Highly trained military personnel don't come cheap, and the new merchant marine program is being funded through the merchants that reap the benefits. The basic crew salary is 100 credits per crew person per hour. This is to be paid whether



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they are active or not.

Of course, there are more costs associated with an active gunnery crew. Maintenance, supplies, infrastructure, retraining, drills... remember, you will be essentially responsible for an active military unit. It is the experience of the Argon Navy that the general cost for an active gunnery crew program comes to around 1,500 credits per hour per crew person. The extra maintenance, training, and supplies needed for the advanced AEGIS Weapon System will approximately double that cost.

Remember, while you are covering the costs of these personnel, and while they will follow your orders, they are still members of the Argon Navy, and they are in short supply. If you do not put them to use, they have been directed to contact the Admiralty for reassignment.

Once you have enough crew, the following ship commands are available:

### **4.1 ACTION STATIONS**

“**Gunnery Crews: Action Stations**” turret command – orders the gunnery crews to man the ship's turrets and prepare for enemy engagement. This order also implies “weapons free” – that is, the gunnery crew will engage all enemies. Crew training includes the following benefits:

- **Target prioritization:** Targets are prioritized in the following way:
  1. All gunnery crews in all ships in a formation will first attempt to engage the target of the flagship<sup>2</sup>.
  2. If unable to engage the flagship's target, gunnery crews next attempt to target ships currently firing on them.
  3. With an **AEGIS** Weapon System installed, additional target prioritization is performed based on the target's class. Gunnery crews will attack enemy ships in order of their assessed threat level – engaging the most dangerous ship in range of their local turret until that ship is destroyed or out of range, then re-targeting on the next most dangerous ship. Target assignments for small (M4 and M5 targets) are spread over all turrets to avoid wasting weapons fire on targets that need only one turret to engage effectively. Without an AEGIS Weapon System, gunnery crews target the first enemy that comes into their sights.
- **Automatic gun selection:** In order to maximize weapon usefulness and take advantage of the superior weapons available in different weapon classes, guns are selected based on the type and range to the target while in an engagement.

Thus, if you have both Gamma HEPT and PPC lasers available, it will use the PPC at long range, then switch to the higher powered GHEPT when close enough.

If the turret has extra effective anti-shield weapons, then those will be used until the target shields are down, at which point the crew will switch to anti-hull weapons.

Weapon selection is performed based on the following criteria:

1. If the target shields are above 5%, then gunnery crews will first attempt to use any extra-effective anti-shield weapons that are available (Ion Disruptors or Phased Shockwave Generators). As these are area-effect weapons, they will only be used if there are no non-combatants in the weapon's effective range.
2. If the target's shields are below 5%, or if anti-shield weapons cannot be used due to non-

<sup>1</sup> “Military Personnel” that are on a player-owned Equipment Dock or Trading Station are subject to being reassigned. Those that are on a ship and are in excess of the number of crew that ship can possibly use are also subject to reassignment. They will not be reassigned if they are on a ship but not active unless there are more on that ship than could be used if they all were active.

<sup>2</sup> “Flagship” means the ship that has the player on it. All turrets on all ships will first try to engage whatever enemy the player's ship has targeted.









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The AEGIS upgrade will make the "Action Stations" command more efficient at shooting down fighters, but will have little effect when in combat against a capital ship.

**Q:** Isn't the AEGIS Weapon System upgrade a little expensive?

**A:** As mentioned above, it's not required in order to use gunnery crew. It's an optional component. It makes your ship better able to engage large numbers of fighters and shoot down incoming missiles. It will make a Titan about twice as effective against fighters. How much would another Titan cost? The real benefit of the AEGIS system is to concentrate combat power. Two ships are always more difficult to coordinate than one.

The AEGIS system also makes available the command "Gunnery Crews: Maximize Captures". Capture a single Xenon K, certainly no more than two, and it will have paid for itself.

In summary, yes, it's very expensive. But at some point, you have to ask yourself... what else do I have to spend my money on?

**Q:** How do I get crew?

**A:** There will be passenger transports flying through Argon space carrying Military Personnel. Follow them.

**Q:** Is there any easier way to find the military transports?

**A:** If you have your own Equipment Dock, you can access a report through the dock's command console that will give you the location of all military transports currently operating.

**Q:** Why does it cost so much to operate a ship with gunnery crew?

**A:** The Gunnery Crews commands are completely useless for out-of-sector combat. They give you in-sector benefits only. As such, you don't need to use the Gunnery Crews commands on patrol ships. Just ships you will be taking with you into battle.

The maximum cost to operate a ship is 270,000 credits per hour (half that if you don't have an AEGIS upgrade). This is approximately the profit from two or three solar power plants if you operate your ship at "Action Stations" continuously. A single assassination mission will provide enough money to operate your ship for 5-80 hours (depending on your combat rating).

Additionally, modern warships don't go around continuously at action stations. Besides crew fatigue, one reason is the cost. If cost is a factor for you, then only run the Gunnery Crews commands when you are going to go into a serious battle. Get involved in the moment. Prepare for combat... you give the order to go to action stations. Makes things sort of cool, if you ask me.

**Q:** Why do all the Boron, Teladi, and Argon ships have gunnery crew too?

**A:** They are generally friendly with the Argon, who (according to the fiction surrounding this upgrade) invented the Gunnery Crew training.

In balance terms, the AI ships were always way too weak. This helps give them more challenge.

**Q:** What about the Khaak? Aren't they way too powerful now?

**A:** That's a matter of opinion. I can still take out a Khaak Destroyer one-on-one with a gunnery crew equipped Titan in about ten seconds (that isn't an exaggeration). Without the gunnery crew script installed, I could hardly ever take out a Khaak Destroyer with a Titan. This plugin *does* make the Khaak harder, but things are still *much* the same as they were before. A Titan without gunnery crews can't take out a Khaak Destroyer without gunnery crews. A Titan with Gunnery Crews can take out a Khaak Destroyer with gunnery crews.

**Q:** Yes, but what about attacking a Khaak Destroyer with multiple friendly destroyers. Say, with five Teladi Phoenix. Before this upgrade I could take out a Khaak Destroyer that way without losing any ships. Now I lose two or more.

**A:** First of all, this is arguably not a bad thing. Once you get to the point where you are pushing Khaak Destroyers around, what else is there left to do in the game? This plugin makes Khaak Destroyers harder, absolutely. The question remains, is this a bad thing?

That being said, with some setup, you can take out a Khaak Destroyer without losses. If you approach a





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<i>Version</i>	<i>Description</i>	<i>Changes</i>
1.03	Unreleased	<ul style="list-style-type: none"> <li>Altered the initialization mechanism to conform to current setup script methodologies.</li> <li>Added the "Hire Gunnery Crews" ware to a second equipment dock. It is now available in Argon Prime and Omicron Lyrae.</li> </ul>
1.04	First public release	<ul style="list-style-type: none"> <li>Added an automatic update system so commands could restart themselves when updated.</li> </ul>
1.91	First beta of version 2	<ul style="list-style-type: none"> <li>Added missile engagement</li> <li>Stub functions in place to support automated "anti-missile missiles"</li> </ul>
1.92	Second beta of version 2	<ul style="list-style-type: none"> <li>Fixed a potential hang issue where missiles that are engaged at long range can cause the game to hang. Sorry about that.</li> <li>Reduced the engagement range of missiles to the maximum CIWS laser range, instead of the maximum main laser range. This allows the missile to get in closer before it is engaged. Hopefully this is a GOOD thing, as it will reduce the time spent engaging the missile (as the shots have less distance to travel and WMDs can be used immediately) and allow the turret to re-target back on ships.</li> </ul>
1.93	Third beta of version 2	<ul style="list-style-type: none"> <li>Added XML language files for French, Spanish, and German.</li> <li>Fixed the README so that Omicron Lyrae is mentioned as a selling point.</li> <li>Fixed a bug introduced in 1.04 where the "Hire Gunnery Crews" ware would not appear in the equipment dock unless you had previously used version 1.03 or earlier.</li> </ul>
1.94	Fourth beta of version 2	<ul style="list-style-type: none"> <li>Fixed a bug where enemy missiles were always being engaged regardless of whether or not they were a threat.</li> <li>Added the "Gunnery Crews: Missile Defense" command which will engage incoming missiles (which are a "threat") fired at you from beyond 2500 meters with one of your own mosquito missiles.</li> </ul>
1.95	Fifth beta of version 2	<ul style="list-style-type: none"> <li>Altered the gun selection logic so that a GHEPT is not selected as a "Heavy" laser if the turret can mount Gamma PPCs. This is because both weapons do the same damage to the hull, and the GPPC is much faster.</li> <li>Added the Bridge Control command that allows you to take manual firing control of a turret via the joystick's fire button. A helper program called JoyScript is required to support this.</li> </ul>
2.00	Version 2 (finally!)	<ul style="list-style-type: none"> <li>Script restarting is finally working properly. For any future version, you will now only have to install the code and all ships will restart any turret commands that are running to make use of the new code.</li> <li>There is now only one message per ship when turrets restart, instead of one message per turret.</li> <li>The "Bridge Control" command configuration has been commented out in the script "setup.plugin.guncrews.xml". This means that the "Bridge Control" command will not appear on your menu. This command should work, but is considered unsupported in version 2. Version 3 will be the version that contains this code. If you want to use it, then you must uncomment the lines in the setup script.</li> </ul>



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Version	Description	Changes
2.10	Version 2.1 release	<ul style="list-style-type: none"> <li>The "Bridge Control" command has been uncommented. An upgrade in the JoyScript utility allows the system to detect when it's running. When you are running JoyScript and it is configured properly, then the "Gunnery Crews: Bridge Control" command will be available. When JoyScript is not running, then you will not be able to access that command. You must have JoyScript version 1.04 or later for this to work.</li> <li>The "Minimum Safe Distance" that you must be from a non-enemy is now dependent on what Weapon of Mass Destruction you are using. If you are using a Gamma PSG, then the distance is 7km, otherwise it is 5.</li> <li>The minimum engagement distance (the distance that you must be away from a missile fired at your ship) that you must be before an anti-missile is launched is now dependent on the class of ship you are in. If you are in an M1/M2, the distance is 2.5km. If you are in an M6, the distance is 750m. If you are in an M3 (Argon Nova only) then the distance is 500m.</li> <li>New turret command, "Gunnery Crews: Maximize Captures". With this command, smaller weapons are favored over larger ones, and WMDs will be used regardless of the shield status of the enemy (but not regardless of whether or not friendlies are in the area). This is an attempt to maximize the number of captures over kills.</li> <li>New "Additional Ship Command" command, "Gunnery Crews: M5 Wasp Assault". This command launches one or two wasp missiles at every M5 within 23km of your ship. While this probably isn't terrible useful, it is a whole lot of fun to take out a 20 ship Khaak cluster this way.</li> </ul>
2.11	Version 2.11 – bug fix release	<p>Note, the file "plugin.guncrews.engagemissile.xml" was deprecated in version 2.10. From this release on, it is no longer included in the distribution. You are free to delete it from your &lt;X2&gt;/script directory.</p> <ul style="list-style-type: none"> <li>The "Missile Defense" command will now no longer fire missiles during out-of-sector combat. It's highly doubtful that anti-missiles are even effective while OoS.</li> <li>Turrets will now engage all incoming missiles if they are not currently busy engaging a ship. They continue only to engage missiles that are deemed a threat to the ship when they are already engaging a ship.</li> </ul>
2.91	First beta of version 3	<ul style="list-style-type: none"> <li>Added the AEGIS Weapon System ware</li> <li>Deleted the Hired Gunnery Crews ware and wrote upgrade code that will delete the ware from any ships it was installed on. This script no longer conflicts with the Hull Repair System script.</li> <li>Added target prioritization by class - the system can now search for the best target available on a per turret basis.</li> <li>Made "fast gun tracking", Missile Defense, Wasp Missile Assault, and turret target re-prioritization for missile interdiction (along with the new target prioritization) all functions of having the AEGIS Weapon System installed.</li> <li>Added checks to make sure "Military Personnel" are on your ship before you can use turret commands.</li> <li>Added crew payment (5000 per crew per hour)</li> <li>Added an Artificial Life plugin to spread Military Personnel around Argon sectors in transport ships.</li> <li>Wrote a slightly better "fiction" to explain this system.</li> <li>Setup script places the AEGIS Weapon System in Argon Prime, Omicron Lyrae, and 5 other random Argon Equipment Docks</li> </ul>



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Version	Description	Changes
2.92	Second beta of version 3	<ul style="list-style-type: none"><li>• Wrote an even better “fiction” and made it look all spiffy – aren't PDF files cool?</li><li>• Fixed the weapon selection logic – in certain cases it was possible to try and switch to a null weapon. Whoops.</li><li>• Fixed a bug in the payment code where a player was charged for only one crewman per turret. What a bargain.</li><li>• Added code to prepare for a signed vs unsigned version split to make upkeep easier</li><li>• Rewrote the player base and ship search code (originally for the upgrade section) as a general lib function so it can use reused in the AL plugin and any other scriptwriter's code.</li><li>• Changed the “M5 Wasp Assault” command to a “Missile Assault” command where you can select between Mosquito or Wasp missiles. This allows you to use mosquito missiles to get the attention of all enemy ships in range.</li><li>• Idle crew now cost 500 credits per hour. Active crew still cost 5000 per hour.</li><li>• If you are carrying more crew on your ship than your ship can use, then on average 25% of them will leave every half hour of game time.</li><li>• If you have crew on an equipment or trade dock, on average 25% will leave per hour.</li><li>• Time that Military Personnel remain in “stock” after an AL transport dock reduced. Now from 1 to 5 minutes.</li><li>• Outer loop timing changes. Attack Enemies and Maximize Captures now check for newly purchased weapons every minute (was every 10 seconds).</li><li>• Changed position of crew number check to eliminate duplicate “Emergency Message” announcements.</li></ul>
2.93	Third beta of version 3	<p>Mostly small tweaks aimed at increasing efficiency and removing weaknesses. Working on getting the best possible kill rate.</p> <ul style="list-style-type: none"><li>• Target prioritization now takes the range to target into account when selecting the best ship to engage.</li><li>• Turret now allowed to use PSG weapons to kill M5 fighters (previously a turret would switch to a non-WMD once the target shields were down). This is intended to allow area effect weapons more leeway in killing swarms of small ships.</li><li>• Checks for incoming missiles are now performed every 5 shots. Previously this was done every 10. Potentially, this was 2700ms between checks – enough time for a missile to slip through the defenses.</li><li>• It was possible in rare instances for a turret to perform a tracking maneuver on a non-existing target. Thanks to ticaki for pointing this out.</li><li>• A few waits were added to the Military Transports AL timer event.</li><li>• Changes to some sound effects. The Missile Assault command sounds a lot better now (I think).</li></ul>



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Version	Description	Changes
2.94	Fourth beta of version 3	<ul style="list-style-type: none"> <li>Fixed a targeting that caused a turret to go myopic (the next target it engaged had to be closer to the ship) right after it had made a kill – made the script three whole lines shorter too. Fixed a bug and made the code more efficient to boot. Yup, I'm just <i>that</i> good.</li> <li>Cost per hour for military personnel has been reduced – thank ticaki for that, I would have left it as it was. :) Now 50 credits per hour for inactive crew (basically nothing), and 3000 credits per hour for active.</li> <li>Code is in place that allows turrets to cooperate on which targets to engage. For starters, only one turret will engage an M4 or M5 fighter unless there aren't enough targets for every turret. No sense in overkill – let's spread the loving around.</li> <li>The Military Personnel Transports AL plugin is now separate from the Gunnery Crews script.</li> <li>My wife suggested that the whole thing works better (seeing that it's live crew we're simulating) if the command name was changed to "Action Stations" rather than "Attack Enemies". I thought about that for a minute and thought... yes! Sounds great. So I'm changing it so it reads more like what you would actually say to live crew.</li> </ul>
2.95	Fifth beta of version 3	<p>Not exactly sure what to call this version – 2.94 was submitted for signing, so this may end up as 3.1, or this may still make it as 3.0 (Note: This made it to 3.0)</p> <ul style="list-style-type: none"> <li><b>Major</b> change to how tracking and firing works. This was almost a complete rewrite of the logic in the inner tracking and firing loop. Previously, a limitation in the script command that aims the turret (the fact that it takes over 150ms to execute – which is three shots of a mass driver) made it so that precise refire delays were impossible. Getting all weapons to fire at their exact refire rate has been sort of the holy grail for me on this project. I had just about thrown up my hands in disgust and was just implementing a form of cheating I hoped the "Powers That Be" would let me get away with (firing more than one shot per turret aim on guns with very fast refire rates) when it came to me that I could split off the aiming into a separate process. Now, there are essentially two "threads" - one handles firing, the other handles aiming. One thread continuously aims, and the firing thread is now free to perform very precise timing of each shot. The practical upshot is that: A) every weapon will fire at its maximum rated refire rate and B) weapons won't slow down as much when the frame rate gets laggy – the new system is <b>much</b> more immune to game lag.</li> <li>A change in the missile targeting logic – much more responsive missile tracking now.</li> <li>The Military Personnel idea has been picked up by other script writers, so it has been split off into its own separate release.</li> <li>Debugging output standardized and lots more added. Now outputs to an external log file when debugging is enabled. Lots of things that I previously only assumed worked have now been verified to work</li> </ul>
3.00	Version 3.00 release	<ul style="list-style-type: none"> <li>Fixed bug where the Action Stations script could switch to a null gun</li> <li>Added support for Kyon weapons – something fiendish this way comes.</li> <li>Created a trimmed down XML readme for translation.</li> <li>Added another AL plugin to resupply race capital ships</li> </ul>

