RENEGADE LEGION®

PREFECT™

ASSAULT FROM THE STARS

OPERATIONAL BRIEFING

PREFECT

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Published by
FASA Corporation • P.O. Box 6930 • Chicago, IL 60680

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MILITARY ORGANIZATION

GROUND ORGANIZATION

After hundreds of years of war, almost all armies have adopted the same structure for their basic combat unit, which is the Century. A Century is made up of three line Platoons and one Headquarters Platoon. The line Platoons are made up of the vehicles and/or personnel needed to carry out the Century's mission. If the Century is a signal unit, the line Platoons will be signal units. Armor Platoons use armored vehicles. The Headquarters Platoon provides supply, maintenance, and battlefield recovery assets.

Three vehicles make up a Platoon. If the Platoon has infantry, they are arranged into squads of eight men each, with a vehicle assigned to transport each squad.

Combat Centuries contain both infantry and tanks, and some type of indirect-fire weapon, such as a mortar. The typical Armored Century has two Platoons of tanks and one Platoon of armored infantry. An Armored Infantry Century reverses that ratio, containing two Platoons of infantry and one Platoon of tanks.

A Headquarters Platoon has three vehicles: one supply, one maintenance, and one recovery. A Headquarters Century has three Platoons: one supply, with recovery vehicles; one Command Platoon, made up of converted combat vehicles that exchange their weapons for communications equipment; and one Medical Evac Platoon. A Headquarters Cohort is assigned a variety of Centuries. In TOG and Renegade organizations, these include an Administrative Century, a Command Century, an Intelligence Century, and a Liaison Century, for coordinating activities with the Navy and any attached Ground Support Wings.

The numbering system used to identify units is also fairly standardized throughout the galaxy. Units are identified by the designation of the Century, the Century's Cohort number and then its Legion number. For example, the Fourth Century of the Third Cohort of the 9999th Infantry Legion would be written as "IV Century 3/9999th Infantry." Commonwealth designations follow a similar pattern, but Arabic numerals are used throughout, and sometimes a letter is used to designate the Century.

TOG LEGION ORGANIZATION

The basic ground force unit is the Legion. Modeled after the Imperial Roman Legions (with some variation to account for the complexity of modern equipment) they all share the same basic structure.

A TOG Legion consists of ten Combat Cohorts, a Supporting Artillery Manus, a Supply Manus, a Military Police Cohort, a Signal Cohort, an Engineer Cohort, and headquarters units. The Legion is commanded by a prefect of the Legion, who has a legatus maximus as his executive officer.

The striking arm of the Legion is its ten Combat Cohorts. The First Cohort is always manned by the best combat troops in the Legion, and is issued heavier equipment than the other Cohorts. The First Cohort consists of a Headquarters Century of nine support vehicles, and ten Combat Centuries. The other nine Cohorts control only six Combat Centuries each, along with a Headquarters Century. Cohorts are commanded by a centurion maximus, while a Century is commanded by a centurion.

The Combat Cohorts are grouped for specific missions into temporary detachments of two to five Cohorts, each called a Manus. Depending on the Manus' mission, the Legion's prefect can assign it support units from the artillery, signal, supply, military police (MP), or engineer elements. A Legion has sufficient Headquarters Centuries to form five additional Manus. A Manus is commanded by a legatus.

The Artillery Manus of the Legion consists of three Cohorts of artillery, one Air Defense Cohort, and a Rocket Century. The Rocket Century is capable of launching satellites (primarily Thors or observation satellites) into a planetary orbit. Artillery Cohorts are assigned to a Manus as intact units and are never broken up. The Air Defense Cohort's Centuries are assigned piecemeal to individual Manus or to rear-area defense. The Rocket Century is always controlled directly by the Legion's Headquarters Cohort.

The Supply Manus controls the activities of the Legion's maintenance, supply, medical, and other administrative units. These elements are normally assigned as needed to support the operations of the different Manus.

The Signal Cohort is responsible for all aspects of communications. They ensure that Legion Headquarters are able to communicate with their far-flung Manus, support units and higher Headquarters. Their mission includes the use and maintenance of communications satellites, though launching is the responsibility of the Rocket Century. The Signal Cohort is also responsible for signal intelligence, signal security, and electronic countermeasures. Signal units are assigned by individual Platoons to various Headquarters as needed.

The Engineer Cohort is responsible for the construction and maintenance of any permanent Legion facilities, clearing or reducing obstacles, erecting barricades, and constructing fortifications. The Cohort has three Combat Engineer Centuries and three Construction Engineer Centuries. The Combat Engineer Centuries are assigned to Manus as needed, while the Construction Engineer Centuries normally are used to construct and fortify supply or maintenance depots in the rear areas.

The Military Police Cohort consists of six line Centuries and functions as a rear-area security force. It is also used to maintain military discipline within the Legion. The MP Cohort is under the direct control of the Legion commander, and only rarely is divided up to support Manus operations.

Depending on its mission, a Legion can be assigned a Wing of supporting spacecraft and/or an auxiliary unit known as an Auxilia. An Auxilia has four to six Cohorts of special troops, such as penal infantry, military police, marine assault troops, or population control troops (riot police). An Auxilia is about the size of a Manus. Unlike a Manus, an Auxilia is assigned organic support troops. This allows the Auxilia to operate without additional support troops for a limited time. In contrast, a Manus depends completely on Legion support units for maintainance in the field.

Legion Designations

Eight million TOG Legions currently exist, along with innumerable specialized Auxilia. The majority of TOG Legions are designated as Strike, Infantry, or Garrison Legions. All follow the basic Legion structure, but deviate to some degree both in organization and type of Cohort.

Strike Legion

Strike Legions are the TOG's frontline combat troops. Their mission is to destroy all enemy forces they encounter. They are not expected to garrison a planet, just to seize it.

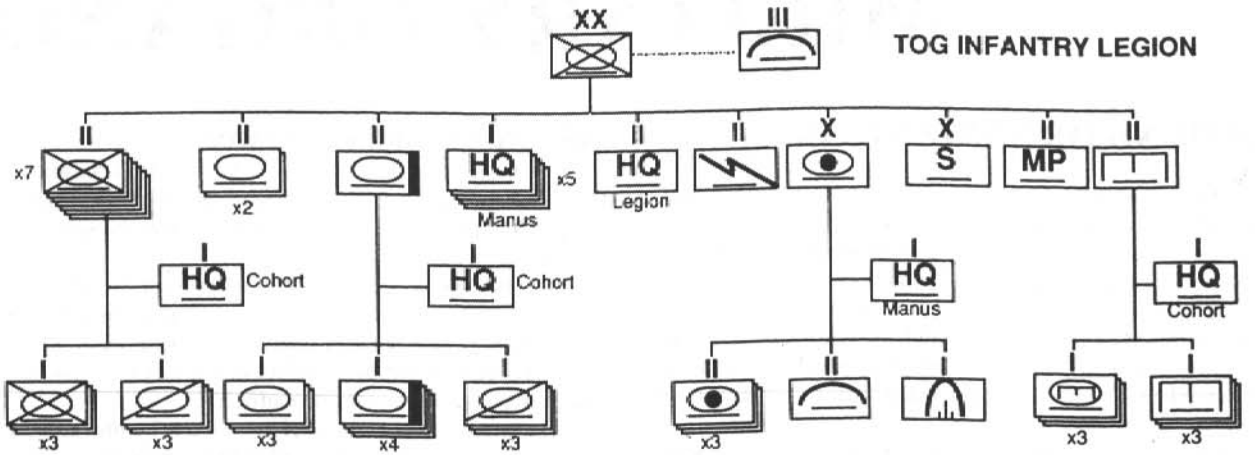
A Strike Legion consists of one Heavy Grav Armor Cohort and nine Medium Grav Armor Cohorts (this mixture may vary). The Heavy Grav Armor Cohort is the First Cohort, and contains four Heavy Centuries, three Medium Centuries and three Light Centuries of grav armor.

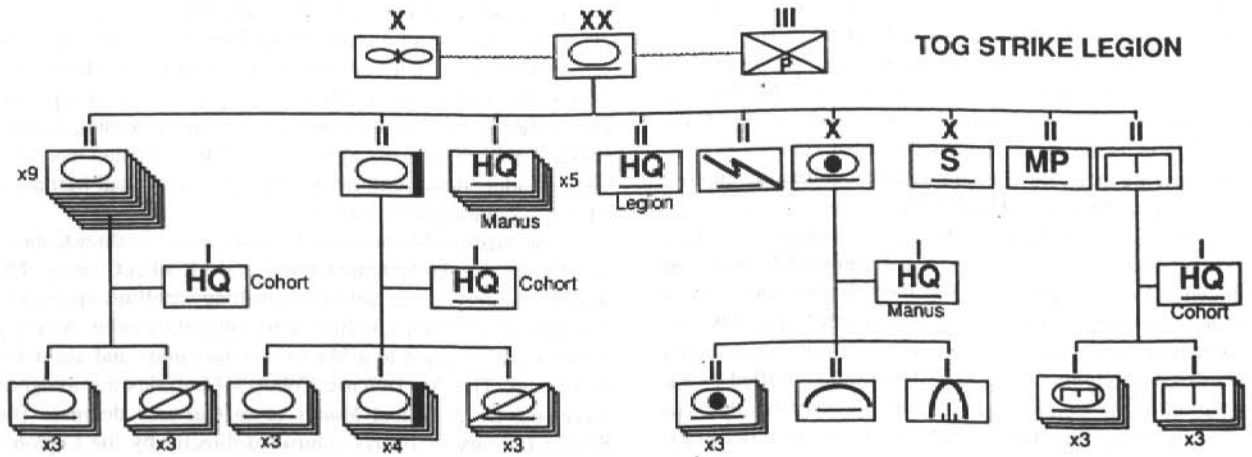
The Medium Cohorts each contain three Medium and three Light Grav Armor Centuries.

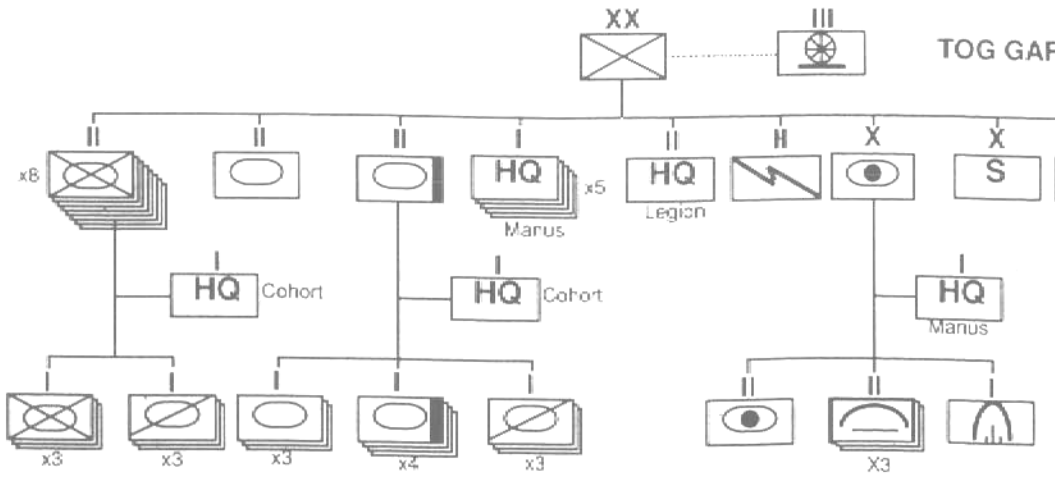
All vehicles in the Strike Legion are equipped with grav drives. This allows the Legion to use the strategic and tactical advantages of grav drives to their fullest extent, because the Legion's logistical tail is as maneuverable as the combat elements.

A Strike Legion is almost always permanently assigned a Space Fighter Wing, which provides organic ground support and local air/space superiority. The Strike Legion or its Fighter Wing does not have any organic interstellar capabilities. All interstellar transports are under the direct control of the Imperial Navy.

The Strike Legion has tremendous offensive firepower available, but relatively few combat infantry. This situation is commonly remedied by assigning the Strike Legion an Auxilia of some type of infantry. The Strike Legion has only 1,536 combat infantrymen, while an Infantry Auxilia typically has more than 2,000 legionnaires. Depending on the type of combat expected and the likelihood of opposition by the population at large, an entire Infantry or Garrison Legion may be attached to support a Strike Legion.







but ground support and space superiority are naval units.

Auxilia are assigned to the Infantry Le Typical Auxilia assignments include grav arm fense, or construction units.

All of TOG's 286 Praetorian Guard u Legions. All Praetorian units are composed of Armor Cohort, two Medium Grav Armor Co Grav Armored Infantry Cohorts. All infantr medium grav APCs. Each Praetorian Guard Col Centuries rather than the standard six. Praetor have permanent attachments of a Heavy Grav Ar a Reinforced Fighter Wing.

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with any organic grav her hover, wheeled, or immobile in compari- equipage keeps costs recognizes the vulner- al bases and usually to redress the balance of two-thirds of their

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OPERATIONAL BRIEFING

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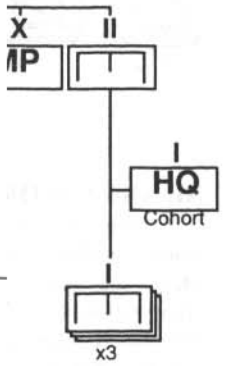

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vy Grav Armor and seven Grav

use grav drives. gions assigned to n. This ties these train, but the cost units is less. If a front, its support grav vehicles. ce Fighter Wing. normally left to tion as needed.

Infantry Legion

The TOG high command views Infantry Leg troops whose mission is to hold the ground w Legions.

A typical Infantry Legion has one Hea Cohort, two Medium Grav Armor Cohorts, Armored Infantry Cohorts.

All vehicles in a frontline Infantry Legion The Supply and Artillery Manus of Infantry Le rear areas use ground vehicles for transportati second-line units to a relatively fixed logistical of raising and maintaining the second-line u second-line Infantry Legion is assigned to the and artillery vehicles are usually replaced with

Garrison Legion

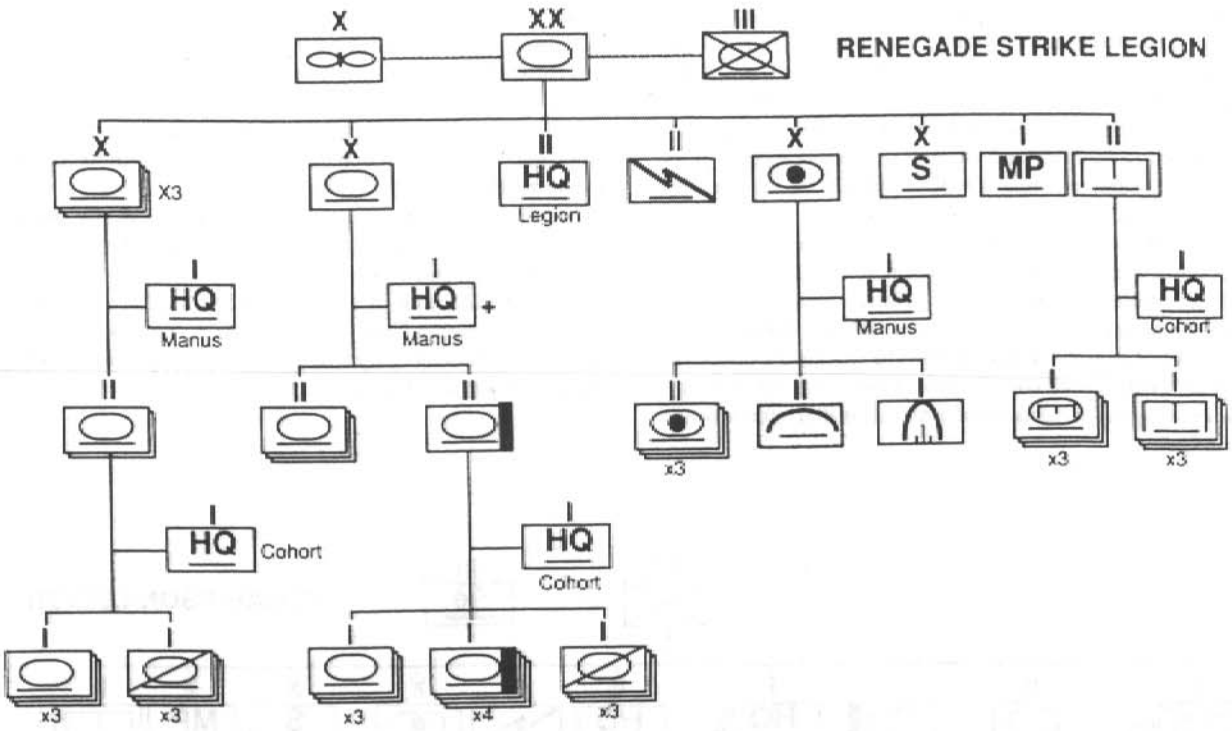
Garrison Legions are the most numerous Legions in the TOG military. A Garrison Legion's primary mission is population control, over and above normal civilian police duties. TOG doctrine calls for one Garrison Legion to be stationed on a planet per million inhabitants. While it is capable of fighting tenaciously against an invading Strike or Infantry Legion, a Garrison Legion's lack of mobility and the generally lower quality of its legionnaires guarantees that it will eventually be defeated by grav-mounted troops.

A typical Garrison Legion has one Heavy Armor Cohort (the First Cohort), one Medium Armor Cohort, and eight Armored or Air Mobile Infantry Cohorts. The Military Police Cohort is upgraded to Manus size and contains one Military Police Cohort and three Riot Control Troop Cohorts. The Engineer Cohort has only three Centuries of construction troops, and the Artillery Manus exchanges two Cohorts of armored artillery for two Air Defense Cohorts.

The Garrison Legion is not equippe vehicles. All the Legion's vehicles are ei tracked. Garrison Legions are practically son to conventional military units, but thi low. However, the TOG High Command ability of the Garrison Legion's logisti assigns two additional Air Defense Cohor somewhat. This support comes at the cos ground artillery support.

A Garrison Legion usually is not support spacecraft. If ground support is commander is expected to provide it.

If guerrilla activity is especially heav might be assigned a Grav or Heavy VT capable of simultaneously lifting three I with their organic vehicles.



RL AND CW ORGANIZATION

Renegade Legion ground forces are organized in the same manner as TOG Legions, with ten Combat Cohorts, an Artillery Manus and support troops. Rank structures are the same, as is the organization of the various types of Cohorts and Centuries. Many Renegade Legions have foregone the strike or infantry designations for other, more romantic designations, such as the 932nd Air Mobile Renegade Legion (organized as a frontline TOG Infantry Legion), or the 5791st Heavy Armored Minerva Legion (organized as a TOG Strike Legion). Following are a few key differences between the Renegades' Legion structure and that of their TOG counterparts.

Organizationally, the Combat Cohorts are permanently assigned to one of four Manus. The First Manus (or Manus Primus) contains the First Cohort and three other Cohorts. The other three Manus are assigned two Cohorts each. The vehicles of the Fifth Manus are used to supplement the headquarters elements of the Manus Primus. Support troops are assigned as needed from the support elements.

This organization allows the Combat Cohorts to develop the teamwork necessary to become a well-integrated fighting force, while at the same time giving the prefect of the Legion the tactical flexibility to tailor a Manus for a specific combat mission by assigning it support elements.

Another major difference is that the military police unit of a Renegade Legion is at Century rather than Cohort strength. Renegade and Commonwealth units seem to have fewer rear-area security and discipline problems than do the TOGs.

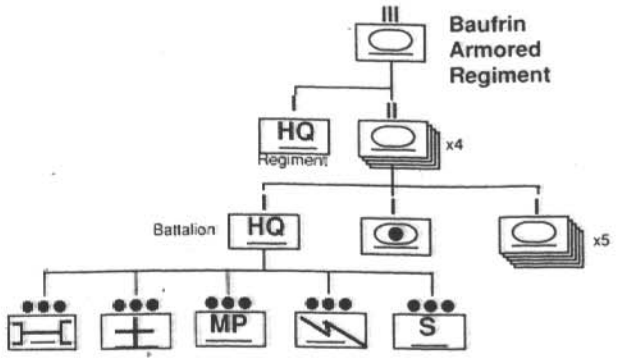
The Renegade ground forces number three hundred thousand Legions, along with a significant number of Auxilia. Auxilia and Fighter Wings are assigned to Renegade Legions in the same manner as to TOG Legions. Of all the Renegade Legions, three are classified as Praetorian: the 51st, the 65th and the 109th. There are no Renegade Garrison Legions.

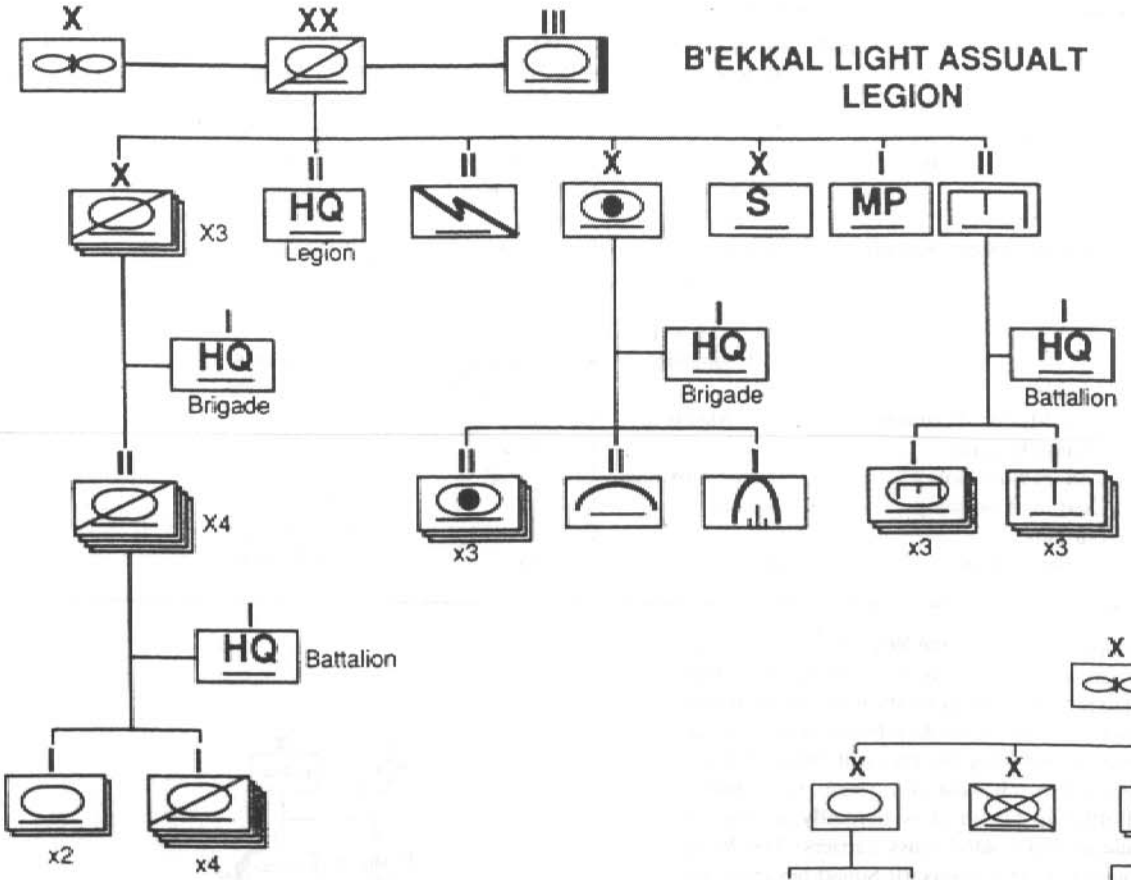
The Commonwealth Armed Forces (CAF) contain two hundred thousand Legions. Half these Legions are organized and operated on the Renegade model. The other half represent a wide variety of planetary and racial military organizations and nomenclature. For example, Manus are called Brigades, Auxilia are known as Regiments, Cohorts become Battalions, and Centuries are Companies.

The most common non-Renegade CAF organizations are the Baufrin, B'ekkal, and KessRith.

Baufrin Units

Baufrin units are organized at Regimental size only. They are self-sufficient at the Battalion level, and have a very decentralized command structure. A typical Baufrin Armored Regiment consists of four Medium Armored Battalions of five line Companies each. The Battalion has an organic Artillery Company, and has organic maintenance, medical, signal, MP and supply Platoons.



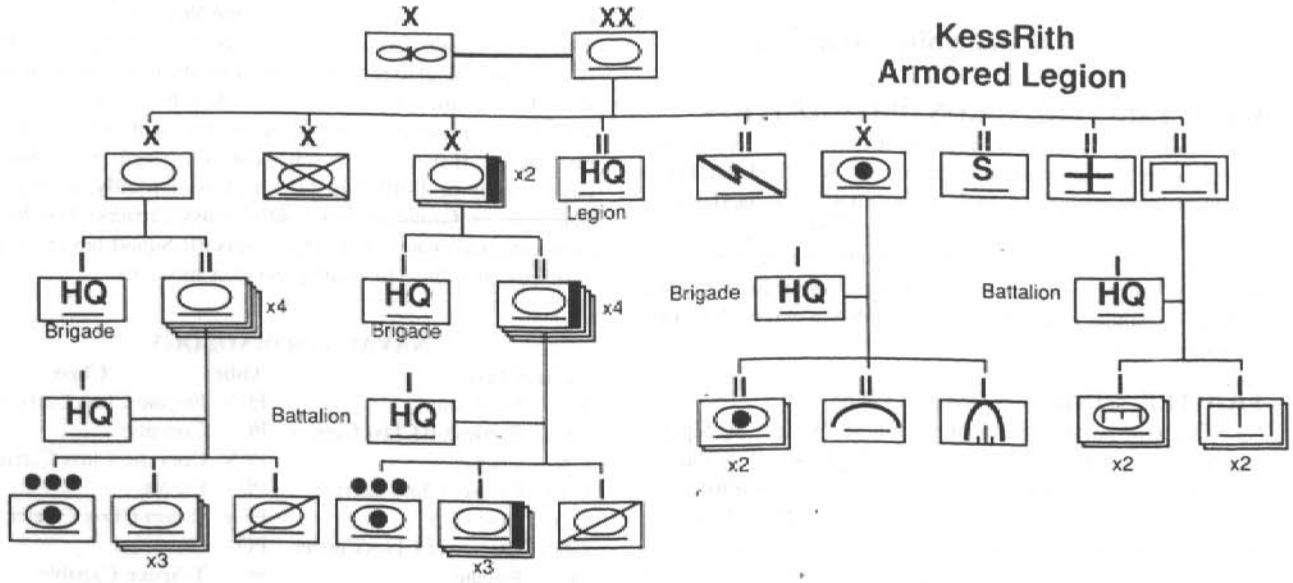


B'ekkal Units

A B'ekkal unit is patterned after the typical Naram military organization. These units are highly mobile, lightly armored, and equal in size to a Legion. A B'ekkal Legion contains three permanent Brigades, each with four Battalions of the same size and type. B'ekkal Legions are never assigned heavy tanks, though they might have a KessRith Armor Regiment attached. The majority of a B'ekkal Battalion's mobile units are light armored vehicles, and the remainder are mediums. Supporting units are the same as for a Renegade Legion.

KessRith Units

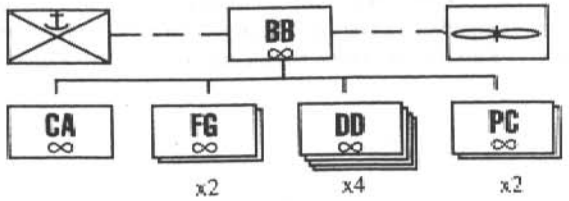
A KessRith unit follows the organizational structure of the KessRith Empire. These units are heavily armored, powerful, and relatively slow. KessRiths organize in groups of four: four line Companies to a Battalion, four line Battalions to a Brigade, and four line Brigades to a Legion. This organization is deviated from rarely. A KessRith Battalion has an organic Artillery Platoon.



NAVAL ORGANIZATION

Naval organization is based on the Battleship Squadron. This force is powerful enough to handle most missions and serves as the basic building block for larger formations. In the navies of the **Renegade Legion** universe, hundreds of thousands of these Squadrons exist. As with their counterparts on the ground, the vast majority of these are reserve fleets.

A Battleship Squadron is usually stationed at a major naval base, and spends most of its time at a docking facility or in a stable orbit. Active duty consists of patrols lasting a month or two. Only rarely are ships reassigned to another Squadron. Smaller ships carry out extensive independent courier duty by order of the Squadron commander.



Typical BattleShip Squadron

BATTLESHIP SQUADRON ORGANIZATION

Naval organization is based on the Battleship Squadron, though other Squadron organizations exist. A typical Battleship Squadron is composed of a single battleship acting as the flagship, a single cruiser, two frigates, four destroyers, and two patrol class ships, normally escort class ships. A Battleship Squadron can operate a Wing of fighters and carry from a Cohort to an Auxilia of Marines. Squadrons operate independently or in Groups of two to five Squadrons.

FIGHTER WING ORGANIZATION

The basic building block of any Fighter Wing is the Squadron, which consists of six fighters, a small headquarters staff of crew chiefs for the individual fighters, and some administrative personnel. Four Squadrons make up a Flight, which is also assigned administrative and maintenance personnel. Three Flights are a Group, and five Groups make up a Wing, for a total of 360 fighters in a typical Fighter Wing. In addition to normal maintenance and supply personnel, the Wing is assigned other assets. All Groups are assigned a Century of Marines or other security personnel to provide security for the unit's installations. Wing Headquarters is also staffed by a detachment of intelligence analysts responsible for providing the unit with timely tactical intelligence. If the Wing operates out of a system, rather than a large carrier or Battleship Group, it is normally assigned a Squadron or Group of light patrol class carriers. The Wing commander allocates these ships to specific Squadrons requiring T-space capabilities to accomplish their missions.

FIGHTER/NAVAL UNIT COMMANDS

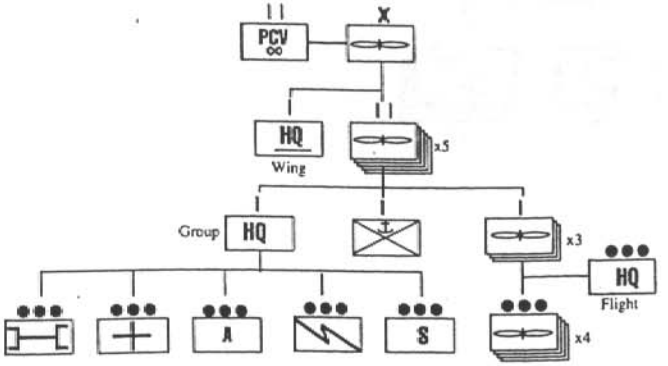
	TOG/Renegade	CW Navy	CW Aerospace
Fighter/Small Craft	Archikeleustes	Sub-Lieutenant	Pilot Officer
Pair/Escort	Plutarchos J.G.	Lieutenant	Flying Officer
Squadron/FG/DD	Plutarchos	Lt Commander	Sqd Leader
Flight	Plutarchos	Commander	Sqd Leader
Wing/BB/CA	Navarchos	Captain	Wing Cmmdr
Fighter Groups/Squadrons	Commodore	Commodore FC	Group Cmmdr
Groups	Rear Admiral	Vice Admiral	

GROUND UNIT COMMANDS

	TOG/Renegade	Royal Army	CW Marines
Legion	Prefect	Major General	Major General
First Manus/Regiment	Legatus Maximus	Colonel	Colonel
Manus/Brigade	Legatus	Colonel	Colonel
Cohort/Battalion	Centurion Maximus	Lt. Colonel	Lt. Colonel
Century/Company	Centurion	Captain	Captain
Platoon	Optio	2nd Lieutenant	2nd Lieutenant
Vehicle/Squad	Sergeant	Sergeant	Color Sergeant

NAVAL TERMINOLOGY

Abbr.	Class	Abbr.	Class
BB	Battleship	FGV	Frigate Class Carrier
BBV	Battleship Class Carrier	PC	Corvette
CA	Cruiser	PCV	Corvette Class Carrier
CAV	Cruiser Class Carrier	PE	Escort
DD	Destroyer	PEV	Escort Class Carrier
DDV	Destroyer Class Carrier	PG	Gunboat
FG	Frigate	∞	T-Space Capable



Fighter Wing

OPERATIONAL TACTICS

Tactics is the planning, training, and control of the ordered arrangements (formations) used by military organizations when engagement between opposing forces is imminent or underway. Grand tactics are the tactics of large formations, such as the forces in a theater of operations such as Shannedam County. Operational tactics control intermediate formations; Fighter Wings, Battleship Groups, and Legions, which is the scope of **Prefect**. Minor tactics are the tactics of small formations, such as Squadrons, Centuries, and other organizations, down to the squad level, as seen in **Leviathan**, **Centurion**, and **Interceptor**.

Tactics are formulated from a careful assessment of grand strategy, available technology, current troop quality, and level of leadership. Of these factors, technology traditionally offers the widest arena for change. Technological advances have shaped the operational tactics used by all combatants in the **Renegade Legion** universe.

NAVAL OPERATIONAL TACTICS

At the operational level, several technological advances and limitations have transformed naval combat tactics. The most dramatic of these advances is the capability to transport people and goods through T-space.

Spaceships can achieve faster-than-light (FTL) flight by moving through T-space. Ships move into T-space using drives that create thrust by superheating hydrogen and helium atoms to near relativistic energies in a gravity compression chamber, then releasing them from the chamber in a powerful burst. This energy is required for ships to move both into and out of T-space.

Ships require a certain level of reaction mass to reach the speeds necessary to make a T-space jump. While this reaction mass is not tactically significant in the scope of **Leviathan** or **Interceptor**, it does affect grand tactics (for example, see **Renegade's Honor**). Most FTL ships carry enough reaction mass to make three sets of accelerations/decelerations to maximum T-space entry speeds. Fighters carry enough reaction mass to travel 4 AUs (twice the distance from earth's sun to Mars) at maximum thrust.

Distance traveled is a function of entry velocity and time spent in T-space. The minimum speed required to enter T-space is 2.5×10^{-5} C. This puts the vessel into T-space at a speed of 1 light year per month spent in T-space. The maximum speed required to enter T-space is 6.25×10^{-4} C, giving a ship a T-space speed of 10,000 LY/month spent in T-space.

Once in T-space, a ship cannot change direction, or make any other maneuver. In fact, a ship must travel in a straight line for at least six minutes before entering T-space in order to avoid making an automatic mis-jump. The longer the ship travels in a straight line before jumping, the lower the possibility of a gross navigational exit error.

Because of a variety of minor factors, a ship can never control precisely where it will exit T-space, even if the crew makes no gross navigational errors. Ships always exit somewhere ahead of or behind their intended exit point. The average distance by which a ship will miss its intended exit point, known as the exit error, can be calculated using the distance traveled in light years. A ship exiting T-space after traveling five light years will exit, on average, ±.000002 LY from its intended exit point (~.127 AUs). A ship that travels a distance of 10,000 LY in T-space will miss its intended exit point by ±.004 LY.

Ships can exit T-space anywhere in a system, but cannot exit at a location occupied by another object.

T-space travel is not unlimited. The slight difference in the energies between normal space (N-space) and T-space causes friction in the molecules of people and objects traveling in T-space. This friction builds up over successive jumps, and people or objects exposed to T-space for more than thirty days will implode. They must spend an equal amount of time in N-space to disperse this friction, referred to as shimmer heat. (Shimmer heat build-up is also known as tau factor, and tau limit as the maximum amount of time a person can spend in T-space. See **Renegade's Honor**). The minimum amount of time a ship can spend in T-space is sixty seconds, making the minimum distance a ship will travel 2.3×10^{-05} LY (~1.465 AUs).

Technological advances have also made it possible to detect a ship moving through T-space by monitoring the disruption pattern it causes. The same molecular disharmony that causes shimmer heat also causes a ship to propagate a spherical disruption pattern around itself as it goes through T-space. This disruption pattern can be detected by special sensors in N-space, called T-Dopplers. If the disruption pattern passes over a T-Doppler station, that station has a chance of detecting the ship. The size of the disruption sphere is in direct relation to the speed the ship is traveling in T-space, with faster ships generating larger disturbances. (The intensity of the disruption pattern does vary, however. See the T-space Disruption Patterns Table below). The radius in LY of such a disruption pattern is based on its T-space speed as shown in the table. A ship traveling at one LY/month creates a disruption pattern with a radius of five light years.

T-SPACE DISRUPTION PATTERNS

LY/Month	Diameter (in LY)	Radius (in LY)
1	10	5
10	11	5.5
100	20	10
1,000	109	54.5
2,000	208	104
3,000	307	153.5
4,000	406	203
5,000	505	252.5
6,000	604	302
7,000	703	351.5
8,000	802	401
9,000	901	450.5
10,000	1,000	500

The chance of a T-Doppler station detecting a T-space disruption passing over it is based on the intensity of the disruption, which in turn is based on the mass of the ship generating the pattern. Small ships (patrol class) are very difficult to detect, while a battleship is relatively easy to detect. Depending on the "quality" of the detection, a T-Doppler station can always determine where a detected ship is heading, know with relative certainty how fast it is going, and guess its mass (a player would need a high detection roll). If a group of ships is traveling in a fleet, each disruption wave generated by each ship may be detected. While a single corvette might be undetectable, when a thousand travel on the same course, some percentage of the fleet will almost always be detected.

It is possible to guess the destination of a ship detected in T-space by simply projecting along its current flight path. It is impossible to say, of course, exactly where along the projected destination line the ship will exit T-space.

Even the fantastic speed available through T-space travel does not give military operations unlimited mobility. Military ships have limited endurance factors, similar to the endurance factors of comparable 20th-century warships. They must be resupplied with consumable stores, such as food, air, and spare parts. While the technology to create a ship with a reasonably self-sufficient ecosystem (total air recycling and self-sufficient food production) is available, that same technology would make the warship useless militarily.

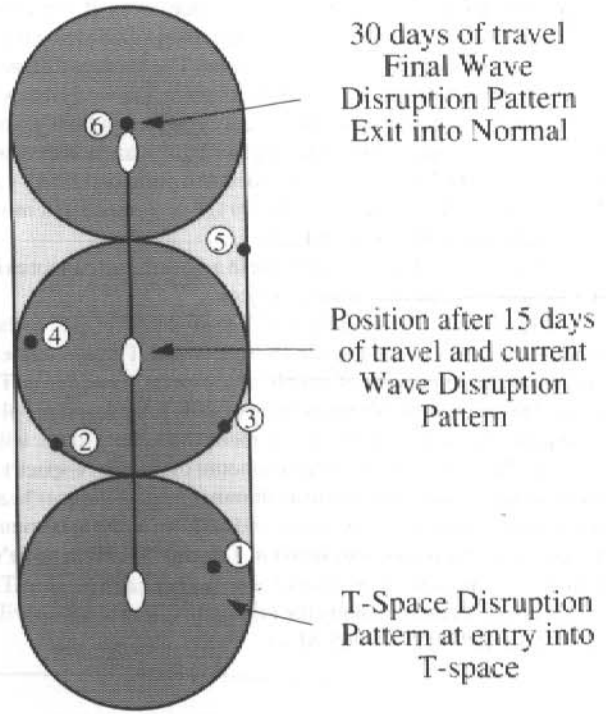
Fighters have even less endurance. Equipped with variable gravity fields, entertainment tapes, and alpha-wave-sleep inducing devices, a fighter can support its crew in reasonable comfort for about five days, with no degradation in the crew's combat efficiency. In six to ten days, a pilot forced to depend on his fighter for survival finds his combat efficiency impaired, but he still can carry out routine operations. After ten days, the support systems become overloaded with waste products, and the pilot will die soon after.

TACTICAL IMPLICATIONS

Technology directly impacts the naval tactics used to launch attacks into enemy-held space and to defend friendly space.

Ships try to avoid letting their disruption pattern pass over T-Doppler stations, or at least keep these incidences to an absolute minimum, to reduce the ship's chances of being detected. If a ship cannot avoid a T-Doppler station, it will attempt to minimize the amount of warning the station can give the ship's enemy.

For example, the ship shown below enters T-space at a speed of 100 light years per month, and in one thirty-day jump moves to the system occupied by T-Doppler Station 6. At this speed, the ship's disruption pattern has a radius of 10 LY. This sphere moves with the ship, as shown. The system's T-Doppler stations have a chance to detect the ship in the (numerical) order given. Station 6 will detect the ship three days before it arrives, if it detects the disruption pattern. (The ship is moving at 3.333 LY/day, and so the ship is 10 LY away when the front of its disruption pattern hits the T-Doppler station.)



A ship may choose to make the trip in a series of jumps, which will minimize the disruption pattern. This tactic results in a slower trip, but offers fewer opportunities for detection. For example, if the ship enters T-space at a speed of 10 LY/month, it will generate a disruption pattern with a radius of only 5.5 light years. In this case, only the T-Doppler station at the ship's destination will have a chance to detect the incoming vessel, but it can detect the ship when the ship is still fifteen days away. While only one station has a chance to detect the ship, rather than six, the same trip takes nineteen months, because the ship must stop for thirty days after each jump of 10 LYs. This travel time exceeds the inherent endurance levels of most ships, which could only make this advance by resupplying along the way.

Most attackers move toward their objectives in a series of jumps of varying length, avoiding all T-Doppler stations between their base and their target. They drop out of T-space into N-space just before their disruption pattern can be detected by the T-Doppler station nearest their target, then increase to a very high FTL entry speed, creating a disruption pattern greater than the distance to the target. The attacking ship can be upon its enemy almost without warning, and this technique creates a minimum of shimmer heat build-up. If a ship needs to retreat, it will have the flexibility to do so.

If a ship is sufficiently small, it might risk detection in order to reach a location quickly. Corvettes and other patrol class ships often risk detection by intervening T-Doppler stations, because it is unlikely that such small ships will be picked up on T-Doppler sensors. A battleship, on the other hand, will keep its disruption pattern as small as possible, because it is very likely that even a single ship of that size will be detected.

T-Doppler stations are commonly deployed defensively inside a system, and in deep space as a picket line along a border. Most deep space T-Doppler stations are automated, though manned stations are not uncommon. All T-Doppler stations have P-Comm links to a system's defense headquarters or the theater headquarters. No network of T-Doppler stations can be 100 percent effective, however, because small ships can slip though undetected.

Small escort-class ships, specially modified to carry T-Doppler sensors, are used as mobile platforms and listening posts, and are affectionately known as "snoopers." These ships supplement T-Doppler networks, or establish positions close to enemy naval bases in order to monitor enemy fleet movements. These ships are also equipped to monitor N-space flight within an enemy system and gather intelligence by monitoring insystem communications. Finally, they can serve as a control station and supply base for intelligence agents operating on a planet, allowing agents to use a P-Comm transmitter the size of a cigarette pack instead of one the size of a small truck. A Squadron of fighters is often attached to these mobile stations as protection against enemy attack. (A snooper can usually detect a large ship closing in on it in time to jump into T-space, but it might not pick up a Squadron of fighters until too late).

Ships can be detected by the burst of light they create as they exit T-space. The bigger the ship, the more intense the burst of light. A ship can conceal its exit from space by jumping to an insystem point which places an object, like the system's sun or a planet, between the ship and the observing station, thus masking its exit burst. If a sensor is scanning the exit area, the probability of a ship being identified as it exits T-space is based on the mass of the ship.

Defense forces can easily determine all the blind zones of each sensor, which can be covered by the scanning arcs of other sensors. The simplest method of achieving full coverage is by placing a sensor high above and below a system's orbital plane.

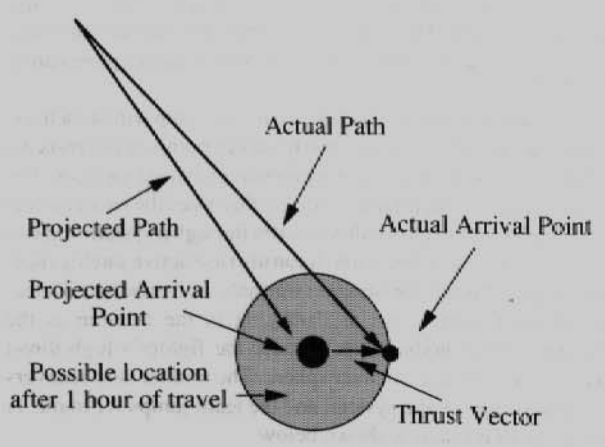
Once in N-space, a ship can be detected in a manner very similar to present-day radar detection. The probability of detection is a function of distance to the target, quality of the set, size of the ship to be detected, and the amount of "noise" a ship is making in the form of active electronic emissions and thrusting. A small or shut-down ship has a lower chance of being detected at any given range than a large ship that is applying braking thrust and actively scanning for the defenses of a system.

As mentioned above, in order to give a system as little warning as possible, a ship will attempt to make its final jump into a system at maximum speed. Arriving insystem at maximum speed means that the ship must travel a minimum distance of 5 LYs in the final jump, given an average exit error of about ±.1 AU. Also, given that a ship can only make an effective attack by reaching its objective at a speed lower than its exit speed, it would need to apply braking thrust for a certain period of time, which will almost certainly reveal its presence, giving the defenders an opportunity to mass local forces against it.

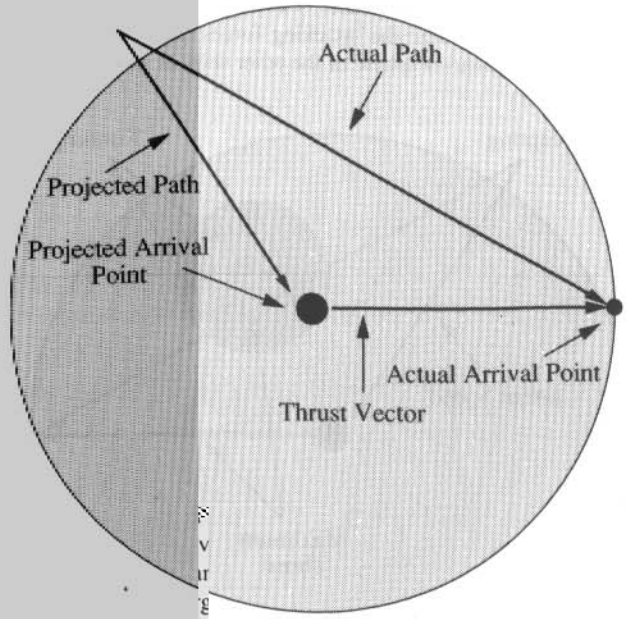
Finally, if a battleship arrives insystem at maximum speed, it will be unable to change its course enough to allow the commander to fly a deceptive course to his objective. A slower entry speed gives the commander more grand and operational tactical flexibility at any level of thrust.

Once in N-space, ships maneuver by applying thrust to change course and velocity. This process can be easily visualized with vector diagrams. If no thrust is applied, a ship will travel in a straight line at a fixed speed forever. The more thrust that can be applied over any given period of time, the greater the magnitude of course changes possible.

For example, if a ship is traveling along one course at a velocity of 4, and it maintains that course and speed, it travels along the indicated path and will reach a projected arrival point after one hour, giving the ship a vector with a length of 4. Because the ship's thrust has a vector length of 1, the defending commander knows with mathematical certainty that in one hour, the attacking ship must be somewhere in the indicated area, known as a maneuver sphere.

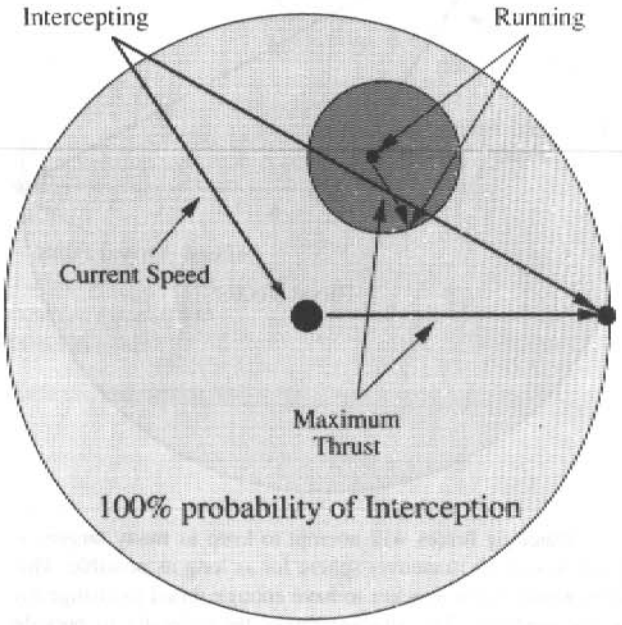


If the ship thrusts with a vector of 4, then the defensive commander's job becomes much more difficult. The size of the maneuver sphere increases by the cube of the change (the area of a sphere is $\prod R^3$). In this case, in one hour the ship can maneuver to any location in a sphere sixty-four times the size of the original.



Attacking for es will attempt to keep as many targets as possible in their m neuver sphere for as long as possible. This tactic requires the ttacker to have enough thrust to change his vector suddenly. T e attacker forces the defender to provide protection to multi le locations, reducing the actual number of enemy forces the a tacker must engage. However, once a target has been mathema cally eliminated as a possible objective, the system commande can release the assets defending that target to reinforce other pos ible targets, if they can reach those targets in time.

Deep space interception of an incoming ship favors the side with the most thrust. If a ship flies a straight path, then interception with almost any type of ship is mathematically possible. If the ship is able to maneuver effectively at high velocity, because it has a high thrust, then an attempted interception becomes much more difficult, if not impossible. The only way to guarantee an interception is to have the attacking forces' maneuver sphere enclose the maneuver sphere of the other ship, as shown below.



If the maneuver sphere of the intercepting ship does not enclose the maneuver sphere of the other ship, an interception may still occur if the target ship is unaware of the location, speed, and heading of the intercepting ship, or if the target ship is willing to be intercepted.

(A successful interception does not automatically mean that the ships will engage in a dogfight-type battle. It is possible for the ships to be traveling so fast relative to one another at the point of interception that they only get off one shot before they pass out of effective range.)

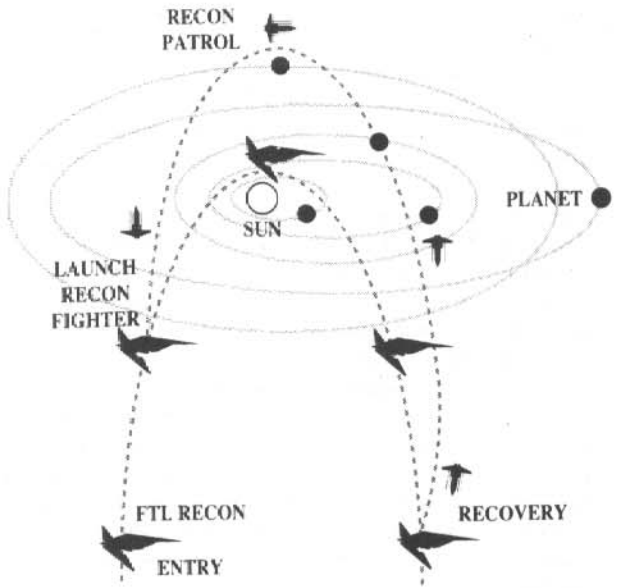
Ship and detection technology, along with the physics of space travel, has led to a variety of insystem tactics that can be applied to the mission of a ship or fleet of ships.

Recon

The success of a recon mission depends on the ability of a ship to get close enough to the objective to get information, then survive the defender's attempts to destroy the ship. A recon mission does not require a ship to slow down or to deliver a high volume of firepower.

Recon missions use stealth, speed, and maneuverability to the maximum abilities of the ship and crew. A typical recon force consists of a mother ship (normally no larger than a patrol class ship) carrying small recon drones or fighters. The mother ship exits T-space at a high speed, attempting to mask its exit flash using the methods described above. The mother ship's entry into N-space is designed to send the ship into a fast, hyperbolic orbit around the system's sun. In order to keep its risk of detection to a minimum, the mother ship does not apply any thrust, or use any active intelligence-gathering methods. If detected, the mother ship will use thrust to modify its course enough to keep its maneuver sphere out of the maneuver sphere of any possible intercepting ships. The longer the mother ship remains undetected, the lower the possibility that a successful interception can be launched.

At some point in its mission, the mother ship will launch one or more recon fighters (or drones) to survey points of interests not within range of its passive intelligence-gathering devices. Because a fighter is much harder to detect than even the small mother ship, it can use thrust to modify its orbit through a system and still have a low chance of detection. It can also use active intelligence-gathering methods if the situation warrants such exposure. Detection of the fighter is not as damaging to the mission as the detection of the mother ship, because the fighter's high thrust gives it a very large maneuver sphere. The mother ship recovers the fighters outside the system, and the team jumps for home. A typical recon mission is shown below.



Stopping a recon mission requires a great deal of effort, skill, and luck on the part of a system's defense force. If the defenders receive a T-Doppler warning early enough, they can saturate possible exit areas with fighters equipped with flash scanners. But because the recon ship will undoubtedly have made its final jump at an extremely high speed, any warning time the defenders receive will be measured in minutes. It is unlikely that a system could scramble fighters to the exit area in time.

Once a recon mission is detected, the defenders will probably launch an interception attempt using high-thrust fighters. Ships with a thrust lower than the intruder's ships cannot force an interception, because a slower ship's maneuver sphere is always smaller than that of a faster ship. Thus, capital ships are useless for deep space interception, unless they are lying directly along the flight path of the intruder and are completely shut down, and thus undetected.

Defending ships at rest with a thrust capability roughly equal to that of the incoming ship can only intercept if they lie between the intruder and its target. And even then, they would only get off one shot before the enemy ship streaked past. Most recon ships are well-enough armored and shielded to absorb multiple attacks from ships of similar size.

Only very fast ships, such as fighters, have a chance to successfully intercept a recon mission. Other ships can only position themselves so that, in order to avoid an interception, the intruding ships must pass well outside of effective sensor range when passing their objective.

Raids

A raiding mission is conducted in much the same way as a recon mission. The attacker must depend on speed and stealth, but must also carry enough firepower to destroy the target.

Raiding tactics vary, but all use the same basic principles of stealth, maneuverability, and speed as does a recon mission. A mother ship covertly enters a system, launches smaller ships that attack a target, and then recovers the raiders. Usually, the mother ship is not directly involved in the attack, and attempts to avoid detection altogether, because damage to its FTL drive would mean the loss of the entire raiding force.

One major difference exists between a raid and a recon mission. The raiding force must possess sufficient firepower to destroy a target. This is problematical for two reasons. If the force does not slow down, it will only get one pass at the target. If the force is large enough to destroy the target in one pass, it is large enough to be detected early in the mission, increasing the likelihood of a successful interception. An interception is likely to succeed in this situation because the early warning gives defenders a chance to adjust their forces early, and because, in fighters, heavy firepower is almost always offset by low thrust.

Most raiders slow down enough to allow multiple passes against the target. But by slowing down near the target, they invite interception by high-thrust enemy ships. The raid commander must balance these aspects of speed, stealth, and firepower carefully in order to successfully accomplish the mission. In most cases, a raid commander will decide on an optimal attack force of fighters and corvettes, because this force mix gives the defender a minimal amount of advance warning and the attacker a reasonable level of firepower.

This is not to say that larger FTL ships are never used for raiding. In fact, using a large capital ship offers several advantages. The capital ship will almost always have enough firepower to destroy its target in a single pass, and so the force no longer needs to slow down. This, in turn, reduces the likelihood of a successful enemy interception in deep space. The capital ship also has a greater survivability rate than a group of fighters, thus lowering casualty levels in the attacking force.

Having a battleship pop out of T-space close to the objective at high speed, vaporize its target as it goes streaking past, and then re-enter T-space before the defenders can react seems to be an excellent tactic. But several factors negate the advantages of this raiding tactic.

The first problem is that a capital ship has low endurance. In order to reduce the risk of alerting defense forces, a battleship must travel at minimum T-space speed. With an effective T-space speed of only 5 or 10 LY/month, and only a few months of stores aboard, a capital ship cannot be used to penetrate very far into enemy-held space without a supply ship escort.

The second problem is that, in order to ensure an effective high-speed attack against a target, the capital ship must attempt to exit T-space at a distance greater than its exit error. Thus, if a ship wishes to give a system the least amount of warning of its arrival by making its final jump at maximum speed, it will have to jump to an exit point at least .127 AUs from its target. At exit speed, the ship would travel that distance in about 24 hours in N-space. If the actual exit point is greater than .147 AUs from the target, a second minimum-speed jump can be made to reach the target, but it would take a battleship with a Thrust of 2Gs six hours to slow to minimum entry speed. A battleship is forced to provide at least six to twenty-four hours' notice of its arrival, if it is not detected earlier by the T-Doppler pickets.

Seven hours is sufficient time for a commander to gather all his insystem forces against a raider. Twenty-four hours' warning time will allow the theater commander sufficient time to reinforce the system.

Because a raiding mission is designed to destroy a target, the defender's job is a bit easier. If an incoming raid is detected early, and its probable objective can be projected, then by simply concentrating forces at the raid's probable objective, the local commander can meet the attack with everything at his disposal.

This task is even easier if there are only one or two potential targets in a system. A commander has only to garrison those points with the majority of his forces, and wait for an attack.

The majority of inhabited systems, however, present a target-rich environment to raiders. At any reasonable level of colonization, the resources of an inhabited system will be exploited to the maximum extent in order to avoid the extensive interstellar import of necessities. Economic targets, such as asteroid/planetoid mining, metal processing, and solar energy collection stations, will exist throughout the system. To protect these assets, a commander must detect the incoming raid as early as possible.

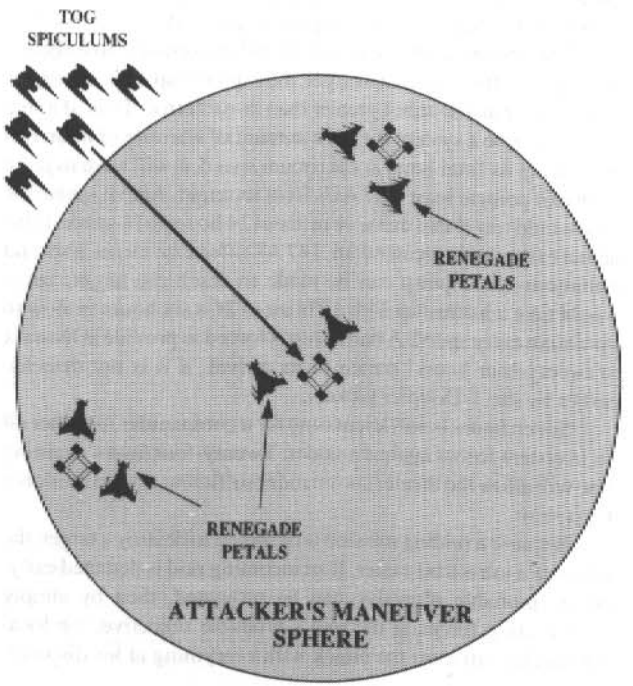
T-Doppler and N-space sensor stations are scattered throughout the system to provide a commander with advance warning of an attack. To protect these military installations, the commander needs to employ fighting forces, which in turn require the deployment of a logistical network throughout the system. P-Comm relay stations, maintenance facilities, emergency rescue services, and fighter rearming/refueling stations must be established and deployed in such a manner that the defending commander can mount a reasonable military force to cover attacks against any point in the system.

If detected, a raiding force will attempt to force defenders to commit their assets to protect one target, then change direction abruptly to hit another target. This ploy can be accomplished in many ways. One is to send a force into the system a few hours before the actual attack force to make a feint at one target. This force will break off as soon as other defense units are pulled out of position.

A second method is to launch large Wing- or Group-size fighter raiding forces, each with multiple objectives. The entire Wing arrives in the system simultaneously, and so can overload a system's defenses. This tactic again creates a high possibility of detection while in T-space, thus allowing defenders to reinforce the system.

Finally, by maintaining their maneuver sphere around a multitude of targets, an attacking force can thin out the defending forces at the actual objective.

For example, a force of TOG *Spiculum* fighters launches a raid against some near-orbit facilities over a Renegade-held planet. At the point of detection, the force's velocity and vector appears to be taking them directly to the planet's VLCA. A Renegade squadron of *Petal*s is deployed in pairs at each of the three facilities shown. In the time that it will take the *Spiculum*s to reach any point in their maneuver sphere, the entire *Petal* force can get to any of the facilities. But by massing at one facility, the *Petal*s will leave the other two open to an attack which they cannot stop. Therefore, the *Petal*s will remain at their assigned facility until that facility has passed out of the attacker's maneuver sphere. If the raid has orders to hit any one of the three targets, the geometry is such that, at worst, the TOG commander will face only two *Petal*s, and maybe none.



System Defense

The system defense mission is the most common mission assigned to naval forces. A system commander with a defense mission must deploy his forces in a manner that will allow him to quickly mass his forces against an incoming raid or an invasion.

Early warning and identification of the attacker's objective is the key to defending any system. Early warning is a tremendous force multiplier. If an attack is detected early enough, reserve forces from nearby systems can be deployed to augment local forces. Even three or four hours is sufficient warning to move insystem FTL ships into positions, using microjumps, that will allow them to launch fighters to intercept attackers. The longer the warning time, the more system defense forces can be massed against an incoming attack.

For the most part, raids are conducted by fighters carried by patrol class ships. As previously stated, this force mix is preferred because the defending forces normally cannot pick up the incoming raid until it is only a few hours away from its objective. The high-thrust capabilities of a fighter allow it to keep multiple targets in its maneuver sphere, thus tying down local forces and preventing them from massing against the raiders.

For very much the same reasons, defense forces rely primarily on fighters. No system has enough large ships to station one or more at every possible target, even those in planetary orbit. Fighters can patrol wide expanses of space quickly and easily. At planetary distances (for example, the earth to the moon), fighters can reposition themselves against an intruder so quickly that their effective zone of control is vastly greater than that of a capital ship. Coupled with small FTL carriers, fighters can provide effective insystem forces capable of covering multiple targets that no one capital ship could cover.

Two system defense tactics are most often used by system commanders. Both have advantages and disadvantages, and most commanders merge the two tactics.

In a mobile defense, the system commander deploys Squadrons of fighters, supported by FTL mother ships, throughout a system. These forces have high thrust for deep space interception attempts, and can be massed quickly against an intruder. Using this tactic, a system can easily be defended against raiders with only a small expenditure of naval assets. But by threatening multiple targets, an attacker can force a defender to chose only one or two targets to defend, leaving the others open to attack.

Rather than relying on the mobility of the system defense forces, a system commander can garrison each potential target with sufficient forces to drive off a raid. This point-defense tactic can be a more cost-effective means of defense than the mobile tactic if the system has only a few targets to defend. The fighters do not require FTL mother ships, and can run with lower thrust (and thus heavier armament). This tactic again allows the attacker to mass against one target and prevents the defender from doing likewise to counterattack. All targets must be equally well-defended. If a multitude of targets exists in a system, an inordinate expenditure of resources is required to defend them.

Hardening important installations also proves effective against raiding, and can supplement point-defense tactics, but it is expensive, and in some cases technologically difficult to achieve, if not impossible.

A typical deployment of naval forces and detection equipment for a relatively minor system with one inhabited planet under control of the Commonwealth appears below. The other planets and asteroids are being commercially exploited in some manner. The system's T-Doppler sensor station is in orbit around the habited planet, along with a naval station capable of supporting the resupply and minor maintenance needs of a Battleship Squadron, and a fighter station capable of supporting and maintaining a Fighter Wing.

The naval forces in the system consist of a Wing of fighters, which is sixty Squadrons. The Wing has sufficient FTL carriers to simultaneously lift all the Squadrons, with each corvette capable of carrying one Fighter Squadron. A force consisting of two medium-sized destroyers is also stationed in the system.

The planet is defended by one Infantry Legion, an Armor Auxilia, and a number of ground defense installations.

In addition to insystem forces, the system commander can call on a theater reserve force of a Battleship Squadron. Once released by the theater commander, this Battleship Squadron can arrive insystem within 24 hours.

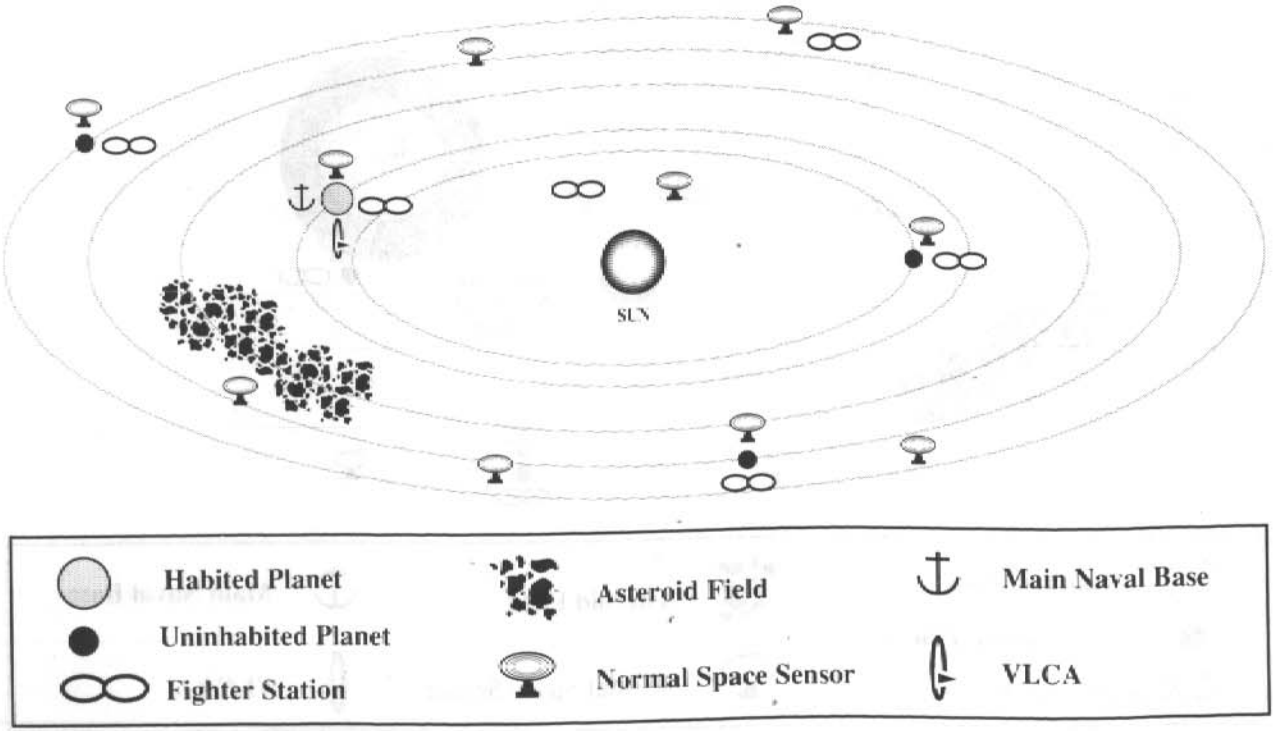
The system commander has deployed N-space sensors at each of the worlds in the system. He has also established orbital detection stations to provide 100 percent coverage of the system. Flight-size fighter bases are also scattered throughout the system, each of which can house twenty-four fighters and four corvettes. The station carries enough supplies and spare parts to allow one to two months of continuous war-tempo operations. These bases also have sufficient maintenance facilities to repair most battle damage, though their supply of parts is limited.

Each fighter station supports four FTL corvettes and a Flight of fighters. The corvettes are primarily used to move the Squadron into a patrol area, or into position to intercept an intruder.

Nine Fighter Flights are stationed at the main fighter station in orbit around the habited planet, along with the required FTL corvettes. The remaining Fighter Flights are stationed one each on the Fighter bases scattered throughout the system. Each base also supports four FTL corvettes. The two destroyers are stationed at the naval base.

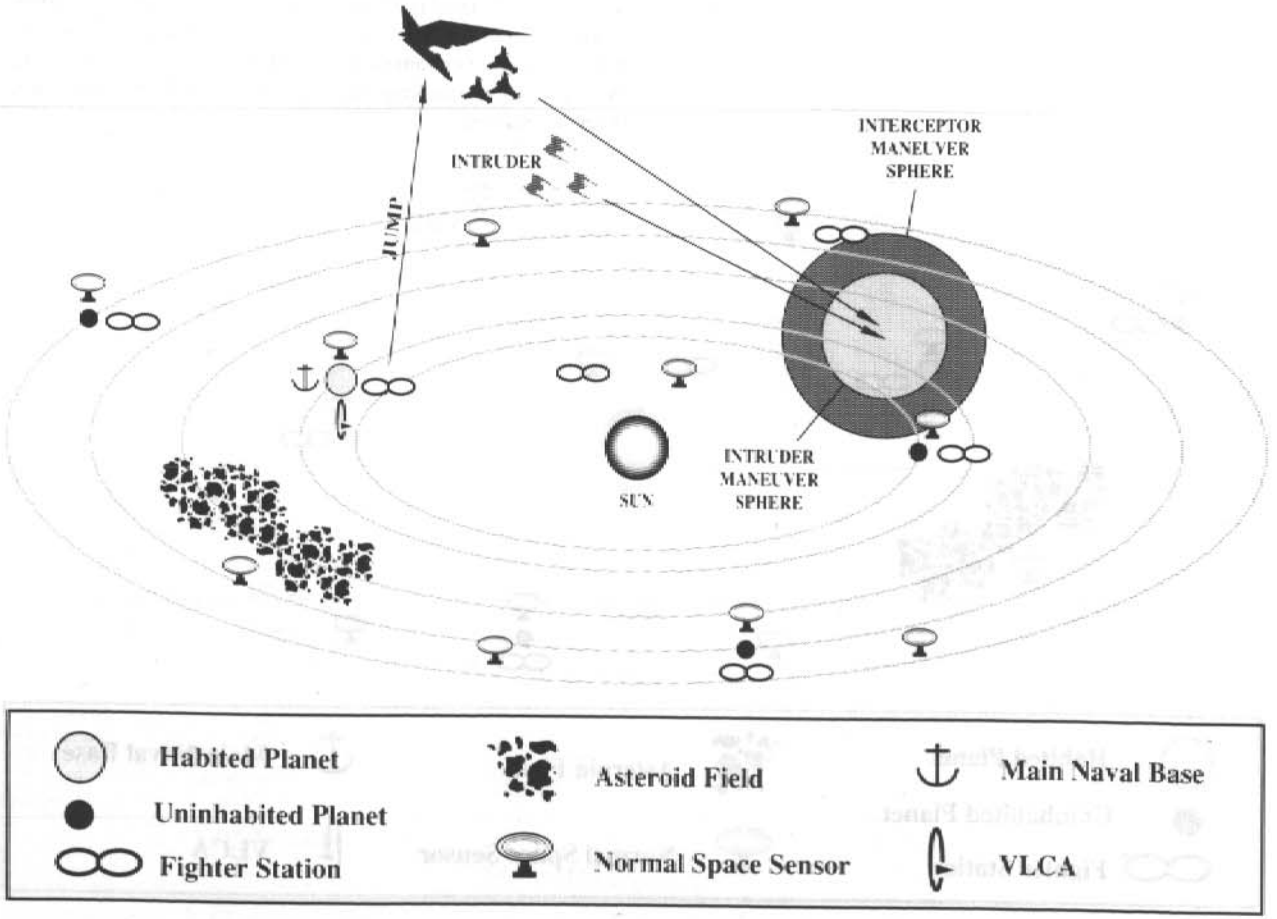
The outlying fighters are used primarily for point defense of the local military and commercial facilities, and to make deep space interceptions of any hostile force. The fighters in orbit around the habited planet provide a point-defense force for the planet, and can reinforce any of the outlying posts.

The system commander uses the N-space sensor stations as a picket line for early warning of incoming ships. In most cases, a small patrol class ship approaching a detection station will be picked up .001 AUs away, even if the ship is shut down (approximately an hour away from the station). A shut-down fighter can escape detection until it closes to .0001 AUs (approximately half an hour out, if speed is 75 Gs and the fighter wants to slow down to a reasonable maneuver speed at the target). Larger ships will be detected at greater ranges. Use of thrusters or active scanning systems by the attacking ship greatly increases the range of a detection station.



If an intruder can be dealt with by a single Fighter Squadron, then a Squadron from an outlying station will attempt to intercept it, usually by using a corvette to carry the Squadron to an interception launch point. This intercepting Squadron will not launch from any base with an assigned point defense mission within the intruder's maneuver sphere. If the intruding force is too large to be handled by a Squadron, the system commander can assign additional assets to intercept it. The system commander must be cautious about committing his forces against an attacker, as over-commitment against one intruder could lay the system open to an attack from an as-yet-undetected force.

Point-defense tactics vary. TOG forces prefer to sortie their fighters out to meet the incoming threat, fire a salvo of missiles, then race back to re-arm and engage any surviving ships close to the target. While this tactic can be effective, the TOG force may not make it back to the objective area in time to engage the surviving enemy. Renegade and Commonwealth doctrine calls for the point-defense forces to engage close to the attacker's objective.



Invasions

Invading an inhabited system is the most difficult and complex type of mission. Unlike the hit-and-run tactics used by recon or raiding missions, the invasion fleet commander must gain long-term control of space over the most heavily defended point in the system, the habited planet. The invasion force must be able to defeat a concerted attack by all the system's space defense forces, not just a few ships in position to respond to a raid.

An invasion is broken up into four phases: pre-attack, space superiority, troop landing, and space superiority maintenance.

Pre-attack Phase

During the pre-attack phase, the invading force makes a detailed recon of the system, and attacks system defense installations and forces at the discretion of the commander. Surprise is essential during this phase. If the T-Doppler coverage for one system was completely destroyed, and no other system was similarly attacked, the local theater commander might consider moving part or all of his theater reserve to that system. Thus, deception is also of primary importance during this phase.

Space Superiority Phase

This phase begins when the invasion force moves toward the target system. It is difficult to hide the movement of such a force, though pre-attack activities should create enough of a diversion that the defending commander might have only one or two days notice before the entire fleet enters orbit around the planet.

The defenses of the system should be thoroughly reconned before the attack. An advance force arriving a short time ahead of the main force will take out the system's N-space sensors, as well as secure or destroy any other outlying facilities. This will not completely blind the defenders, but it will force them to rely on sensors near the habited planet, or use their combat ships for patrol duties. In either case, this tactic will limit the defender's ability to react to maneuvers by the invasion fleet, especially the smaller elements.

If the mission includes capturing a space facility intact, Marine forces will accompany the advance force. Outlying ground facilities may be captured by Marines or legionnaires, depending on the situation.

The invasion fleet will emerge from T-space at a sufficient distance that it can decelerate down to battle speed once it arrives at the planet to be invaded. If the invading force makes a high-speed jump into the system and is accompanied by battleships, it will appear about six hours out from the planet.

The invasion fleet's first mission is to destroy the opposing fleet, then eliminate any orbital facilities of military value. These facilities may be captured by Marine assault or destroyed outright.

In most cases, the defenders will have sufficient time to move forces to the system before the invasion fleet actually arrives. It is almost impossible to hide the movement of a battleship in T-space or N-space, and an invasion force requires battleships in order to seize and hold a planet. The size of the defending fleet depends on the advance warning the theater commander received, the location of his reserves, and threats against other systems in the theater.

If the defender elects to oppose the invading fleet's landing with his fleet, the standard method is to intercept the invaders near the planet under any available covering fire from planet and orbital defense systems. In most cases, the attacker will only skirmish beyond the effective range of ground-base defenses.

When possible, the defending fleet will beat off the attack by the invader. If that is not possible, it will break off the action and assume a fleet-in-being strategy. The fleet-in-being strategy attempts to create enough doubt about the defending fleet's actual capabilities that the invading fleet holds back from fully intervening in the ground battle.

The invasion fleet will be accompanied by numerous supply and maintenance ships, along with other logistical support units. Until the invader controls the economic assets of the planet, it must protect its replenishment fleet in order to remain in the system for any length of time.

The defender can force the enemy fleet to use most of its assets to protect its logistic elements by withdrawing to secret bases within the system and launching raids against the invader's support elements. Fighters locate and track the enemy supply ships, then destroyers micro-jump into the midst of the supply train, ravage it, and get out again, without revealing the location of their own bases. A fleet can also operate from nearby uninhabited systems, keeping in contact with the insystem forces by P-Comm, again launching raids against the logistical elements of the invaders' fleet. The invading fleet is forced to assign a disproportionately large force to protect its logistical tail from these attacks.

Troop Landing Phase

When it has achieved space superiority, the invading fleet will begin landing operations against the planet. The invaders generally choose landing zones (LZ) protected only by the smaller planetary defense installations described in **Interceptor**. Large defense installations (battleships on the ground), are avoided, and left to be cleared by the ground troops.

Preliminary bombardment, designed to knock out local defense installations covering the landing zone, can be carried out from orbit, because these assets are fixed. Mobile defense batteries can only be knocked out if they are spotted by ground observers.

The first landing wave is launched using small assault boats carrying light grav vehicles. These forces are escorted by fighters and led by a destroyer. The destroyer leads the assault forces to within one kilometer of the surface, knocking out any fixed installations that survived the initial bombardment. At one kilometer the grav vehicles are ejected, and the boats return to the relative safety of space. The tanks decelerate and move toward their objectives.

After the first wave has secured a landing zone, the second and third waves are landed directly on the surface of the planet, rather than being dropped from orbit. Legions are formed and move out. (See **Ground Force Tactics** for further explanation.)

Defense installations come in a variety of sizes and shapes. The smallest installations are simply turrets mounting fighter-type weapons and missile launchers. The large installations are effectively capital ships without the drives, consisting of laser bays, massive missile batteries, and a host of small turreted point-defense towers. Small defensive installations are effective against fighters, corvettes, and incoming Thor javelins or missiles, as well as ground vehicles. Their weapons are too small to damage larger ships. Large installations equipped with bay-type weapons can damage a capital ship, but are too unwieldy to engage ground targets.

Space Superiority Maintenance

When the invading troops have landed, the fleet's mission is to consolidate its hold on the system and provide support to the ground forces.

The fleet must first seal off the planet from outside support. This requires that a significant portion of the fleet be stationed near the planet as a mobile reserve. Next, the fleet must ensure that its own logistic train is protected from raiders, and that the ground forces receive supplies in a timely manner. Finally, the fleet must be arrayed in such a manner that it can quickly form up to defeat a defending relief fleet.

These considerations greatly reduce the number of fleet assets that can be assigned to directly support the ground action. At best, a Legion commander can expect to have only a single battleship or a Squadron of destroyers available for ground support.

Bay lasers can fire accurately through the atmosphere. Fixed targets whose positions are known through orbital observation (though small installations can be camouflaged to a certain extent) or espionage make easy targets. Mobile targets require a surface observer to designate the area with a special laser and call in the fire mission.

Naval fire control (NFC) teams will be assigned to the combat elements of the Legions (approximately ten, or one for each Cohort). Fire control teams can call in fire from the orbital ground support group within a minute. Fire requests from non-NFC units require substantially more time to process. While a time delay is not as critical against a fixed target, it does make mobile targets almost invulnerable to non-NFC-directed bombardments.

Typical Invasion

A typical invasion may unfold as follows.

The system is under attack. The invasion fleet was detected in T-space about three days before it arrived, and consists of three Battleship Squadrons, a carrier with an additional Wing of fighters, transports carrying the elements of two Strike Legions and an Auxilia of Imperial Marines. The defending theater commander has reinforced the system with a replenishment group of two Battleship Squadrons that will operate out of a nearby uninhabited system, and a Commonwealth Armored Cavalry Regiment.

During the pre-invasion phase of the attack, TOG agents located most of the military installations in the system and on the planet. However, they did not find a mothballed installation in the asteroid field capable of supporting two groups of fighters and several destroyers. The system commander intends to use this as an insystem base if he must adopt the fleet-in-being strategy.

This base is quickly and surreptitiously stocked with stores and maintenance personnel. Half the fighters in the outlying stations are returned to the fighter base near the planet. The outlying bases are alerted, and can be destroyed if it appears they will fall into enemy hands.

PREFECT

One day before the invasion fleet arrives, a Wing-size fighter raid strikes the system. While three of the corvettes were detected in T-space, the size of the raid was greater than expected. Most of the N-space detection stations and two of the fighter stations are destroyed because the system commander would not release any of the ships protecting the habited planet.

The invasion fleet arrives, but fighter patrols attempting to cover the gaps in the N-space detection network fail to detect it for four hours, and the fleet bores straight toward the planet. The space battle is uneven. The system commander launches just more than a Wing of fighters and two Battleship Squadrons, while the TOG commander has three Battleship Squadrons and almost a Wing of fighters. The TOG fighters have been detailed to protect the transports, which are trailing the Battleship Groups.

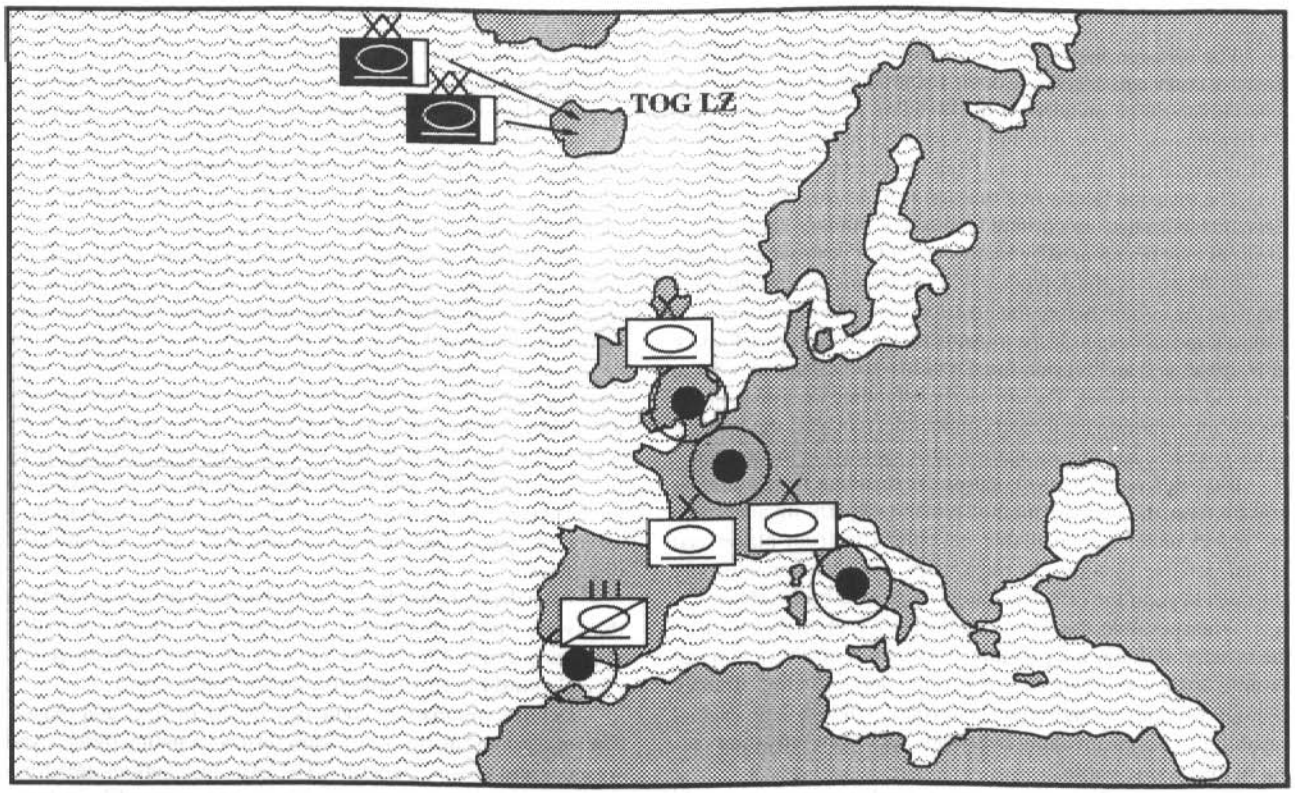
After losing a cruiser, two destroyers, and a frigate, the Commonwealth system commander breaks off the action. Two full groups of fighters take off on evasive courses to the asteroid base, accompanied by several destroyers. The larger capital ships withdraw to a nearby uninhabited system, where they are met by replenishment ships.

The invader lost a cruiser, and other ships took significant damage. Nearly two groups of fighters have been scattered. The Marines take and secure the orbital facilities, and prepare to secure a landing zone on the planet. (For simplicity in describing the action, the planet is assumed to be earth.)

The majority of the industry and major population centers are in Europe and North Africa. The seat of government is Gibraltar. The rest of the planet is populated, but this area will be the major battleground.

The four major defensive installations are London, Rome, Paris, and Gibraltar. A small base is also located on Iceland. The Renegade Strike Legion and Commonwealth ACR have been deployed by Manus as shown below, in the Alps, Scotland, the Pyrenees, and Gilbraltar. They are positioned so that any TOG forces landing in Western Europe can be attacked immediately by at least two full Manus.

The TOG commanders decide to secure Iceland first and use it as a base of operations against the Renegade forces in Europe. Iceland is out of range of the defensive fire of the large installations, and the smaller installations on the island can be quickly overcome. Once seized, Iceland can be easily converted into a ground naval port capable of supplying the logistic needs of the TOG ground forces.



Iceland is close enough to the main battleground to serve as a forward supply base for the ground commander. Any movement against the LZ by Renegade forces stationed in Europe must be made across the Atlantic Ocean, and so will be easily spotted from space, even if the defending force flies at minimum altitude. Renegade movement against Iceland across Russia and the north pole would reduce the risk of detection, but the increased travel time also makes this a risky operation.

The TOG Strike Fleet commander must decide whether to advertise his proposed landing zone by blasting the known defensive installations on Iceland, or to make a hot landing on Iceland, exposing the assault force to defensive fire from the two or three known defensive installations, in addition to any unknown installations. The commander elects to make a short preliminary bombardment, followed closely by a landing.

Assault boats carrying Platoon-size units make the initial assault. Escorted by the carrier's fighters and other larger craft, these boats drop a Manus of four Armor Cohorts onto the island. The assaulting forces take some damage from an undiscovered installation, but the position is quickly silenced by orbital bombardment. Renegade fighters attempt to intervene, but are driven off by the escorting TOG fighters.

Iceland is deemed secure after a few hours, and the rest of the TOG Legions land. Three of the Marine Cohorts also land, to provide base security. Engineers begin constructing dug-in supply and maintenance bunkers, and the Legions form up. Ground operations against the Renegade forces in Europe can now begin.

GROUND OPERATIONAL TACTICS

Like naval tactics, ground tactics depend heavily on current military technology. The combat deployment of ground forces in the 69th century is heavily influenced by the grav drive combat vehicle, as well as the advanced weapon systems, battlefield sensors, and defensive equipment, such as armor and shields, available to the military.

Grav vehicles operate by manipulating the local gravity field. A planetary body must have a minimum gravity field of .05 Earth normal for a grav drive to function. Maximum altitude is 15 kilometers above the mean surface of an Earth-type planet, but the maximum altitude varies according to the local gravity field. For example, the maximum operating altitude on Mars is 5.7 kilometers, and the moon has a maximum operating altitude of 2.5 kilometers. Some terrain features on low-gravity worlds cannot be surmounted by grav-drive-equipped vehicles; in other words, grav operations on low-G worlds are more heavily influenced by the terrain than are operations on Earth-normal planets.

Grav drives are different from the anti-grav drives used by fighters and ships to maneuver in the atmosphere. Anti-grav drives simply negate gravity, and require some form of thrust (jet, fan, propeller, and so on) to impart lateral movement. This type of propulsion unit is extremely vulnerable to damage, making the anti-grav-drive vehicle significantly less survivable in combat than a grav-drive vehicle.

Grav vehicles accelerate and decelerate in much the same way as 20th-century aircraft, in that the turning radius is a function of airspeed. The turning radius of a grav vehicle is always much larger than that of a ground vehicle. Ground vehicles use the friction of their contact with the surface to help overcome inertia, while grav vehicles must use their own power to turn.

Grav vehicles operating at tree-top level flight (TTF) and below (20 meters or less) can attain a maximum safe speed of 240 kph over clear ground. Movement through built-up areas, trees, and rubble is slower, but can easily reach 96 kph. Higher altitudes allow safe speeds of up to 900 kph.

Grav vehicles supplement the driver's reactions with terrain avoidance sensor systems, which allow the grav vehicle to operate at high speeds even through woods or other broken terrain. If this system is damaged, the safe operating speed of the vehicle is greatly reduced.

Grav tank defensive equipment (shields and armor) is the same as that found on a fighter. Grav tank offensive equipment is also the same as that found on fighters, except that the weapons are designed to work best in terrain-hugging combat. In grav tank ground combat, 95 percent of all direct enemy sightings occur at ranges of 4 kilometers or less, and so weapons are optimized to engage targets at this range. Because the engagement ranges are so short, tanks have the advantage of using painting lasers to penetrate shields and Gauss cannons to penetrate armor.

Most grav tank weapons, except for lasers, use hyper-velocity kinetic energy to penetrate armor. Lasers must first penetrate a tank's shields in order to damage armor. Shields can be negated by painting lasers which, once locked on, can read the flicker rate of the shield and synchronize firing to bypass the energy field. Sheer distance in space, and lag time, makes these shields useless on ships.

Because of ground clutter, or built-up areas, a fighter can only engage a grav vehicle that is operating close to the ground (at tree-top or normal flight) using strafing or dive-bombing attacks. Fighters can attack grav vehicles operating at a higher altitude (low-altitude flight) in the same manner as normal airborne targets.

A fighter will always defeat a grav tank flying at LAF, because the fighter need never close to within the 4-kilometer effective range of the tank's guns. A grav tank will almost always defeat a fighter of equal weight at TTF or NF, a fact which explains the development of specialized tanks, rather than grav-equipped fighters.

Anti-air vehicles are specialized tanks with fire-control systems capable of firing missiles into space with the same restrictions as small defense installations. AA vehicles can fire only three or four missiles in each salvo.

Grav vehicles are expensive, and difficult to build and maintain, much as were 20th-century helicopters. Ground vehicles are cheaper to build and easier to maintain, but unlike grav vehicles, ground combat vehicles cannot exceed 100 tons or go faster than 86 kph cross-country, and require a power plant that prevents them mounting shields.

TACTICAL IMPLICATIONS

Ground force technology has had a major impact on the nature of planetary combat. The grav mounted force is highly mobile, very lethal, and has a high survivability rate, allowing troops to control an extremely large area of terrain with a relatively small number of vehicles.

Grav operations are characterized by an operational doctrine known as C^3; Contact Phase, Concentrate Phase, and Combat Phase. Grav forces operate in a widely dispersed formation when attempting to contact enemy forces (Contact). Once contact is made, the grav forces attempt to collapse on the contacted enemy unit (Concentrate) in order to bring overwhelming firepower to bear (Combat). By concentrating, however, an attacking force increases its chances of enemy detection. The enemy commander can then attempt to preempt the opposing strike by concentrating his own forces against the attacking force, or by using space bombardments to break up the attack.

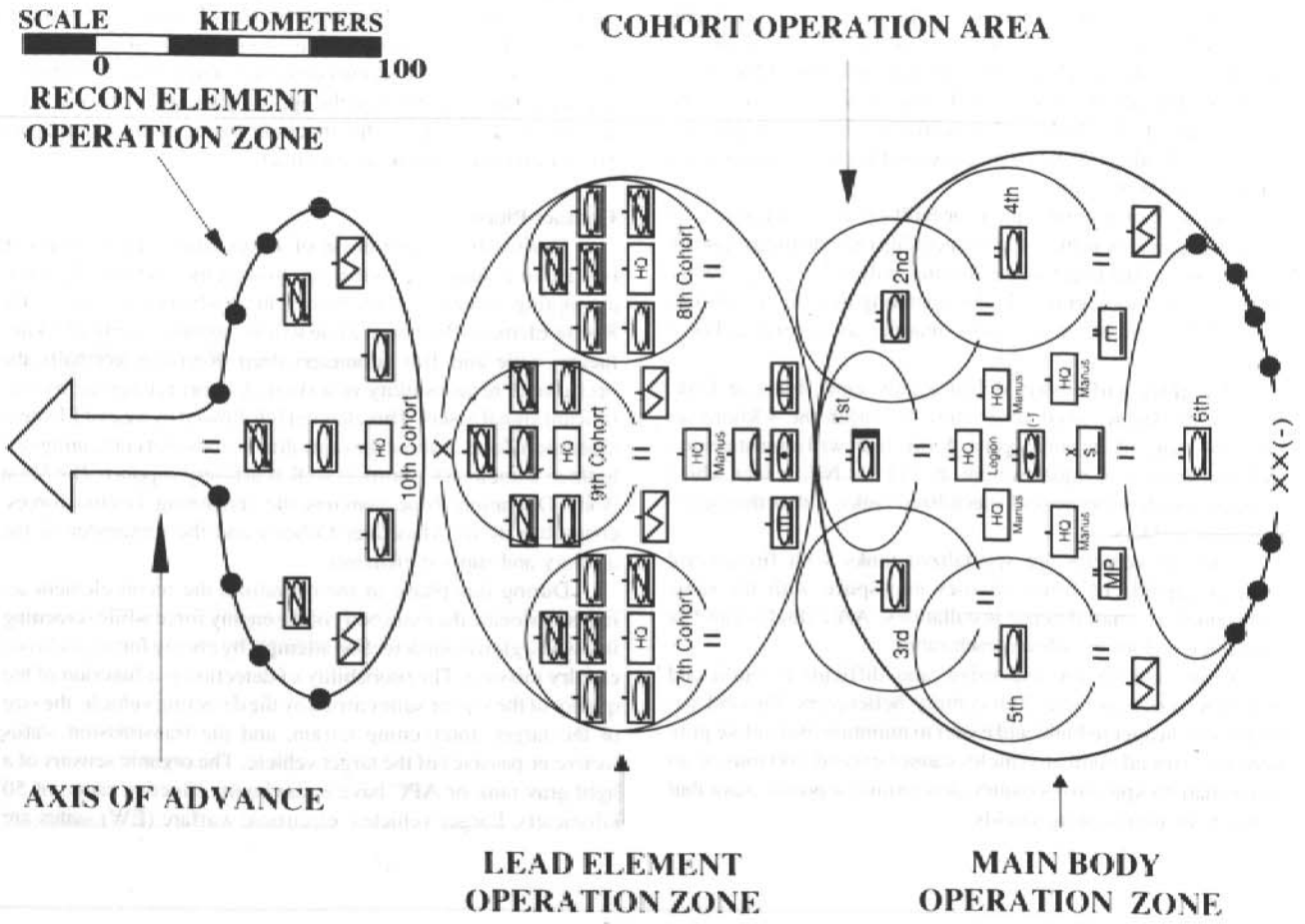
Contact Phase

During the contact phase of an operation, the Legion will operate in a dispersed formation, fronted by a screen of pickets attempting to locate enemy forces. In an advance to contact, the Recon Element Operation Zone will be approximately 200 kilometers wide and 100 kilometers deep. Recon is normally the operational responsibility of a single Cohort reinforced by significant signal assets. This element is followed by a Lead Element Operation Zone of about the same dimensions, but containing two to three maneuver Cohorts as well as artillery support. The Main Body Operation Zone contains the remaining Legion forces, consisting of six Maneuver Cohorts and the remainder of the artillery and support elements.

During this phase of the operation, the recon element attempts to locate the main body of the enemy force while screening its own Legion from detection attempts by enemy forces, a classic cavalry mission. The probability of detection is a function of the quality of the sensor suite carried by the detecting vehicle, the size of the target, intervening terrain, and the transmission status (active or passive) of the target vehicle. The organic sensors of a light grav tank or APC have a maximum effective range of 50 kilometers. Larger vehicles' electronic warfare (EW) suites are

less effective, primarily because the thickness of their armor and the intensity of their own shields interferes with clean signal reception. Intervening terrain can block and distort sensor readings at a distance, though within 15 kilometers, any grav vehicle will be able to detect moving active vehicles regardless of the terrain. The size and activity of the target also impacts the probability of detection: larger vehicles are more likely to be detected than smaller vehicles, and a dug-in vehicle, operating its sensors in a passive mode and covered with emission-suppressing netting, has a much lower chance of being detected than one operating at tree-top level using active sensor arrays.

The Legion's signal assets are also heavily involved in the contact phase. Signal Centuries are made up of two types of vehicles, EW and ECM. EW vehicles carry massive passive and active sensor arrays, and even moderately effective neutrino detectors. These vehicles significantly increase a Task Force's chances of detecting large bodies of enemy forces. ECM (electronic countermeasures) vehicles are designed to mask, jam, and deceive enemy EW vehicles in order to defeat enemy attempts at pinpointing friendly forces.



Concentration Phase

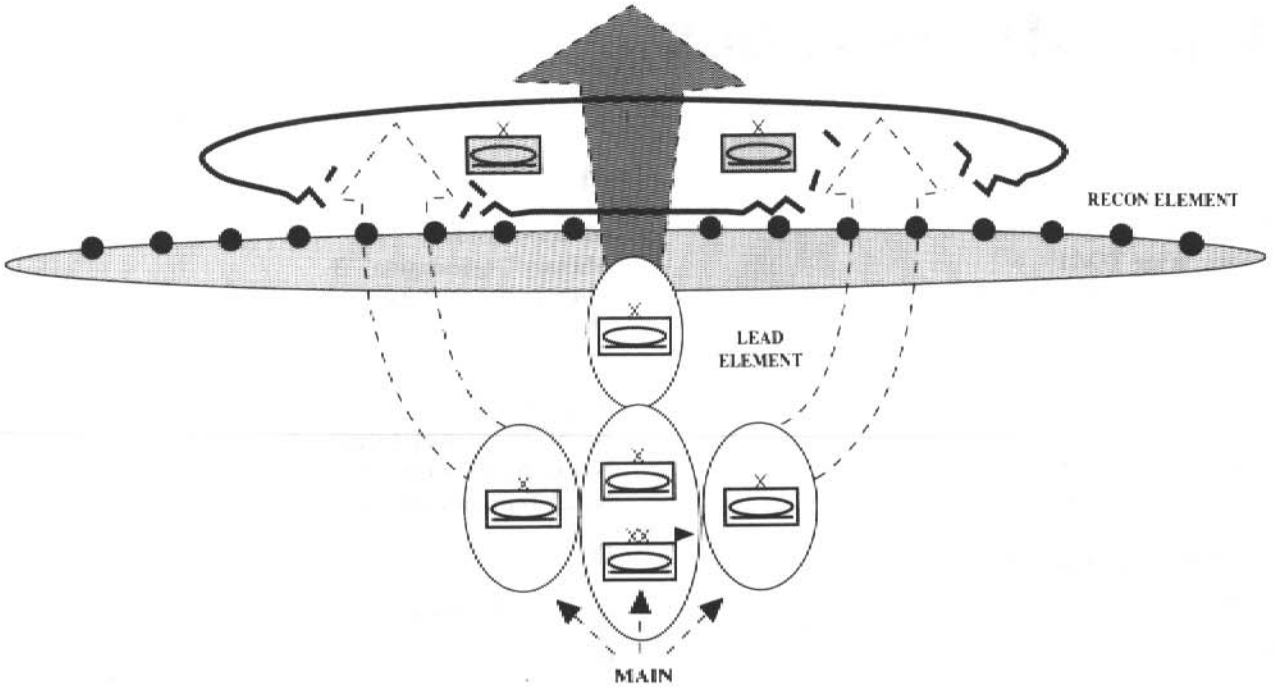
Once the enemy's exact location has been established, the Legion commander needs to rapidly concentrate his forces against a weak area of the enemy line. The recon element maintains contact with the enemy force while the lead and main body elements of the Legion concentrate to a front of 25 to 40 kilometers. If the size of the enemy force is equal to the friendly force, this rapid concentration can result in a local superiority of five to one or more, thus guaranteeing that the friendly force will rupture the enemy line.

If the enemy has successfully detected the friendly force's main body, however, they can also collapse their forces and achieve parity or even superiority on the local battlefield. Usually, the reacting force does not have enough time to complete its maneuvering before the battle is joined, and so goes into combat at a disadvantage.

In this phase of an operation, the superiority of grav-equipped forces over ground forces becomes even more important. In general, a grav-equipped force has an operational speed of approximately 240 kph, while a ground force has an effective operational speed of 30 to 40 kph, and is significantly restricted by terrain. This disparity allows the grav force to concentrate up to seven times faster than the ground force. The ground force must conduct all its operations in a more concentrated formation, reducing its ability to control the surrounding terrain, or face overwhelming odds when it engages a grav-equipped force.

Combat Phase

Combat follows the contact and concentration phases of the operation. If the commander has been successful in the first two phases, his success in this phase of the operation should be assured. Generally, the lead element of the Legion, a Manus of four Cohorts with artillery and engineer support, will attempt to break through the enemy formation. The Legion commander normally holds the main body forces in reserve as this battle develops. If necessary, a Manus can form to support the lead element's attack if it bogs down. Two Cohort Manus can also be formed, and sent to make flanking attacks while the remainder of the main body supports the lead element attack.



Space assets can also be used to support these attacks. Time-on-target barrages from orbital battleships and cruisers can blast the way clear for an advancing Cohort. Fighters can perform ground attack missions, either in conjunction with friendly forces or alone. Fighter missions become problematical only if the grav forces are operating in the dirt, forcing the fighters to come within effective range of the tank's guns, which can bring down a typical fighter in one shot. If the enemy is attempting to operate out of ground clutter, then the fighters will be able to defeat them easily. Space superiority primarily serves to drive the enemy grav force down into the terrain, restricting its maneuverability.

Logistics

Grav forces are extremely mobile, not tied down to or constrained by terrain. If supply elements are also equipped with grav vehicles, a force's logistical train is equally mobile. However, it is impossible to repair vehicles on the move, or resupply a moving vehicle from a space transport, or care for wounded soldiers in the back of a mobile hospital. These functions must be performed at fixed bases.

The Supply Manus of a grav Legion is capable of maintaining and repairing the vehicles of the Legion, as well as keeping the combat elements supplied with consumable stores, as long as the operation is not overwhelming. Most grav Legions cannot carry more than a day's worth of combat supplies, however. If off-planet resupply efforts are sporadic, and local supplies cannot be attained, the Legion quickly becomes ineffective. Ground bases, complete with warehouses, repair facilities, hospitals, administrative offices, and barracks for incoming troops are a vital part of a successful operation.

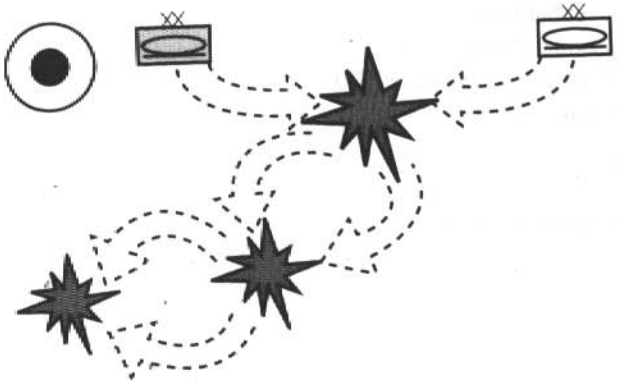
Because these fixed bases are lucrative targets for orbital bombardments, they need to be protected with massive defensive capability. These bases are generally heavily armored and shielded, and have laser arrays and missile batteries fully capable of engaging orbital forces. Most of these weapons are not capable of engaging enemy ground forces, but like their space-borne brethren, ground bases have numerous turreted weapons for point defense against missiles and fighters. These weapon systems are equally capable of engaging a grav tank, and make taking a base a dangerous mission.

Operation Patterns

The combination of unrestricted mobile forces tied to fixed bases creates a pattern of combat not unlike the pattern of combat in the American Civil War.

Operations are directed at enemy bases. Enemy and friendly forces maneuver against one another, with recon elements attempting to locate and fix the enemy force. The attacking force attempts to bypass the enemy force and strike directly at the base. The enemy force interposes itself between the attackers and the base and forces a battle. Both forces concentrate on a battlefield, and the battle is fought. If the battle is indecisive, the forces break contact and disperse again, and the attacker continues to maneuver around the defending force, attempting to attack the base.

Once the defending force is defeated, its remnants will retreat to the base, where it will supplement the ground vehicle-equipped garrison units. The attacking grav Legion will then attempt to break through the final defensive line of ground, grav, and fixed defensive forces, to disable the orbital defense systems. Once the attacking force accomplishes that task, space forces can attack unopposed, which in turn means that the stationary installation is indefensible, and the remaining mobile forces are forced to withdraw. If no alternative supply base is available, the defending forces will quickly be mopped up as attrition and lack of supply reduces their numbers.



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