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THE WEAPONS MERCHANTS: A BACKGROUND PAPER ON HEGEMONY IN ARMAMENT PRODUCTION

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It has been my contention for many years that the overriding impetus behind the arms race, and now the ballistic missile defense race, has been the profits earned by weapons manufacturing and the other types of exploitation that superpower status protects. In this paper I will be discussing seven large corporations that have now grown to dominate weapons systems contracting. They are Lockheed Martin, Boeing, Raytheon, General Dynamics, Northrop Grumman, United Technologies, and TRW. They are the US corporations that rank among the **“World’s TOP-10 Weapons Manufacturers.”** These seven are not the only ones making weapons, or grabbing for a bigger piece of the cake. In fact, I see their operations as only a microcosm of the larger, more pervasive activity in the overall race for monopoly and profits that has infested our environment and our lifestyle.

Nevertheless, I have chosen these seven weapons makers because their products are at the cutting edge of death and destruction. Very seldom do you see a weapons system without at least one of their names attached. The weapons and weapons systems shown later in this paper are the activities of these seven corporations that I am aware of at this time. I have undoubtedly missed some. I would also like to emphasize that these are only the cutting edge -- the infrastructure to support them is even more immense and equally profitable to produce. And of course there are the black budget items that are too super secret for us taxpayers to know what we are financing. Finally, I will not dwell extensively on -- actually, will hardly mention -- the vast market for weapons and weapons systems to foreign countries. For a more overwhelming and mind-boggling picture of the activities of these seven corporations, visit their web sites (see References) and go to their “products” pages.

PUSHING THE MONOPOLY LIMITS: FORMAL MERGERS

Early in the 20th century America passed anti-trust laws to prevent any one company from monopolizing a given market, and to prevent companies from conspiring to set prices. This resulted in the breakup of Standard Oil Corp., among others. Large corporations have ever since been striving to maximize profits while, at best, skirting the edge of these laws and, at worst, finding methods to disregard these laws in a manner that cannot be readily recognized.

Since at least the mid-1960s there has been a constant string of mergers and buy-outs which have resulted in fewer and fewer companies amassing a disproportionate share of the market. We

have seen this happen in grocery chains, the automotive industry, petroleum companies, aircraft manufacturers, internet providers, ad infinitum. These mergers transcended national borders and they have gained momentum in recent years. To illustrate the seriousness of this trend, the Strategic Research Institute held its 3rd *Annual Aerospace and Defense Consolidation Conference* on 10-12 September 2001 at The Westin Horton Plaza in San Diego, California.¹ The theme was “Strategies to Merge, Acquire, Grow, or Sell,” focusing on 2nd and 3rd tier aerospace and defense companies. One of the two special case studies at this conference was the Raytheon Aerospace spin-off.

This conglomeration of corporate power is nowhere so visible as in military contracting. Mergers have now about exhausted the tolerance of watchdog agencies tasked to prevent monopolies. Now military contractors are experimenting with other means of circumventing the letter of anti-trust laws while violating their spirit.

For some time I have been concerned over this endless string of corporate mergers. I have observed that each merger results in “downsizing” the work force to maximize profits. Because mergers are, at least ostensibly, reviewed to assure compliance with anti-monopoly laws, sometimes a segment of the organization being bought must be spun off as an independent company as token observance of the anti-trust spirit.² What mattered was that this spin-off satisfied the Federal Trade Commission.

Often a large company will voluntarily sell a division of its business that is not profitable enough to satisfy the board of directors. Or, it may sell a division that no longer fits into the fields in which that company wants to specialize -- read as monopolize. In either case, another company with a different area of specialization may buy that division to compliment its “specialization.”

I chose these seven companies because they rank among the “Top 10” of the world’s producers of lethal weapons. Their ratings are:

<u>Company</u>	<u>US Rating³</u>	<u>World Rating⁴</u>
Lockheed Martin	1	1
Boeing	2	2
Raytheon	3	3
General Dynamics	5	5
Northrop Grumman	4	6 (?) ⁵
United Technologies	6	9
TRW	7	10

¹See <http://www.srinstitute.com> and click on “Aerospace and Defense.”

²An example of this is when Lockheed Martin had to break off an independent Space Systems/Loral before it could absorb the remainder of Loral Corporation, so that Lockheed Martin would not monopolize the satellite field. Never mind that the president of the new and independent Space Systems/Loral sat on the Lockheed Martin board of directors.

³As given in <http://web1.whs.osd.mil/peidhome/procstst/p01/fy2000/top100.htm>, modified to reflect Northrop Grumman/Litton merger.

⁴As given in *Defense News*, 30 July 2001, p. 50.

⁵Probably calculated before merger with Litton.

Now let us look at how much business these companies receive from the military establishments of the world each year. The figures are as follows:

<u>Company</u>	From the US ⁶ DOD Prime Contracts (fiscal year 2000)	From the World ⁷ Total Defense Revenues (calendar year 2000)
Lockheed Martin	\$15.1 billion	\$18.0 billion
Boeing	12.0 billion	17.0 billion
Raytheon	6.3 billion	14.0 billion
General Dynamics	4.2 billion	6.5 billion
Northrop Grumman	5.8 billion	5.6 billion (?) ⁸
United Technologies	2.1 billion	4.1 billion
TRW	2.0 billion	4.0 billion
	=====	=====
TOTAL	\$47.5 billion	\$69.2 billion

These seven corporations received over 57% of the \$82.5 billion in Pentagon prime contracts that went to the top 100 US defense contractors. They received over a third of the total \$133.2 billion in prime Pentagon contracts awarded to all companies. Let us look at how each of them has obtained the position it now holds. Pay particular attention to the increased tempo of mergers, acquisitions, and takeovers starting early in the 1990s.

1. ***Lockheed Martin.***

A boyhood ambition was fulfilled when Allan Loughead lifted his Model-G hydro-airplane from the surface of San Francisco Bay in 1913. He and his brother, Malcolm, later changed their name and formed Lockheed Aircraft Company. This company was purchased by Robert and Courtland Gross during the 1930s, and furnished fighters and bombers for the Army Air Corps during World War II. Expansion continued after the war to include the missiles and space division in Sunnyvale, California.

With the demise of the cold war, Lockheed combined with a Russian company to form Lockheed-Khrunichev-Energia International in 1992, thus allowing Lockheed to sell commercial launch services on Russia's Proton rockets.

Lockheed also acquired Sanders Associates in 1992, a large military electronics firm in Nashua, New Hampshire.

In 1993 Lockheed bought General Dynamics' Fort Worth Division for \$1.5 billion, and became the builder of F-16 fighter jets.

⁶As given in <http://web1.whs.osd.mil/peidhome/procstst/p01/fy2000/top100.htm>, modified to reflect Northrop Grumman/Litton merger.

⁷As given in *Defense News*, 30 July 2001, p. 50.

⁸It appears that this figure may have been determined before Northrop Grumman acquired Litton.

Fulfilling a boyhood dream, Glenn L. Martin in 1909 took to the air near Santa Anna, California in his home-made airplane. Although too late for World War I, the Martin bombers and flying boats played a key role in World War II. Later Martin Company merged to create the Martin Marietta Corporation. In 1993 Martin Marietta purchased General Electric's aerospace business. (GE had previously swallowed RCA's satellite business.) In 1994 Martin Marietta acquired General Dynamics' Space Systems Division. On 12 March 1995 the merger of Lockheed and Martin Marietta was completed to form the new Lockheed Martin Corporation.

That was not the end of business ambitions. On 8 January 1996 Lockheed Martin announced that it had clinched a \$9.1-billion deal to absorb all of Loral Corporation, except for its Space Systems as described above. The acquisition was approved by federal regulators on 18 April 1996.

On 3 July 1997 Lockheed Martin announced that it was buying Northrop Grumman Corp. That merger was not supported by the Pentagon and was challenged by the US Justice Department. The deal was scrapped on 16 July 1998. One of the main reasons was that Northrop Grumman is moving rapidly to the forefront in ground and airborne surveillance and the merger would have put too many capabilities under one roof. Had it gone through it would have put under the title of Lockheed Martin what were once 22 separate companies who competed to make free enterprise work in America. As it is, those 22 companies have now been reduced to two.⁹

According to *Defense News*, it appears that Lockheed Martin may now be trying to obtain the remainder of Loral Corporation -- Space Systems/Loral -- which it had to spin off as an independent company in 1996.¹⁰ Alcatel, which holds a 20-percent interest in Space Systems/Loral, filed suit against Loral in a New York US District Court on 16 March 2001 for breaking its 1997 agreement not to discuss the sale or merger of Space Systems/Loral with Lockheed Martin. Alcatel contends that Loral broke that agreement. Lockheed Martin and Space Systems/Loral have no comment.

On 3 June 2001 Lockheed Martin announced its strategic alliance with Microsoft Corporation to collaborate in pursuing new government business in the field of information technology.

Lockheed Martin has also formed alliances and joint ventures with foreign companies and governments. Lockheed Martin UK, a registered British company located in Portsmouth, England, is a subsidiary of Lockheed Martin (Bethesda, Maryland). Lockheed Martin Australia Pty. Ltd. is an Australian company involved with radar which lies at the heart of Australia's long-term defense strategy. Lockheed Martin and Rafael (Haifa, Israel) each own 50% interest in Precision Guided Systems US (PGSUS) located at Orlando, Florida. Lockheed Martin and Elbit Systems Ltd. (Haifa, Israel) were in January 1998 making plans to do joint business. Lockheed Martin's Aeronautical Sector formed a long-term alliance with IBM (Armonk, New York) and Dassault Systemes (Suresnes, France) to design computer-based aircraft development tools and processes that allow engineers to simulate the spectrum of airplane design before actually creating parts, tools and

⁹Another instance of a megamerger between aerospace giants being refused was the attempt of General Electric (GE) to merge with Honeywell. Ironically, it was the European Union (EU), not the United States, who nixed the deal. Mario Monte, the EU Competition Commissioner, stated: "The merger between GE and Honeywell, as it was notified, would have severely reduced competition in the aerospace industry and resulted ultimately in higher prices for customers, particularly airlines." (*Mercury News*, 4 July 2001, p. 3C)

¹⁰See *Defense News*, 16 April 2001, p. 2.

processes. Lockheed Martin Space Systems has formed a joint venture with Russia's Intersputnik communications network, (which owns 15 prime high-altitude slots for satellite deployment) to strengthen its competitive position in marketing communications satellites globally. Lockheed Martin also has an office in Geneva, Switzerland, called Lockheed Martin International S.A., which is the spearhead to grab as much as possible of the new business market in eastern Europe.

Lockheed Martin has also built for China a surveillance system, called a Vessel Traffic Management Information System, which can detect and track surface ships. It is installed on Hainan Island off the coast of mainland China (of recent media attention regarding the EP-3 spy plane incident).

2. Boeing.

William Boeing moved to Seattle in 1908 and bought Heath's shipyard in 1910. This was later to become his first airplane factory. The Boeing Airplane Company built B-17 and B-29 bombers during World War II. After the war the company built B-47 and B-52 bombers as well as other military and commercial aircraft and helicopters. Later Boeing entered the field on cruise missiles, rockets, and space vehicles.

On 6 December 1996 Boeing acquired Rockwell International Corporation's Space and Defense Units. The history behind this merger started when North American Aviation, Inc. was founded on 6 December 1928. On 7 November 1955 it established four separate divisions: Rocketdyne, Atomics International, Missile Development, and Autonetics. On 22 September 1967 North American Aviation Inc. merged with Rockwell Standard Corporation to become North American Rockwell. The name was again changed to Rockwell International in February 1973 when Collins Radio joined the corporation. When Rockwell International's space and defense units were purchased by Boeing they were renamed Boeing North American which is a wholly owned subsidiary of Boeing..

Boeing bought McDonnell Douglas Corporation on 1 August 1997. Donald W. Douglas and David R. Davis formed the David Douglass Company on 22 July 1920. Donald Douglas incorporated it as The Douglas Company in July 1921. On 6 July 1939 James S. McDonnell incorporated McDonnell Aircraft Corporation at Lambert Field, Missouri to produce plexiglass aircraft canopies. The Douglass and McDonnell Companies merged on 28 April 1967 to become McDonnell Douglas Corporation. On 6 January 1984 Hughes Helicopters Inc. joined the McDonnell Douglas Corporation. Now all of these are part of Boeing.

In October 2000 Boeing took control of Hughes Electronics Corporation's Space and Communications Company.

Boeing also has international connections. Boeing, Russia, and Ukraine are partners on a sea-based satellite-launching program called Sea Launch -- using a converted offshore drilling platform near the equator. Boeing and Russia are the primary partners in the International Space Station. Boeing on 13 April 2001 signed a partnership deal with the Russian Space Agency that could lead to billions of dollars in business and enhance Boeing's presence in the European market, especially since the Russian Space Agency has also signed an accord with the Franco-German-Spanish European Aeronautic Defence and Space Company (EADS). Boeing currently has a research center in Moscow with over 500 technicians in seven Russian cities. Boeing Capital's European financial services business has opened a new branch in Dublin, Ireland.

On 20 June 2001 Boeing and Mitsubishi announced an agreement to further broaden their cooperation which includes space-based communications, space and communications services, multimedia, navigation, launch services, and space infrastructure. In July 2001 Boeing was chosen to cooperate with the Italian defense firm Finmeccanica to build an aerial refueling tanker for the Italian Air Force. Boeing provides maintenance and support to Saudi Arabia for the F-15 aircraft.

3. Raytheon.

Laurence K. Marshall, Vannevar Bush, and Charles G. Smith founded The American Appliance Company in 1922. In 1925 they marketed the first gaseous rectifier tube for radios under the brand name of Raytheon. In that same year they changed the name of the company to Raytheon Manufacturing Company.

During the 1990s Raytheon sold many of its “non-core” businesses, apparently to focus on the more lucrative military contracts. Those businesses included the D.C. Heath educational publishing unit; home appliances; heating and air conditioning; and its Semiconductor, Switchcraft, Seiscor Technologies. In 2000 it completed the sale of its engineering and construction subsidiary.

But during the 1990s Raytheon also gained other assets which strengthened its position as a defense contractor. In 1992 it increased its electronics capability by acquiring AMBER Engineering which designs infrared sensor components and focal plane arrays.

In May 1995, after merging its equipment and missiles divisions, Raytheon acquired E-Systems, which specializes in intelligence, reconnaissance and surveillance systems; command and control systems; guidance and navigation systems; and control, communications and data systems.

During June 1996, Raytheon acquired Chrysler Corporation’s aircraft modification and defense electronics businesses and consolidated them into Raytheon E-Systems.

The following year, with megamergers taking place among Pentagon contractors, Raytheon decided that in order to survive in defense electronics it must adopt a strategy of acquisition and merger. In July 1997 it acquired Texas Instruments’ Defense Systems and Electronics businesses.

In December 1997 Raytheon took over the remaining defense business of Hughes Electronics for \$9.5 billion -- the largest transaction in Raytheon history. Hughes had previously bought General Dynamics missile business in 1992.

After the merger with Hughes, Raytheon consolidated all its defense business. In 1999 Raytheon again streamlined its defense and government operations.

By mid-2001 Raytheon was having cash flow problems because of its continual downgrading of its debt rating over the past five years -- \$13 billion in debts acquired during Raytheon’s buying spree. The company may have to sell businesses in order to recover.

Raytheon also has foreign involvement. It owns Raytheon Systems Limited which operates in the United Kingdom. Raytheon Systems Canada Ltd. operates in British Columbia province of Canada, Raytheon has also teamed up in a 50-50 joint venture with France’s Thales Group in a joint venture company called Thales-Raytheon Systems, for a European radar and air-defense system. Raytheon provides advanced artillery tactical data systems and software modifications for Portugal and Turkey. On 6 July 2001 Raytheon was awarded a \$30 million contract to provide transportation support services for the Cooperative Threat Reduction Program in the former Soviet Union.

4. **General Dynamics.**

General Dynamics has a long and complex history of buying companies and selling business units. It would be too complicated to detail all the acquisitions and divestitures, some of which were quite prominent. For instance, there is a long history of purchasing classic aircraft companies to form what is now General Dynamics' business jet unit. Even in the military field some substantial divestments were made, such as when it sold its Defense Systems unit to Martin Marietta, which later became Lockheed Martin. Or when it sold its Fort Worth unit -- maker of F-16 fighter jets -- to Lockheed (now Lockheed Martin). However, for the purpose of this paper I will focus only on the history of General Dynamics current military contracting units.

General Dynamics is divided into four main business segments:

- Aerospace
- Combat Systems (Land)
- Information Systems and Technology
- Marine Systems

The Aerospace segments is all business jets so only the latter three will be addressed in this paper.

Electric Boat Company was founded in 1899. It acquired Holland Torpedo Boat Company (founded in 1859 by John Holland) that same year and Electro Dynamic Company in 1900.

In 1954, when it started building the first nuclear-powered submarine -- *USS Nautilus* -- Electric Boat established General Dynamics as its parent company. Electric Boat then became a division of General Dynamics' Marine Systems.

In 1964, Bethlehem Shipbuilding's Fore River Shipyard was acquired by General Dynamics as part of its Marine Systems. The Fore River Shipyard was founded in 1884 as Fore River Engine Company -- renamed in 1901 as Fore River Ship and Engine Company. When acquired by Bethlehem Steel Company in 1917 it became Bethlehem Shipbuilding Corporation's Fore River Shipyard.

In 1982, Chrysler Corporation's Detroit Arsenal Tank Plant and business was bought by General Dynamics, and renamed Combat Systems.

In 1995, General Dynamics acquired Bath Iron Works as part of its Marine Systems. Bath Iron Works was founded in 1833 as Bath Iron Foundry.

In 1996, General Dynamics acquired Teledyne Brown Engineering's Muskegon Center. Also in 1996, it acquired Lockheed Martin's interest in AV Technology, LLC. Both became part of General Dynamics' Information Systems.

In 1997, Computing Devices International is acquired from Ceridian Corporation by General Dynamics for its Information Systems. Computing Devices International was started in 1977 by Control Data Corporation (realigned as Ceridian Corporation in 1992).

In 1997, Armament Systems became a subsidiary of General Dynamics in its Combat Systems division. It was started in 1948 when General Electric bought Bell Aircraft's Burlington, Vermont plant. In 1962 this plant became part of GE Missile and Space Division, and was named Armament Systems in 1967. GE Aerospace, including Armament Division, merged with Martin Marietta (later Lockheed Martin) in 1993 and Martin Marietta's Ordnance Systems became part of Armament Systems. Armament Systems was then acquired by General Dynamics.

In 1997 General Dynamics Information Systems acquired Advanced Technology Systems. Advanced Technology was formed by Western Electric in 1951, acquired by AT&T in 1984, and then by Lucent Technologies in 1996.

In 1997, Defense Systems was acquired by General Dynamics and split up between its Combat Systems and Information Systems. Defense Systems was formed by GE in 1940. It was sold to Martin Marietta (now Lockheed Martin) in 1993 and then bought by General Dynamics.

In 1998, National Steel and Shipbuilding Company (NASSCO) was acquired by General Dynamics as part of its Marine Systems. NASSCO was established in 1905 as California Iron Works. It was renamed National Iron Works in 1922. It acquired Ingle Manufacturing Company in 1938 and Lynch Shipbuilding Company in 1948. After being renamed NASSCO in 1949, it acquired Martinolich Shipbuilding Company in 1957. In 1960 NASSCO was bought by Henry J. Kaiser Company, Morrison-Knudson Company, and F. E. Young Construction Company. Through a series of buy outs, NASSCO became a wholly owned subsidiary of Morrison-Knudson by 1974. Then in 1989 NASSCO was acquired by its employees through a stock ownership plan, and was later acquired by General Dynamics.

In 1998, Computer Systems and Communications Corporation -- founded as a private company in 1991 -- was acquired by General Dynamics for its Information Systems segment.

In 1999, Food & Machinery Manufacturing was acquired by General Dynamics and renamed General Dynamics Robotics Systems -- part of its Combat Systems.

In 1999, Interactive Television Company, GTE Government Systems' Worldwide Telecommunications Systems Division, and GTE Government Systems' Communication Systems Division are acquired by General Dynamics for its Information Systems segment.

In 2000, Saco Defense was acquired from New Holt Holding Corporation and became the Saco, Maine portion of General Dynamics' Armament Systems.

In 2000, Caldwell Cable Ventures, Devcor Inc., GTE Government Systems' Electronic Systems Division, and Creative Concept Corporation were acquired by General Dynamics' Information Systems.

In 2001, General Dynamics acquired Primex Technologies and renames it Ordnance and Tactical Systems of the Combat Systems segment.

In 2001, Matthews Land Company Inc. And Motorola's Information Systems group were acquired by General Dynamics' Information Systems.

Currently General Dynamics is bidding against Northrop Grumman to acquire Newport News Shipbuilding. Newport News is the only company besides the Electric Boat Division of General Dynamics that builds nuclear-powered submarines. It is also the sole producer of aircraft carriers. The Pentagon is expected during the fall of 2001 to give its recommendation to the Justice Department's antitrust division on whether it should oppose either or both takeover proposals.

General Dynamics also has foreign operations. Santa Barbara Sistemas, a Spanish government-owned company is operated by General Dynamics. General Dynamics owns Canada-based International Telecom, Inc. Also a subsidiary of General Dynamics is Computing Devices Canada and Computing Devices Company Ltd. in the UK. There is Mansour General Dynamics in Saudi Arabia, as well as General Dynamics offices in Egypt, Kuwait, and Turkey. General Dynamics owns 25% of Steyr-Daimler-Puch Spezialfahrzeug AG in Austria, which makes armored combat vehicles for NATO members.

5. *Northrop Grumman.*

Jack Northrop started his first company during the 1920s but it was acquired in 1929 by Boeing-owned United Aircraft and Transport Corporation. Northrop stayed with the Boeing group

until 1932, at which time he convinced Donald Douglas to provide 51% financing for a new Northrop Corporation. In 1937 that company was dissolved and in 1939 Jack Northrop founded and incorporated Northrop Aircraft Company.

Grumman Engineering Corporation was founded at Baldwin, Long Island in 1929 to build floats for Navy scouting planes. In 1932 it became Grumman Aircraft Engineering Corporation and moved to Bethpage, Long Island in 1937. It merged with Northrop Aircraft Company in 1994 to form the present Northrop Grumman Corporation.

Logicon Inc., founded in 1961, is a leader in advanced information technology with expertise in command, control, communications, computers, intelligence, surveillance, and reconnaissance. It is now a subsidiary of Northrop Grumman.

Westinghouse Radio Division was incorporated in 1938. Northrop Grumman in March 1996 acquired Westinghouse Electric Corporation's defense electronics and systems businesses.

In 1997-1998 Northrop Grumman attempted to merge with Lockheed Martin -- described above. That venture was doomed to failure.

In December 2000, Northrop Grumman announced intentions to acquire Litton Industries for \$5.1 billion. Among all its other activities, Litton owns Ingalls Shipbuilding which builds Aegis cruisers and destroyers and is in the alliance for the new DD-21 destroyer. In early April 2001 the company announced that it had received all regulatory approvals and that the \$3.8-billion deal was complete. This merger takes Northrop Grumman out of the weapons systems subcontracting role and makes it a real contender as a systems integrator. A systems integrator is responsible for the design, development, testing, integration, and support of a weapons system; and may pick several subcontractors to produce the individual elements of the system. The merger also put Northrop Grumman in a leading position for ground and airborne surveillance systems. Whereas this company is now one of the three key contractors for military fighter aircraft, it is fast moving into the space and missile field as well as shipbuilding.

On 20 April 2001 Northrop Grumman announced that it will acquire Aerojet-General Corp's Electronic and Information Systems Group for \$315 million. This group, which specializes in space-based sensing and smart weapons technology, will become part of Northrop Grumman's Electronic Sensor and Systems Section (Baltimore, Maryland).

Currently Northrop Grumman is bidding against General Dynamics to acquire Newport News Shipbuilding. Newport News is the only company besides the Electric Boat Division of General Dynamics that builds nuclear-powered submarines. It is also the sole producer of aircraft carriers. The Pentagon is expected during the fall of 2001 to give its recommendation to the Justice Department's antitrust division on whether it should oppose either or both takeover proposals.

Northrop Grumman has a presence in Australia, Belgium, Canada, China, Egypt, France, Ireland, Japan, Korea, Saudi Arabia, Singapore, Taiwan, Thailand, and the United Kingdom. Israel plans to buy up to five US-built warships of the type previously furnished by Northrop Grumman's shipyard. On 17 June 2001 Northrop Grumman announced that it had signed a memorandum of agreement with TERMA A/S of Denmark to collaborate on electronic warfare business projects. Northrop Grumman has a contract for engineering of Taiwan's E-2C Early Warning Command & Control Aircraft. Northrop Grumman has signed a memorandum of understanding with the European Aeronautic Defence and Space Company (EADS) for cooperation in the field of airborne radar. Northrop Grumman is also teamed with EADS to re-engine NATO's AWACS aircraft and trainer cargo aircraft.

6. *United Technologies.*

United Technologies is divided into five business units -- Pratt & Whitney, Carrier Corporation, Otis Elevator Company, Hamilton Sunstrand, and Sikorsky Aircraft. Carrier Corporation and Otis Elevator Company deal in commercial products (heating & air conditioning and elevators respectively). This paper will be confined with the history and military products of the other three.

In 1919, Standard Steel Propeller Company was established. A year earlier, in 1918, Thomas A. Dicks and James B. Luttrell organized the Dicks-Luttrell Propeller Company, which was the predecessor of Standard Steel.

In 1920, Hamilton Aero Manufacturing was founded by Thomas F. Hamilton. Earlier, in 1909, Hamilton and Paul J. Palmer had founded Hamilton & Founder to manufacture gliders and Aeroplanes.

Igor I. Sikorsky was born in Russia and built his first rubber-band helicopter model at the age of 12. His first helicopter in 1909 failed to lift its own weight but he had better success with airplanes. He designed a bomber that was used by the Imperial Russian Air Force in 1915, but his fascination was always with a machine that could rise vertically from the ground. The Bolshevik Revolution in 1918 caused Sikorsky to emigrate to America where he founded Sikorsky Aero Engineering Corporation in 1923. The name was changed to Sikorsky Manufacturing Corporation in 1929 and then to Sikorsky Aviation Corporation.

In 1925, Pratt & Whitney Aircraft was incorporated. In that year, Frederick Brant Rentschler was seeking a firm to manufacture aircraft engines contacted Pratt & Whitney Tool, a division of Niles-Bement-Pond Company. The new aircraft company was formed. Stockholders were Frederick Rentschler, George Mead, and Pratt & Whitney Tool.

In 1929, Pratt & Whitney Aircraft, Hamilton Aero Manufacturing, Sikorsky Aviation Corporation, and Standard Steel Propeller joined with Chance Vought and Boeing Airline & Transport to form United Aircraft and Transport. The new company consolidated Hamilton Aero Manufacturing and Standard Steel Propeller to form the Hamilton Standard Propeller Corporation as a subsidiary.

In 1934, United Aircraft and Transport was dissolved under federal pressure that airlines should not be affiliated with aircraft equipment manufacturers. Pratt & Whitney, Sikorsky, and Hamilton Standard Propeller stayed together to form United Aircraft Corporation.

Around 1945 Sikorsky moved totally into helicopter production and flew the first jet-powered helicopter in 1957. In 1948 Pratt & Whitney produced its first jet engine and opened its Canadian plant in 1952. In 1949 Hamilton Standard diversified beyond propellers to controls, aircraft environmental/pressurization technologies, space suits, and fuel cells. It dropped "propeller" from its name and became known as the Hamilton Standard Division of United Aircraft. Pratt & Whitney also got into fuel cells. In 1958 United Aircraft established itself in the fields of solid rocket motors and advanced propulsion techniques.

In 1975, United Aircraft Corporation changed its name to United Technologies Corporation because it had diversified beyond aircraft..

In 1982, United Technologies purchased the Stomberg Carlson unit and the Communication Company from General Dynamics.

In 1999, United Technologies acquired the Aerospace Heat Transfer and Fluids Management business from IMI Marston, placed it under Hamilton standard and renamed it HS Marston

On 10 June 1999, United Technologies acquired Sunstrand Corporation and combined it with Hamilton Standard to form the present Hamilton Sunstrand business unit. In 1905, Levin Faust, Elmer Lutzhoff, and Swan Anderson created The Rockford Tool Company. In 1909 Edwin Cedarleaf and the Sunstrand brothers (Oscar and David) started the Rockford Milling Machine company. These two companies combined in 1926 to form the Sunstrand Machine Tool Company. In 1959 it changed its name to Sunstrand Corporation. After major acquisitions the Corporation formed three business units: Sunstrand Data Control, Sunstrand Heat Transfer, and The Falk Corporation. A fourth business unit -- Sunstrand Fuel Handling -- was added in 1970. Over the years, Sunstrand Corporation made the following military-related acquisitions: Vap-Air Division of Vapor Corporation in 1975; Task Corporation and a new Sunstrand facility in Singapore in 1977; Plessey-Hydratech in 1981; Sullair Corporation, Signatron Inc., and Wulfsberg Electronics in 1984; Turbomach division of Solar Turbines in 1985; Milton Roy Company in 1991; Electric Systems Division of Westinghouse Electric Corporation in 1992; Dowty Aerospace's ram air turbine business in 1995; the remaining 50% of Auxiliary Power International Corporation (a joint venture with Labinal of France started seven years earlier) and Automated Power Management Systems from Leach International in 1996; Keystone Engineering Company, Williams Instrument Company, and ANSIMAG Company in 1998. During that same time Sunstrand sold its Machine Tool division in 1977 and its Heat Transfer business in 1990.

In 2001, the Sensor Systems Division of Orbital Sciences Corporation was acquired by United Technologies.

United Technologies also has foreign operations. Twenty-seven armed forces operate aircraft powered by almost 11,000 military engines made by Pratt & Whitney and Pratt & Whitney Canada. Owned by United Technologies and managed by Hamilton Sunstrand are Nord-Micro Elektronik in Germany; Microtecnica in Italy; Ratier-Figeac in France; Shannon Aircraft motor works with aftermarket service operations in Ireland, France, and Canada; the gear products business of A Gorninan Company Ltd. in Australia; MASO Process Pumpin GmbH in Germany; HS Marston Aerospace Ltd. in England; Claverham Group Ltd. in England; and Castor SrL of Italy. Hamilton Sunstrand also has manufacturing facilities in Singapore and Puerto Rico. Sikorsky has licensing agreements with Westland (United Kingdom), Mitsubishi Heavy Industries (Japan) and Korean Air (South Korea).

7. TRW.

TRW describes itself as a global technology, manufacturing and service company with customers in 35 countries. Thompson Products was founded in Cleveland in 1901 to manufacture screws and fasteners. In 1958 it entered the electronics and defense markets by merging with Los Angeles-based Ramo-Wooldridge Corporation. The combined company was then known as Thompson Ramo Wooldridge, or TRW. For the next three decades it acquired businesses with long-term growth potential. Many of the acquisitions were to support its automotive division. For the purposes of this paper I will from here on discuss only TRW's electronics and defense activity.

Between 1991 and 1993 TRW restructured its company to “divest non-strategic and under-performing assets and to streamline its core businesses.”¹¹

In December 1997 TRW paid almost \$1 billion for BDM International Inc. which was a leader in information system integration and system management.

On 18 January 1999 TRW completed acquisition of Astro Aerospace Corp. TRW Astro Aerospace (Carpenteria, California) is now a wholly owned subsidiary of TRW Space & Electronics Group.

In May 1999 TRW completed a \$7 billion acquisition of Lucas Varity plc (Britain). Although much of this merger enhanced TRW’s automotive business, it also enhanced the technological capabilities and customer base of its aerospace and information systems operations. Lucas Varity had previously acquired Lucas Aerospace Ltd., which is now known as TRW Aeronautical Systems.

On 14 June 1999 TRW Aeronautical Systems’ Lucas Aerospace acquired Peugeot Citroen’s SAMM (France), a high-technology flight systems supplier. Besides boosting TRW to the No. 1 market position for flight control actuation, this also improves TRW’s presence in Europe.

On 24 August 1999 TRW Aeronautical Systems’ Lucas Aerospace acquired Pierburg Luftfahrtgeräte Union GmbH (Germany). This reinforced TRW’s position as a leading aerospace engine systems supplier.

By the first quarter of 2000 TRW had increased its technology base through equity positions in RF Micro Devices, Endwave Corporation, Astrolink, Wireless Inc., E-Certify, E-Synch, MultiLink Technology, iSky, VCI, and Celera. Meanwhile, the company continued to divest its non-core automotive businesses.

To enhance its laser capabilities TRW in October 2000 purchased Cutting Edge Optronics (St. Louis, Missouri) for \$19 million. Cutting Edge Optronics is a designer and manufacturer of solid-state lasers, related components, and laser diodes.

FROM MONOPOLY TO CONSPIRACY: TEAMING UP TO SQUEEZE OUT COMPETITION

Mergers in the military contracting field have just about saturated the Federal Trade Commission’s ability to accommodate. I have noticed that new methods are now undergoing experimentation -- methods that allow companies to form alliances in ways that reap the greatest profits. It has not been uncommon in the past for groups of companies to form teams when bidding on a contract, with the winning team getting the award. Now, however, this teaming up seems to have taken a new twist -- forming only one team thereby eliminating competition.

With only these five companies dominating three of the most lucrative categories of weapons manufacture, it would seem that they should be satisfied. But perhaps the failure of Lockheed Martin being able to merge with Northrop Grumman was an indicator that conglomeration has reached its saturation point. Big corporations now seem to have devised a system of alliances which give each company an out-and-out monopoly for a certain piece of the pie. This new system provides all the advantages of teaming up while at the same time avoiding the lower profits caused by bidding against each other. Here are a few contracts that have recently come to my attention.

¹¹http://www.trw.com/about/main/1,1015,1_1151^2^1151^1151,00.html

1. *The Advanced EHF Satellite.*

The Advanced Extreme High Frequency (EHF) Satellite contract award is the first program that came to my attention in which big corporations corner a section of the development and manufacturing areas without competition. It seems that if they can't conglomerate, they can specialize in areas that monopolize a discrete part of the whole. The Advanced EHF satellite team epitomizes this behavior.

The Advanced EHF satellite is a follow-on to the existing Military Strategic and Tactical Relay (MILSTAR) communications satellite. Three companies -- Lockheed Martin, TRW, and Boeing -- are currently teamed on the MILSTAR project. Lockheed Martin is the prime contractor that makes the satellite as well as the vehicles to put it into orbit. TRW provides the low-data-rate payload and Boeing makes the medium-data-rate payload.

Now the Advanced EHF satellite is entering the picture as MILSTAR's replacement. The Pentagon wanted some semblance of competitive bidding so, in September 1999, Lockheed Martin (teamed with TRW) and Boeing were each awarded a \$22-million, 18-month study contract to define the Advanced EHF system. The winner would become prime contractor.

Competition was not to happen. In April 2001, when the study was not even half over, the three companies involved convinced the Pentagon that the Advanced EHF could be obtained 18 months sooner (by December 2004 rather than June 2006) if they worked as a team and the Pentagon waived competitive bidding. Despite some internal dissension, the Pentagon canceled the competitive studies and awarded the \$2.6-billion prime contract to Lockheed Martin. TRW and Boeing would be subcontractors for major subsystems. Lockheed Martin expects to receive \$825 million over ten years and the balance would be divided between TRW and Boeing along with a string of minor subcontractors and vendors. So we now have the same trio that produced MILSTAR lined up to build Advanced EHF.

Predictably, as with most government contracts, it failed to meet the schedule. In mid-June 2001 it was already a year behind and overrunning the budget by about half a billion. An investigation by the General Accounting Office (GAO) is in progress.

Things got worse. On 15 August 2001, only 4 months after the contract was awarded, the Defense Acquisition Review Board determined that the Advanced EHF satellite was already \$1 billion over its \$2.6 billion budget and that the 2004 launch date would not be met. The preliminary design effort was extended until the end of September 2001.

In essence, although each partner could build a satellite alone, they each choose to only build an isolated part rather than undercut total profits by having to undercut a competitor. When this trio team up there are no other qualified competitors -- conglomeration has already eliminated them. This effectively gives each member a monopoly in building its specific part. All of this may (or may not??) be according to the letter of anti-monopoly law, but it certainly violates the intention to prevent monopolies.

2. *The US-Israeli Arrow Contest.*

For many years the US has been providing most of the funding to help Israel develop the Arrow anti-tactical missile. Now that Arrow is deployed, the Israelis want to sell it to other countries such as Turkey, India, Japan, South Korea, and Taiwan. The US has approved this move providing the missiles are produced in the US -- Israel can produce the launcher, radar, and other components of the deployed system.

Arrow's prime contractor in Israel is Israeli Aircraft Industries Ltd. (IAI), which operates under the supervision of the Israeli Ministry of Defense. In September 2000, IAI opened competitive bidding among Boeing Company's Seal Beach, California division, General Dynamics Corp. (Falls Church, Virginia), and Raytheon Co. (Lexington, Massachusetts) for production rights of at least 51% of Arrow missiles. Lockheed Martin (Bethesda, Maryland) was essentially eliminated from the competition because IAI was concerned that the company could not devote proper attention to Arrow, considering its obligations to so many other high profile ballistic missile defense projects.

First General Dynamics dropped out. Then in mid-November 2000 Raytheon bowed out of the race for production rights, opting instead to be a subcontractor to Boeing. That left Boeing as the winner without a struggle. IAI then began scrambling to bring Lockheed Martin back into the competition in order to preserve some semblance of competitive bidding.

In this case, what appeared to be another attempt to build a weapons system without competitive bid hit a snag. The US government became concerned over potential transfer of sensitive technology that would violate the Missile Technology Control Regime. So on 24 January 2001 Boeing announced that it was also suspending negotiations on co-producing Arrow. The outcome of this example still remains to be seen. Loopholes in the Missile Technology Control Regime are being sought.

3. *Low Orbit Space Based Infrared System (SBIRS-Low).*

SBIRS-Low is part of the satellite-based early warning and tracking network for ballistic missile defense (BMD). It is planned as a constellation of about 24 low orbit satellites to track missiles and warheads midcourse in their flight, and to discriminate between actual warheads and decoys.

On 16 August 1999 the US Air Force awarded two teams -- one led by TRW Space and Electronics Group and the other by Spectrum Astro -- a \$275-million competitive contract each to define the SBIRS-low concept. In August 2001 this study period, which would expire in October 2001, was extended 9 months with another \$230 million contract to each team. Launches are to start in 2006 and be complete in 2011. A production contract could range up to \$5 billion. The Air Force intends to spend \$11.8 billion on SBIRS-Low over its lifetime through fiscal year 2022.

On the Spectrum Astro team, Northrop Grumman is the main partner. Spectrum Astro leads overall design effort and is responsible for the spacecraft and overall systems architecture. Northrop Grumman is responsible for the sensor design and related ground systems data processing, and the ground segment integration. Analex Corporation, and the Space Dynamics Laboratory of Utah State University are also on this team.

It began to look as though some new blood was competing for a major satellite contract but in March 2001 it was announced that the two heavyweights in spacecraft manufacture would be brought onto the Spectrum Astro team. Lockheed Martin Space Systems was added to develop algorithms and key aspects of the ground segment. Boeing's Missile Defense And Space Control Division (California) was brought aboard to develop sensors and associated algorithms. According to John Chino, vice president of Northrop Grumman: "Large team members such as Northrop Grumman, Lockheed Martin, and Boeing bring years of experience and proven technology to the

SBIRS-Low program.”¹² This program bears watching as it introduces some interesting speculation on Spectrum Astro’s role in the original bidding, and who might have been that company’s technical advisors.

4. DD-21 Land-Attack Destroyer.

The DD-21 destroyer program has been proceeding with two competitive teams -- a blue team led by General Dynamics and including Lockheed Martin as systems integrator, and a gold team led by Northrop Grumman with Raytheon as systems integrator and Boeing as a team member. These industrial teams are competing to build 32 destroyers at an estimated cost of \$24 billion. The competition was put on hold 31 May 2001 pending resolution of several Pentagon reviews. This will delay construction for two years, until 2007.

Now *Defense News* reports that the Navy is exploring new acquisition strategies for this program.¹³ It is considering combining the gold and blue teams into a super team. The Navy claims this will allow it to choose the best that each team has to offer and will save time and cost. Although this new strategy is ostensibly initiated by the government, it has the appearance of being very much like the Advanced EHF satellite program discussed above. Events should be closely monitored as they unfold.

MAJOR PROGRAMS CONTRIBUTING TO A U.S. FIRST-STRIKE CAPABILITY

At this point I would like to show how the corporations being discussed are contributing to the five elements of a first-strike capability. I will address them element by element.

1. Anti-Satellite Warfare (ASAT).

There is currently only one program to my knowledge that is specifically labeled anti-satellite. It is the Kinetic Energy Anti-Satellite (KE-ASAT) interceptor. Remember, however, that most if not all of the Ballistic Missile Defense programs shown below are also applicable to destroying satellites.

KE-ASAT.

Boeing.

2. Precision Nuclear Delivery Vehicles.

These are the strategic weapons that would destroy an opponents land-based weapons and command posts, as well as other critical targets. Although some heavy bombers (B-52s and B-2s) are in this arsenal, the main first strike weapons are submarine-launched ballistic missiles (SLBMs) and silo-based intercontinental ballistic missiles (ICBMs).

B-2 Bomber

Northrop Grumman.

B-52 Bomber

Boeing.

Nuclear ALCM

Boeing.

Minuteman-3 ICBMs.

Boeing: Manufacturer

TRW, Boeing, Lockheed Martin: ICBM Integration Team

MX ICBMs (Peacekeeper)

Boeing: Manufacturer

TRW, Boeing, Lockheed Martin: ICBM Integration Team

Northrop Grumman: LN-195 Alternate Inertial Guidance System

¹²Lockheed Martin, Boeing Join SBIRS-Low Team.

¹³*Defense News*, 6 August 2001, p. 4.

Trident SLBMs	Lockheed Martin: Overall contractor Northrop Grumman: Missile launching systems General Dynamics: Inertial Guidance Systems United Technologies: subcontractor
Trident Submarines Nuclear Tomahawk	General Dynamics Raytheon.

3. *Anti-Submarine Warfare (ASW).*

A good portion of ASW platforms (ships and submarines) are not being covered in this paper and are not produced by the corporations addressed in this paper.

P-3C Maritime Patrol Aircraft	Lockheed Martin: Manufacturer Raytheon and Lockheed Martin: Modifications
S-3A ASW Carrier-Based Aircraft	Lockheed Martin: Manufacturer Northrop Grumman: AN/ASN-92(V) Carrier Inertial Navigation System. Raytheon and Lockheed Martin: Modifications
SH-60 Sea Hawk helicopter	United Technologies
Attack Submarines (<i>Los Angeles & Sea Wolf</i> class)	General Dynamics United Technologies is subcontractor on Sea Wolf.
Mark-46, Mark-48 and Mark-50 Torpedoes	Raytheon United Technologies is subcontractor on Mark-50.
Surface Sensors Upgrades	Lockheed Martin, Northrop Grumman, Boeing and Raytheon
Advanced Deployable System acoustic sensors for littoral waters	Lockheed Martin
Subsurface Sensor Upgrades	Lockheed Martin, Raytheon and Boeing
Dipping Sonar for ASW Helicopters	Raytheon
AN/AQS-14 Side-Looking Dipping Sonar	Northrop Grumman
Airborne Low Frequency Sonar ¹⁴	Raytheon
AN/SQS-56(I)/DE1160(I) Sonar System	Raytheon
Undersea Warfare Systems ¹⁵	Lockheed Martin
Ocean Surface Warfare Systems ¹⁶	Lockheed Martin
TB-29A/BQ Towed Array	Lockheed Martin
Undersea Coastal Surveillance System ¹⁷	Raytheon
Data Links/Communication/Sensor Systems for undersea surveillance	General Dynamics
Towed Passive Array Sensors (for submarines)	General Dynamics

¹⁴Also referred to as the AN/AQS-22 System. This is the next generation dipping sonar and sonobuoy processing system for ASW helicopters. It includes active and passive dipping sonars and the AN/SSQ-36BT, -41B, -53D, -57B, -62B and -77B active and passive sonobuoys.

¹⁵These include the AN/SQQ-89(V)14 Surface Ship Undersea Warfare Combat System, the HAS-2154 Hull Sonar Array, and the TB-29/BQ Towed Sonar Array.

¹⁶These include the AN/SLY-2(V) Surface Ship Electronic Warfare System and the AN/BLQ-10 Submarine Electronic Warfare System.

¹⁷This involves furnishing upgraded sensors and systems to the Surveillance Towed Array Sensor System.

4. ***Ballistic Missile Defense (BMD).***

BMD has been in the limelight for some time and is even more so at present. I will try to group the technologies in some sensible order below.

a. Terminal Missile Defense (Formerly Theater Missile Defense).

PAC-3 System	Lockheed Martin: Interceptor Raytheon: Launcher and Fire Control Boeing: Warhead Seeker (sensor) General Dynamics: warhead case
Navy Area Defense System	Raytheon: SM-2 Block-4A interceptor Raytheon: AN/SPY-1 Radar and Fire Control Lockheed Martin: Aegis System Software Lockheed Martin: Vertical Launch System
Medium Extended Air Defense System	Lockheed Martin: PAC-3 Interceptor (Other contractors are German and Italian)
Theater High-Altitude Area Defense (THAAD)	Lockheed Martin: Interceptor Boeing: Kill Vehicle Northrop Grumman: Infrared Focal Planes Northrop Grumman: Battle Control Station Raytheon: TMD/GBR X-band Radar
US-Israel Tactical High Energy Laser (THEL)	TRW: US contractor (Others are Israeli.)

b. Ground-Based Midcourse Missile Defense (Formerly National Missile Defense).

Prime Contractor/Systems Integrator	Boeing
Ground-Based Interceptor	Boeing: Booster Stack Raytheon: Exoatmospheric Kill Vehicle Boeing: Alternate Exoatmospheric Kill Vehicle Lockheed Martin: Payload Launch Vehicle, the Surrogate Test Booster Lockheed Martin: Multi-Service Launch System to launch target for interceptor.
Ballistic Missile Early Warning Radars	Raytheon (5 large phased array radars)
X-Band Tracking Radars	Raytheon.
Battle Management Command, Control and Communications System (BM/C3)	TRW

c. Sea-Based Midcourse Missile Defense (Formerly Navy Theater Wide Missile Defense).

Standard-3 Interceptor Missile	Raytheon
LEAP Kill Vehicle	Boeing and Raytheon
AN/SPY-1 Radar and Fire Control	Raytheon
Aegis Radar System	Lockheed Martin
Vertical Launch System for interceptors	Lockheed Martin

d. Boost-phase Missile Defense System.

Airborne Laser (ABL)	Boeing: Aircraft and integration with laser Boeing: Battle Management System Software TRW: Chemical Oxygen Iodide Laser Lockheed Martin: Sensors and Beam Control
Space-Based Laser (SBL)	TRW, Lockheed Martin, Boeing: Team SBL

Sea-Based Boost

No contracts awarded yet. Probably will be the same contractors as Sea-Based Midcourse.

Space Hit-To-Kill Experiment

No contracts awarded yet.

e. Space-Based Sensors.

**Defense Support (existing early warning) Satellite
High-Orbit Space-Based Infrared System (SBIRS-High)**

TRW

Lockheed Martin: Team leader

Northrop Grumman: Infrared sensors
(Honeywell is also on team)

Low-Orbit Space-Based Infrared System (SBIRS-Low)

Spectrum Astro is prime contractor.

Lockheed Martin, Northrop Grumman and
Boeing are on the team.

Single Integrated Air Picture

Raytheon and **Lockheed Martin** for the
Cooperative Engagement Capability segment.

f. NATO BMD Defense.

Competing Team No. 1:

Lockheed Martin, TRW, and European companies.

Competing Team No.2:

Boeing, Northrop Grumman, Raytheon, and European companies.

5. *Command, Control, Communications, and Intelligence (C3I).*

Many C3I programs that pertain to specific first-strike elements are discussed above under those specific elements, such as certain radars and satellite sensors. Those listed here are others I believe contribute significantly to a US first-strike capability although they may have other uses. This list does not by any means exhaust the complete range of C3I programs, but the contractors involved would be similar.

Military Strategic and Tactical Relay (MILSTAR)
communications satellite.

Lockheed Martin: Prime Contractor

TRW: Low Data Rate Payload

Boeing: Medium Data Rate Payload

Navigation System Timing And Ranging (NAVSTAR)
Global Positioning System (GPS) satellite.

Lockheed Martin: Block-2R

Boeing: Block-2F

DSP Satellites (current early warning satellites)
Wide Area Augmentation System to enhance GPS
E-3 Airborne Warning And Control Systems
(AWACS) aircraft.

TRW

Raytheon

E-4B Advanced Airborne Command Post
E-6 TACAMO Communications Aircraft
E-8 Joint Surveillance and Target Attack
Radar System (JSTARS) aircraft.

Boeing: Aircraft

Northrop Grumman: Radar

Boeing

Boeing

Airborne Surveillance Testbed
In-Flight Interceptor Communications System (IFICS)

Northrop Grumman: Systems Integrator

Boeing: Aircraft

Northrop Grumman: Radar

Boeing

TRW

MAJOR PROGRAMS WHICH CONTRIBUTE TO REGIONAL WARS

The following are some of the major weapons systems used to fight regional wars. This list is not comprehensive and does not include systems or weapons listed above. Most of the support

services, consultation, and infrastructure provided by the corporations being discussed are not shown. For the most part, what is listed are the current programs. Some weapons systems still in use but not mentioned here -- such as Army tanks, Navy ships, and some aircraft -- were made by these seven corporations but production has ceased.

1. *Satellites.*

Ground-Based Electro-Optical Deep Space Surveillance System (GEODSS)	TRW
Defense Satellite Communications System (DSCS)	Lockheed Martin
Fleet Satellite Communications System (FLTSATCOM)	TRW
UHF Follow-On Communications Satellite (Follow-on to FLTSATCOM)	Boeing
Defense Meteorological Satellite Program (DMSP)	Lockheed Martin
DMSP Weather imagery sensors by	Northrop Grumman
Keyhole Spy Satellites	Lockheed Martin
Inertial Upper Stage for deep space launches	Boeing

2. *Airplanes, Helicopters and Unmanned Aerial Vehicles.*

B-1 Bomber	Boeing
B-2 Bomber (conventional role)	Northrop Grumman
B-52 Bomber (conventional role)	Boeing
	Northrop Grumman: electronic countermeasures.
C-2 Navy Cargo/Transport Aircraft	Northrop Grumman
C-17 Transport/Cargo Aircraft	Boeing
	United Technologies provides engines.
C-130 Transport/Cargo Aircraft	Lockheed Martin: Manufacturer
	Boeing: Avionics Modernization Program
	Other modifications & integration support and other programs (\$1 billion contract awarded on 30 July 2001)
C-40A Military Transport Aircraft	Boeing
KC-10 Tanker/Cargo Aircraft	Boeing
KC-135 Stratotanker	Boeing
RC-135 Surveillance Aircraft	Boeing
E-2C Navy Early Warning Command & Control	Northrop Grumman: aircraft & search/track radar.
	TRW: Mission Computer
EP-3 Electronic Surveillance Aircraft	Lockheed Martin: Aircraft
	Raytheon and Lockheed Martin: Modifications
ES-3 Electronic Surveillance Aircraft	Lockheed Martin: Aircraft
	Raytheon and Lockheed Martin: Modifications
EA-6B Navy Electronic Countermeasures Aircraft	Northrop Grumman
RC-7B Army Reconnaissance Aircraft	Northrop Grumman
SR-71 Spy Plane	United Technologies provides engines.
U-2 Spy Plane	Lockheed Martin
F-4 Fighter Aircraft	Boeing: prime contractor
	Northrop Grumman: Electronic Countermeasures
F-5 Navy Fighter Aircraft	Northrop Grumman

F-14 Strike Fighter

Northrop Grumman

Raytheon: Radar and Weapon Control Systems¹⁸

Lockheed Martin: Infrared Search & Track System

Boeing: prime contractor.

Northrop Grumman: electronic countermeasures and LR-500 Passive Direction Finding System

Raytheon: radar systems.

United Technologies: engines, controls, and diagnostic systems.

Lockheed Martin: prime contractor

Northrop Grumman: radar/targeting/navigation and electronic countermeasures/jammer.

United Technologies provides engines.

Boeing, Northrop Grumman and Raytheon: Aircraft

Lockheed Martin: Nite Hawk Infrared Targeting Syst.

United Technologies: controls and diagnostic systems.

Lockheed Martin

Boeing

United Technologies

United Technologies

United Technologies

Boeing: prime contractor.

Lockheed Martin & Northrop Grumman: Targeting & Navigation, Electro-Optical, & Longbow Systems.

Boeing

Boeing

Lockheed Martin

Northrop Grumman

Lockheed Martin

Northrop Grumman provides surveillance radar.

Northrop Grumman

TRW

F-15 Fighter Aircraft

F-16 Fighter Aircraft

F/A-18 Strike Fighter/Attack Aircraft

F-117 Stealth Fighter

AV-8 Harrier Short Take Off/Landing Aircraft

CH-53 Super Stallion Helicopter (Air Force)

MH-53 Sea Dragon Helicopter (USMC)

UH-60 Black Hawk Helicopter

AH-64 Apache Attack Helicopter

CH-46/UH-46 Helicopters

CH-47/MH-47 Helicopters

Uninhabited Combat Air Vehicle

Fire Scout Unmanned Aerial Vehicle (UAV)

RQ-1 Predator Tank Killer UAV

RQ-4A Global Hawk Unmanned Aerial Vehicle

Hunter UAV

3. Missiles, Rockets, and Missile Systems.

Atlas Rockets to boost satellites into orbit

Delta Rockets to boost satellites into orbit

Conventional Air-Launched Cruise Missile (CALCM)

Tomahawk Conventional Land-Attack Cruise Missile

SM-2 Land-Attack/Anti-Ship Standard Missiles

Army Tactical Missile System (ATACMS)

Navy Tactical Missile System (NTACMS)

High Mobility Artillery Rocket System (HIMARS)

Multiple-Launch Rocket System (MLRS)

Rolling Airframe Missile for ship defense

Lockheed Martin

Boeing

Boeing

Raytheon

General Dynamics: warhead assy.

Raytheon

Lockheed Martin

Lockheed Martin

Lockheed Martin

Lockheed Martin

Raytheon

¹⁸These are the AN/AWG-9 and AN/APG-71 Weapons Control Systems.

Advanced Unitary Penetrator Missile for hard targets	Lockheed Martin
BLU-109 Missile for hard targets	Lockheed Martin
HAVE LITE Precision-Guided Air-to-Ground Missile	Lockheed Martin
Paveway Laser-Guided Bomb	Raytheon
Harpoon Missile and its derivatives ¹⁹	Boeing
	General Dynamics: warhead case
Joint Air-to-Surface Standoff Missile (JASSM)	Lockheed Martin
Wind Corrected Munitions Dispenser ²⁰	Lockheed Martin
AGM-65 Maverick Missile	Raytheon
AGM-88 High-Speed Anti-Radiation Missile (HARM) for radar	Raytheon
	General Dynamics: warhead case
AGM-130 Standoff Missile	Boeing
AGM-142 Precision-Guided Air-To-Ground Missile	Lockheed Martin
AGM-154 Joint Standoff Weapon (JSOW) ²¹	Raytheon
	General Dynamics subcontractor
AIM-9 and AIM-9X Sidewinder Missiles	Raytheon
	General Dynamics wing & rolleron
AIM-54 Phoenix Missile	Raytheon
AIM-120 Advanced Med.-Range Air-to-Air Missile (AMRAAM)	Raytheon
	General Dynamics subcontractor
AIM/RIM-7P Sparrow/Advanced Sea Sparrow Air-to-Air Missile	Raytheon
	General Dynamics: warhead case
GBU-15 Modular Guided Weapons System ²²	Boeing
Joint Direct Attack Munition (JDAM) ²³	Boeing: Team Leader
	Lockheed Martin: On team
Evolved Sea Sparrow Missile	Raytheon
Python-4 Air-to-Air Missile	Lockheed Martin
Starstreak Air-to-Air Missile	Lockheed Martin
Hawk Air Defense Missile	Raytheon
	General Dynamics: warhead case
HUMRAAM Advanced Air Defense Guided Missile System	Raytheon
SEA RAM Anti-Ship Missile Defense System	Raytheon
Excaliber Precision-Guided Extended-Range Artillery Projectile	Raytheon
Extended-Range Guided Munition for Navy/Army artillery	Raytheon

¹⁹This includes the Harpoon, Harpoon Block-2, Standoff Land Attack Missile (SLAM), and the SLAM Extended Range. It also includes the Harpoon shipboard launch system.

²⁰Converts CBU-87, -89 and -97 into all-weather precision-guided weapons.

²¹3,000 JSOWs are being equipped with bunker-penetrating warheads.

²²The GBU-15 can precisely deliver the Mk-84 2000-lb. general purpose bomb or the BLU-109B 2000-lb. penetrating bomb.

²³JDAM is a tail section that converts “dumb” free-fall bombs to “smart” weapons. It uses the NAVSTAR GPS system and can independently target each bomb. It is more advanced than the GBU-15.

Enhanced Fiber Optic Guided Missile	Raytheon
Brimstone “fire and forget” anti-tank missile	Boeing
Hellfire II Anti-Armor Missile	Lockheed Martin
	General Dynamics: warhead assy.
Javelin Shoulder-Fired Anti-Armor Missile	Lockheed Martin and Raytheon
Stinger Shoulder-Fired Fire-and-Forget Missile	Raytheon
Shoulder-Launched Multipurpose Assault Weapon	General Dynamics
Line-Of-Site Anti-Armor (LOSAT) Weapon	Lockheed Martin
Tube-launched, Optically-tracked, Wire-guided (TOW) Missile	Raytheon
Tube-launch, Optical engaged, Wireless Fire & Forget (TOW-FF)	Raytheon
MPIM/SRAW anti-armor/anti-bunker weapon	Lockheed Martin
Precision-Guided Mortar Munition (PGMM)	Lockheed Martin
Brilliant Anti-Armor (BAT) Submunition	Raytheon
	General Dynamics: subcontractor
Low-Cost Autonomous Attack Smart Submunition	Northrop Grumman: target seeker.
Ship Self-Defense System	Lockheed Martin
HYDRA-70 2.75-inch Rocket System (for helicopters)	Raytheon
Autonomous Free-Flight Dispenser System (for aircraft)	General Dynamics
	General Dynamics

4. *Sensors, Battle Management, Navigation, and Communications.*

Airborne Battlefield Command & Control Center	Lockheed Martin
Army Airborne Command & Control System	Raytheon
Global Command & Control System (Army) (May be same as above entry)	Lockheed Martin
Tactical Aircraft Moving Map Advanced Capability	Boeing
Force XXI Battle Command Brigade and Below	TRW
Theater Aerospace Command & Control Simulation Facility (Air Force)	Lockheed Martin
Consolidated Training & Services for National Imagery & Mapping College	Lockheed Martin
Search/Reconnaissance Radars for Aircraft ²⁴	Raytheon
Target Sight System for the AH-1Z Cobra Helicopter	Lockheed Martin
Avionics Systems for MH-60R helicopter	Lockheed Martin
AN/AAQ-16(3FOV) Helicopter Infrared Sensing System	Raytheon
AAQ-24(V) NEMESIS Missile Warning System	Northrop Grumman
AAR-54 Electronic Warfare System	Northrop Grumman
AN/AAR-58 Missile Warning System for Aircraft	Raytheon
AN/AAS-44(V) Infrared Detecting/Ranging/Tracking Set ²⁵	Raytheon
AN/ALP-73 Passive Detection System for aircraft	Northrop Grumman
AN/ALP-125 Tactical Electronic Reconnaissance System for aircraft	Northrop Grumman
AN/ALQ-144 Infrared Countermeasures Sets	Lockheed Martin
AN/ALQ-161 Electronic Countermeasures/ Radio Frequency Surveillance System for B-1B aircraft	Northrop Grumman

²⁴These include the AN/SPS-73 Surface Search radar, the ARL-M Crazy Hawk, and the ASARS-2 Radar.

²⁵This system is to target Hellfire missiles from Helicopters.

AN/FPS-117 Radar System for Atmospheric Early Warning System ²⁶	Lockheed Martin
ALQ-131, ALQ-162 Electronic Warfare Systems	Northrop Grumman
ALR-69 Radar Warning System	Raytheon
AN/BLD-1 Precision Direction Finding System for attack subs	Northrop Grumman
LR-100 Warning & Surveillance Receiver for UAVs and others	Northrop Grumman
MIMS Missile Warning System	Northrop Grumman
Mark-2 Ship Self Defense System (Navy)	Raytheon
WANDA Laser Infrared Countermeasures System	Northrop Grumman
Instantaneous Frequency Measurement Unit for spacecraft use	Northrop Grumman
Inertial Navigation Units	Northrop Grumman
Fiber Optic and Advanced Inertial Guidance Systems	Northrop Grumman
Precision Targeting and Attack Systems ²⁷	Lockheed Martin
Mobile and Airborne Radars ²⁸	Lockheed Martin
Aircraft Radars ²⁹	Raytheon
Relocatable Over-The-Horizon Radars (Navy)	Raytheon
Tethered Aerostat Radar System (Air Force)	Lockheed Martin
Infrared Electro Optical Systems	Northrop Grumman
Laser Designators for Airborne Vehicles ³⁰	Northrop Grumman
Laser Sight for Armored Vehicles	Northrop Grumman
Man-portable Laser Sights/Designators	Northrop Grumman
AN/PVS-10 Sniper Night Sight (Army)	Northrop Grumman
Imaging Cameras for small satellites	Northrop Grumman
Nationwide Aircraft Defense System	Northrop Grumman
Guardrail/Common Sensor for wide area coverage	TRW
Electronic Countermeasures for A-10 and F-111 aircraft	Northrop Grumman
RF Electronic Warfare & Integrated Electronic Warfare for helicopters	Northrop Grumman
Vision, Targeting & Firing Sensors for Light Armored Vehicle (LAV)	Raytheon

²⁶This system was previously known as the Distant Early Warning Line (DEWLINE). It consists of 33 long-range surveillance radars stretching along the extreme perimeters of Canada and Alaska as well as Iceland, Hawaii and Puerto Rico. It is used to provide military aircraft identification and commercial air traffic surveillance.

²⁷These include Low-Altitude Navigation & Targeting Infrared for Night (LANTIRN) and Precision Attack Navigation & Targeting with Extended Range Acquisition (PANTERA), both for fighter aircraft; Shipboard Infrared Search & Track for sensing anti-cruise missile threats; and Tactical Reconnaissance Armored Combat Equipment Requirement (TRACER).

²⁸These include the FPS-117 Mobile Air & Missile Defense Radar, the AN/TPS-59(V)3 Tactical Missile Defense Radar, the MMSR Mobile 3D S-band Surveillance Radar, the PSTAR Portable Search & Target Acquisition Radar, the AN/APS-145 Airborne Surveillance Radar, and the AN/APG-67 Multimode Radar.

²⁹This includes AN/APG-63, -63(V)1, -63(V)2, -65, -70 and -73 radars; AN/APQ-174, -180 and -186 radars; and the AN/APS-137B(V)5 radar system.

³⁰These are used on the Dark Star UAV; the F-117A, F/A-18, F-111, and F-4 aircraft; the SH-60, AH-64, and Aeroscout helicopters; and LANTIRN.

Warfighter Information Tactical (WIN-T) Army battlefield communications Guardrail Information Node (Army) Secure, Mobile, Anti-Jam Reliable, Tactical Terminal Advanced Targeting Forward Looking Infrared sensor Flexible Acquisition and Sustainment Tool Program (Air Force) SPITFIRE satellite communications manpack terminal (Army) MK-73, Mod-3 Transmitter Encryption Hardware & Software Military Computer Systems Tactical Control System Block 1/2 for Unmanned Aerial Vehicles Automatic Air Collision Avoidance System for aircraft and UAVs (Air Force)	Northrop Grumman, Lockheed Martin, and Boeing, forming teams. TRW and General Dynamics already involved. TRW Raytheon Boeing Lockheed Martin and Boeing on team with four other companies. Raytheon Raytheon General Dynamics General Dynamics Raytheon Lockheed Martin
5. Land Systems. M109A6 Paladin self-propelled howitzer M992 Field Artillery Ammunition Supply Vehicles Bradley Fighting Vehicle FOX Nuclear, Biological, and Chemical Recon. System M1A1/M1A2 Abrams Tank Wolverine bridge Launcher (bridges for armored vehicles)	TRW: Electronic System Technical Support TRW: Electronic System Technical Support Raytheon: Acquisition System and Commander's Independent Viewer General Dynamics General Dynamics General Dynamics
6. Sea Systems. Manufacture Aegis Cruisers and Destroyers LPD-17 San Antonio Amphibious Assault Ship Ship & Submarine Overhaul/Repair/Modernization/Conversion Advanced SEAL Team Delivery System (mini-sub) Submarine Propulsion and Power Generation Machinery Wasp LHD Class Amphibious Assault Ships T-AKR Roll-On/Roll-Off Sealift Ships Integrated Deepwater System (US Coast Guard Cutter replacement) Manages 15-ship Maritime Prepositioning Force³¹ Manages 90-ship Ready reserve Force	Northrop Grumman General Dynamics Northrop Grumman: prime contr. Raytheon: Systems Integrator General Dynamics: design support, networking & communication Northrop Grumman Northrop Grumman Northrop Grumman Northrop Grumman Northrop Grumman General Dynamics Boeing is team leader. Northrop Grumman also on team. General Dynamics General Dynamics

³¹These ships are prepositioned in areas where conflict is likely to arise and contain about a 30-day supply of everything for an initial military operation: tanks and ammunition to food and fuel to spare parts and lubricants.

7. Miscellaneous.

Numerous Cannons and a Machine Gun

Boeing³²

General Dynamics³³

Numerous Cartridges and Projectiles

General Dynamics³⁴

Numerous Anti-Tank Ammunition

General Dynamics³⁵

Phalanx Close-In Weapons System (20 mm gatling type)

Raytheon

Night Vision Goggles and other Equipment

Northrop Grumman

Joint Helmet Mounted Cueing System (Air Force)

Boeing

Strike Helmet 21 cueing system for F-15E aircraft

Boeing

A1 Radio Frequency Module for AN/APX-100 Transponder
System (Army)

Raytheon

MAJOR WEAPONS PROGRAMS IN DEVELOPMENT

The following are some of the major weapons systems that are in development and have not been mentioned previously. The list is not comprehensive.

1. Satellites & Space.

Navigation System Timing And Ranging

(NAVSTAR) Global Positioning System

(GPS) satellite.

Advanced EHF Satellite

Lockheed Martin and **Boeing** competing for Block-3

Lockheed Martin is prime contractor.

TRW and **Boeing** are major subcontractors.

³²Cannons by Boeing are: 25mm M242 Bushmaster, 30mm Bushmaster-2 Automatic Cannon, Mk-44 30mm/40mm Automatic Cannon, 35mm/50mm Bushmaster-3 Cannon, 30mm M230/M230LF Automatic Cannon, and 27mm aircraft cannon. Machine gun by Boeing is the 7.62mm EX-34 produced in the United Kingdom for the Ministry of Defence.

³³General Dynamics weapons include the GAU-19/A 12.7mm, M61A1/2 and M197 20mm, GAU-12/U 25mm, and GAU-8/A 30mm gatling guns for airplanes, helicopters, armored vehicles, and ship close-in defense; as well as the Mk-19 40mm and Mk-47 Mod-0 grenade machine guns.

³⁴These include the M50 Series, PGU-27A/B TP, PGU-28A/B SAPHEI, PGU-30A/B TP-T, M430A1, M940, MK149, and MK244 Mod-0 ELC 20mm ammunition; the PGU-32/U SAPHEI-T, PGU-33/U TPF-T, M791, M792, M793, M910, Mk2 Tracer, and M919 APFSDS-T 25mm ammunition; the PGU-13/B, PGU-14/B, PGU-15/B, 30mm x 173 family, M788TP, M789 HEDP, 30mm ammunition; M433, TCM97, and M918 40mm ammunition; the M720, M720A1, and M888 60mm mortar ammunition; the M821A1 and M889A1 81mm mortar ammunition; the M933, M934, and M934A1 120mm mortar ammunition; the M107 and M795 155mm projectile; the M913 105mm projectile; and the M864DP 155mm extended range projectile. Also includes 40mm High Velocity Canister Cartridge for grenade machine gun and various modular artillery charge systems and 155mm artillery propulsion systems.

³⁵These include the M900 APFSDS-T (depleted uranium), C76, C76A1, M476A1/A2 105mm projectiles; the M829A1/A2 APFSDS-T (depleted uranium), Terminator APFSDS-T, DM43A1 APFSDS-T, M865 TPCSDS-T, M830 HEAT-MP-T, and M831A1 TP-T 120mm projectiles; M864 DPICM, M485A2 Illum, and M4A2 & M203A1 propelling charges.

Wideband Gapfiller Communications Satellite³⁶	Boeing
XSS-11 Experimental Microsatellite Program	Lockheed Martin
X-37 Reusable Space Veh. (NASA and Air Force)³⁷	Boeing
Mobile User Objective System	Navy communication satellites Boeing, Lockheed Martin, Raytheon, and Spectrum Astro are competing for contract.
Space-based Radar Surveillance Systems	Northrop Grumman

2. *Airplanes, Helicopters and Unmanned Aerial Vehicles.*

Joint Strike Fighter	Boeing and Lockheed Martin competing. Northrop Grumman is on Lockheed Martin team. United Technologies provides engines.
F-22 Stealth Fighter Aircraft	Boeing and Lockheed Martin Northrop Grumman provides radar. United Technologies provides engines.
Multi-Mission Maritime Aircraft	Boeing and Northrop Grumman have study contracts
Next Generation Aerial Refueling Tanker	Boeing and Lockheed Martin competing.
V-22 Osprey	Boeing teamed with Bell Helicopter Textron, Inc. General Dynamics: 12.7 mm Turreted Gun System.
RAH-66 Comanche Reconnaissance Helicopter	Boeing and United Technologies lead team. Lockheed Martin, TRW, General Dynamics and Northrop Grumman are on the team..
X-47A Pegasus Unmanned Aerial Vehicle	Northrop Grumman
X-47B Navy Unmanned Combat Air Vehicle	Northrop Grumman
Cypher Unmanned Aerial Vehicle	United Technologies

3. *Missiles, Rockets, and Missile Systems.*

Tactical Tomahawk	Raytheon: Prime contractor Lockheed Martin: Weapons Control System Lockheed Martin is modifying electronic control syst. Boeing has concept definition and demo. contract. Lockheed Martin developing supersonic solid-fuel ramjet engine.
Fasthawk supersonic cruise missile	
Tomahawk Launcher Module for Trident Sub	Northrop Grumman and General Dynamics on team. Lockheed Martin on competing design.

4. *Sensors, Battle Management, Navigation, and Communications.*

Future Imagery Architecture³⁸	Boeing Raytheon, Eastman Kodak and Harris Corp. also.
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³⁶The Wideband Gapfiller is an interim step to replace the Defense Satellite Communications System (DSCS) satellite until the Advanced Wideband Communications Satellite comes on line around 2008. Boeing has a contract for six satellites to be launched between 2004 and 2010.

³⁷Air Force wants to drop this project.

³⁸This is a new generation spy satellite system which has also been called Discoverer II. It will be a massive \$25-billion project involving hundreds of subcontractors. Some two dozen satellites are planned over the next 20-30 years, starting in 2005.

Terminator infrared targeting syst. for F/A-18E/F	Raytheon
Moving Surface Target Engagement Capability	Northrop Grumman
Litening II Targeting Pod for night/bad weather	Northrop Grumman
Advanced Targeting Pod (to replace LANTIRN)	Lockheed Martin
AAR-54(V) Missile Approach Warning System	Northrop Grumman
CNI antenna designs for new aircraft and ships	TRW
Future Combat System (FCS) (Army/DARPA)³⁹	Boeing, Raytheon, TRW, Lockheed Martin, and Science Applications Intl. are competing.
Area Air Defense Command Capability (joint svcs)	General Dynamics
ESGN Inertial Measuring Units for SSN-688 subs	Boeing
Remote Powered All Optical Fixed Distribution	
System hydrophone	Northrop Grumman
Unattended Ground Sensors to track mobile targets	Lockheed Martin
Joint Service Light Nuclear, Biological, and Chemical Reconnaissance [Sensor] System	TRW
Joint Tactical Radio System	Raytheon leading team. Boeing leading team which include TRW , BAE Systems, Harris Corp., and Rockwell Collins.
Network Early Warning System for cyber attacks	Northrop Grumman
Advanced Towed Passive Array Sensors (for subs)	General Dynamics
5. Land Systems.	
Mobile Tactical High Energy Laser study (Israel)	TRW
Advanced Amphibious Assault Vehicle (USMC)	General Dynamics
Interim Armored Vehicle Army Rapid Reaction	General Dynamics
Crusader 155mm Artillery System	
for self-propelled howitzer	General Dynamics
6. Sea Systems.	
Mark-54 Lightweight Hybrid Torpedo	Raytheon
DD-21 Land-Attack Destroyer	Lockheed Martin systems integrator of blue team. General Dynamics leads blue team. Raytheon systems integrator of gold team. Northrop Grumman leads gold team. Boeing is a member of the gold team.
Virginia Class Attack Submarine	General Dynamics
Advanced Seal Delivery System (new Special Operations Forces Mini Submarines)	Northrop Grumman
T-ADC(X) Auxiliary Dry Cargo Carrier ship	General Dynamics

³⁹FCS include six key enabling technology programs sponsored by DARPA and the Army -- Jigsaw, NetFires indirect fire system, FCS Communications (voice, video, data), Percept OR unmanned ground vehicle, the A-160 Hummingbird vertical take-off and landing system, and the Organic Air Vehicle.

7. **Miscellaneous.**

Solid State Laser Technology	TRW
Boost Phase Deterrent Operat'nal Airship Veh. ⁴⁰	Lockheed Martin
Small Diameter Bomb for fighter planes	Boeing, Lockheed Martin and Raytheon competing.
XM-301 20 mm Lightweight Gatling Gun	General Dynamics
Tank Modular Ammunition System	General Dynamics
5-inch Extended Range Guided Munition (Navy)	Raytheon
	General Dynamics: subcontractor
XM982 Extended Range Artillery Projectile	General Dynamics
XM977 Lightweight Ammunition	General Dynamics
Tank Extended Range Munition	General Dynamics
XM231/XM-232 155mm Propelling Charge	General Dynamics
Anti-mine Countermeasure Charge for the Landing Craft Air Cushion Vehicle	General Dynamics
25mm Objective Crew Served Weapon for Joint Services Small Arms Program	General Dynamics
Next Generation Reactive Armor for Bradley Fighting Vehicle	General Dynamics

WITH A LITTLE HELP FROM THE GOVERNMENT

It is my belief that most elected government officials were put in office by Big Money and, therefore, their main focus is to enhance the interests of their constituents -- those with Big Money. When in office they appoint and confirm other officials who will pursue the same goal. If my hypothesis is true, then the government will, among other things, work toward enhancing the profits of weapons manufacturers. Following are some events which support my hypothesis:

1. ***Weapons Contractors To Be Relieved Of Research And Development Costs.***

Today there are many ways the Pentagon uses to encourage or compel manufacturers to pay part of the research and development (R&D) costs for major weapons systems. Most of this is written into the contract in such ways as limits on annual R&D funding increments, ceilings on cost-plus contracts, and awarding development contracts known to be less than actual cost. This is especially true when contracts are awarded to competing teams, and it is reasonable because in other industries the manufacturer foots all the R&D cost before a product is sold. Of course the cost of that product is adjusted so that R&D costs are recovered, but that is also true when a military contractor bids on the final production contract for a weapons system.

Now, however, the new undersecretary of defense for acquisition, Edward C. Aldridge, has ordered that the Pentagon stop this practice. One unidentified DOD official stated: "We want our contractors to earn money on our contracts. We want the industry to be healthy so it can do its best to perform contracts."⁴¹ This, of course, implies that the conglomerated defense industry is struggling to make a profit.

⁴⁰This unmanned blimp or airship has been proposed as a platform for anti-missile interceptors or sensors. Other military applications include surveillance by radar and other sensors as well as theater communications.

⁴¹Cited in *Defense News*, 28 June 2001, p. 6.

Aldridge didn't waste any time. His 16 May 2001 order was issued the fourth day on the job. It followed a recommendation from a November 2000 study by the Defense Science Board of the Pentagon entitled "Preserving a Healthy and Competitive U.S. Defense Industry to Ensure Our Future National Security."

Edward Aldridge was chief executive officer (CEO) of Aerospace Corporation in Los Angeles at the time of his Pentagon appointment. He was previously head of McDonnell Douglas Electronic Systems (now part of Boeing).

2. *White House Considers Easing Export Controls.*

Exports of dual-use-technology -- technology which can be used for military use as well as civilian -- was previously covered by the Export Administration Act. It expired in 1994 but has been kept alive with various presidential orders by the Clinton administration. Meanwhile, the Senate has been debating a new export control act but has not been successful in getting it passed into law. Amendments to the currently debated law would put most of the responsibility on the Commerce Department which mostly sides with industry and is not as concerned about sensitive technologies as the Pentagon. The House is balking because it feels the Pentagon should be involved to decide national security interests. Passage look doubtful for 2001.

Now the Bush administration is planning to issue an executive order that will give the Pentagon little say in what is exported and thus remove obstacles for exporters. The Pentagon will only be able to appeal a Commerce Department decision and the new executive order will only accommodate appeals on a limited number of items. Those appeals would be processed by a panel with representatives from the Pentagon, the Commerce Department, and the National security council. It is expected that the Pentagon would be regularly outvoted.

Possibly to beat the White House to the punch, the Pentagon is revising its list of sensitive munitions to make it shorter. However, this review is being done under the aegis of the US Defense Trade Security initiative, approved by the Clinton administration, which is a list of 17 objectives for reform of the arms export control system. It seems that the State Department and the Pentagon disagree over proposed changes to the list.

Regardless of the various feeling about whether all this loosening up will be a good move or a bad one, the bottom line is that this upcoming presidential order will make it much easier for the weapons merchants to turn a profit.

3. *Weapons Contractor Executives Appointed To Top Government Posts.*

The United States Constitution says there shall be civilian control over the military. Let us take a peek at how this is being acted out.

New Secretaries of the Navy, Army and Air Force were sworn in on 24 May, 31 May, and 1 June 2001 respectively. A new Undersecretary of the Air Force, newly elevated to the No. 2 spot in the Air Force, has also been nominated. Here is a run down on each.

Gordon England was executive vice president of General Dynamics, and a 30-year veteran of the defense and technology industries, when he was tapped for Navy Secretary. General Dynamics, though not described in the paper, held the position as fourth largest military contractor for 2000 (until the Northrop Grumman- Litton merger). It was the builder of Trident submarines and

one of the only two companies to build nuclear-powered submarines. England has to sell his approximately \$5.3 million in General Dynamics stock in order to “legally” eliminate a conflict of interest.

Retired Brigadier General Thomas E. White is the new Army Secretary. Prior to his appointment, White was vice chairman of Enron Energy Services which is responsible for providing energy outsource solutions to US commercial and industrial customers.

Before becoming Air Force Secretary, James G. Roche was a 23-year career retired Navy captain and a president of Northrop Grumman’s Electronic Sensors and Systems Sector. He has been dubbed the first sailor to lead the Air Force.

For the No. 2 spot, Undersecretary of the Air Force, Lockheed Martin Space Systems president has been nominated. This job is significant since the Air Force has been designated the executive agent for space. In this position Smith, a veteran of “black budget” programs, will be responsible for much of the Ballistic Missile defense budget while also directing spy satellite operations jointly with the CIA.

There may be some strong behind-the-scenes struggling between the Navy and Air Force secretaries over the auctioning of Newport News Shipbuilding. England’s General Dynamics and Roche’s Northrop Grumman are both bidding to take over that company. Whichever wins, it will essentially reduce major shipbuilding to two corporations.

Mike Gerhart, law professor at Virginia’s William and Mary College, observed: “The Founders [of the U.S. Constitution] had intended civilian control of the military.”⁴² Yet none of the senators during confirmation hearings expressed concerns about retired military officers overseeing the Army and Air Force. Gerhart expressed greater worries about the conflict of interest these new secretaries will have in performing their jobs. He said: “I’d be very dubious about their judgments.”⁴³

William Hartung of the World Policy Institute was also critical of these appointments. He noted that the Bush administration seems to be establishing a corporate-style structure in Washington. “They probably could find some very qualified executives who are not in the defense industry,” he said. Then he added: “After all, the defense firms don’t have the best reputations for controlling costs.”⁴⁴

4. Summary.

The only real reason for the overkill in weapons production that makes any sense is the money earned in conjuring up, developing, testing, deploying, and maintaining weapons systems. It doesn’t even matter if they work. But when you have a customer whose officials are willing to embezzle the stockholders’ money to help in this profiteering, it makes moneymaking so much easier. In the case of the weapons merchants, their customers are governments, and the stockholders of those customers are the taxpayers.

⁴²Cited in Newsday, 31 May 2001.

⁴³Cited in Newsday, 31 May 2001.

⁴⁴Cited in Newsday, 31 May 2001.

CONCLUSION

I think the above discussion illustrates that the arms race, missile defense, national security, or whatever name is used to generate the manufacture of weapons, is driven by the profit imperative -- high yield for the stockholders and lavish salaries for the workers. It is because of this vast array of military manufacturing, and the global business adventurism that these weapons protect, that the "enemy" image must be impressed on Americans. Without the Saddam Husseins and the rogue nations this behavior could not be justified. Therefore we are kept fearful of threats against which we must protect ourselves.

Yet the arguments regarding these weapons all seem to focus on technical capabilities, political impact, international opinion, vital resources, generation of jobs, ad infinitum. These "practical" arguments have their place but to change the social climate that supports warmaking and global exploitation we must address the entire spectrum of causes, and particularly the root cause. Pursuing the "practical" arguments alone is exactly what the weapons merchants and the Pentagon want. So long as we continue to argue against weapons systems on those grounds we are playing their game. They are much better prepared to carry on that open-ended debate than we are. Meanwhile, profiteering continues. Thus benevolent change never occurs. And amid all this scramble for the taxpayer's dollar, the Pentagon contractors seek ways of turning more of those dollars into profits. This has led to conglomeration and teaming up to bid on contracts.

The spirit of free enterprise is virtually dead today, as small businesses are forced out of the picture. That is happening in the fields of health care, grocery chains, gasoline suppliers, internet providers, and most if not all of the other suppliers of goods and services. Yet we revel in our label of "democracy," and we celebrate the "freedom" that rings throughout our land. Perhaps we are only acting out of habit. Perhaps we are deluding ourselves. Perhaps democracy is atrophying and our freedom is an illusion. I think an old proverb is most pertinent in this case: "You don't feel the chains until you try to move."

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GLOSSARY

ABL	AirBorne Laser	GE	General Electric.
AMRAAM	Advanced Medium-Range Air-to-Air Missile.	GEODSS	Ground-Based Electro-Optical Deep Space Surveillance System.
AT&T	American Telephone & Telegraph.	GPS	Global Positioning System.
ATACMS	Army Tactical Missile System.	GTE	General Telephone Electronics.
ASAT	Anti SATellite.	HIMARS	High Mobility Artillery Rocket System.
ASW	Anti-Submarine Warfare.	IAI	Israeli Aircraft Industries.
AWACS	Airborne Warning And Command System.	IFICS	In-Flight Interceptor Communications System
BAT	Brilliant Anti-Tank.	IBM	International Business Machines.
BMD	Ballistic Missile Defense.	ICBM	Inter-Continental Ballistic Missile.
C3I	Command, Control, Communications, and Intelligence.	JASSM	Joint Air-to-Surface Standoff Missile.
CALCM	Conventional Air-Launched Cruise Missile.	JDAM	Joint Direct Attack Munition.
CIA	Central Intelligence Agency.	JSOW	Joint StandOff Weapon.
CNI	Communications, Navigation, Identification.	JSTARS	Joint Surveillance and Target Attack Radar System.
DARPA	Defense Advanced Projects Agency.	KE-ASAT	Kinetic Energy - Anti-SATellite interceptor
DOD	Department OF Defense.	LANTIRN	Low-Altitude Navigation & Targeting Infrared for Night.
DSCS	Defense Satellite Communications System.	LASER	Light Amplification by Stimulated Emission of Radiation.
EADS	European Aeronautic Defence and Space Company.	LASM	Land Attack Standoff Missile.
EHF	Extreme High Frequency.	LAV	Light Armored Vehicle.
ERGM	Extended Range Guided Missile.	LEAP	Light ExoAtmospheric Projectile.
EU	European Union.	LOSAT	Line-Of-Sight Anti-Tank.
FCS	Future Combat System.	MILSTAR	MILitary Strategic and Tactical Relay communications satellite.
FLTSATCOM	FLeeT SATellite COMmunications.		

MLRS	Multiple Launch Rocket System.	SBL	Space-Based Laser.
mm	Millimeter.	SLAM	Standoff Land Attack Missile.
MPIM/SRAW	Multi-Purpose Individual Munition/Short-Range Assault Weapon.	SLBM	Submarine-Launched Ballistic Missile.
NASA	National Aeronautics and Space Administration.	SM-2	Standard Missile 2.
NASSCO	National Steel and Shipbuilding Company.	SM-3	Standard Missile 3.
NATO	North Atlantic Treaty Organization.	SOSUS	SOund Surveillance UnderScan, or SOund SURveillance System.
NAVSTAR	NAVigation System Timing And Ranging.	TACAMO	TAke Charge And Move Out.
NMD	National Missile Defense.	THAAD	Theater High Altitude Area Defense.
NTACMS	Navy Tactical Missile System.	THEL	Tactical High Energy Laser.
PAC-3	Patriot Advanced Capability 3.	TMD	Theater Missile Defense.
PANTERA	Precision Attack Navigation & Targeting with Extended Range Acquisition.	TMD/GBR	Theater Missile Defense Ground-Based Radar.
PGMM	Precision-Guided Mortar Munition.	TOW	Tube-launched, Optically-tracked, Wire-guided.
PGSUS	Precision Guided Systems U.S.	TRACER	Tactical Reconnaissance Armored Combat Equipment Requirement.
R&D	Research and Development.	TRW	Thompson Ramo Wooldridge
RADAR	RAdio Detection And Ranging.	UAV	Unmanned Aerial Vehicle.
RCA	Radio Corporation of America.	UK	United Kingdom.
SBIRS	Space-Based Infra Red System.	US	United States.
		USMC	United States Marine Corps.