Fact Sheet

One Space Park
Redondo Beach, CA 90278

For more information, contact: Sally Koris
310.812.4721
sallykoris@ngc.com

Defense Support Program (DSP) Overview

The 23 satellites built by Northrop Grumman for the Defense Support Program (DSP) have been the cornerstone of North American Aerospace Defense Command's (NORAD) Integrated Tactical Warning and Attack Assessment system, helping to guard the U.S. and its allies against enemy missile attack. Below is a summary of key milestones that have made DSP one of the most successful space programs in U.S. history in terms of performance, reliability, survivability, and flexibility.

History at a Glance:

- DSP is developed in mid to late 1960s as a space-based early warning system to detect and report launches of intercontinental ballistic missiles (ICBM) and submarine-launched ballistic missiles (SLBM). At the time, the threat came from both the Soviet Union and China, which were building inventories of ICBMs and SLBMs.

- Northrop Grumman (then TRW) receives first DSP contract in 1967 from the U.S. Air Force under strictest veil of secrecy. Contract calls for combining the capability of infrared sensors (to detect thermal radiation from rocket engine exhaust plumes) with the newly demonstrated concept of man-made, earth-orbiting satellites.

- First DSP satellite is launched Nov. 6, 1970. Earliest DSP satellite weighs 2,000 pounds, contains 2,000 infrared detectors, and has 400 watts of power. Expected design life is 1.25 years.

- By the mid-1970s, DSP satellites are upgraded to meet increasingly complex security needs. The weight of Satellites 7 to 9 increase to an average of 2,300 pounds. Power grows to 680 watts. Number of detectors expands three-fold, to 6,000. Expectation for design life is now two years.

- By the late 1970s, DSP's sensor is upgraded to improve survivability. Adding medium wavelength infrared capabilities not only provides protection against laser and particle beam attacks, but also marks the first space sensor application of mercury cadmium telluride, now the material of choice for infrared sensors. Additional upgrades allow DSP to provide accurate and reliable data with no interruption in service even when faced with more threats, smaller targets and advanced countermeasures.

- In 1991, Northrop Grumman (formerly TRW) opens the Telemetry and Orbital Test Station (TOTS), an innovative facility that brings the data to engineers, saving significant travel time and costs. Before TOTS, a large contingent of contractors had to travel to the

operations site to monitor the satellite's health throughout launch, deployment and orbital testing. With TOTS, data is analyzed, processed, tracked, archived and displayed with a host of computerized tools and networked to all other operations sites.

- DSP serves a critical role during Operation Desert Storm, detecting the launch of SCUD missiles and providing timely warning to civilian populations, coalition forces and commanders in Israel and Saudi Arabia. Gulf War experiences confirm DSP's flexibility in dealing with tactical as well as strategic threats.

- On May 10, 2005, Northrop Grumman ships the 23rd DSP satellite to Cape Canaveral Air Force Station for launch preparation. Shipment marks a first and a last for the program. The 23rd, and final, DSP is the first operational satellite to be launched aboard an EELV Delta IV-Heavy built by the United Launch Alliance (ULA).

- The DSP satellite on Flight 23 weighs 5,263 pounds, uses 1,274 watts of power and can accommodate 6,000 detectors. Its design life goal is five years, far exceeding the original requirement.

- Northrop Grumman is expected to continue supporting satellite system for years to come. The growth of DSP's capabilities — tested and proven over the past 36 years — ensures that this constellation will provide surveillance, and protection, well into the 21st century. Satellite operational life expectancies exceed twelve years.

DSP Performance at a Glance:
From a geosynchronous orbit, DSP satellites detect and provide early warning of strategic and tactical missile launches, space launches and nuclear explosions. In more than 36 years of operation, DSP satellites have met or exceeded all performance requirements. Here are some examples of DSP's performance:

- **Greatly exceeded design life,** DSP satellites have exceeded their specified design lives by an average of four times requirement through four upgrade programs.

- **Exceptional performance,** delivering more than 162 years of value beyond the required three-year design life on-orbit to-date (the equivalent of delivering 30-50 additional satellites without the cost of the launch).

- **Detected launch point and heading determination accuracies** have improved by factors of four to ten since DSP's early years.

- **Ground processing and satellite improvements** have significantly increased mission and system performance, the program's scope, and efficiency. A new means of processing DSP data called Attack and Launch Early Reporting to Theater (ALERT) was brought on line in 1995, improving warning of attack by short-range tactical missiles.

- **The compatibility and successful integration** of DSP's 23 satellites with six different launch vehicle systems demonstrates the system's flexibility.

- **Continual process improvements** through Six Sigma and process improvement tools have resulted in substantial cost and schedule savings as well as increased program flexibility.

DSP Innovation at a Glance:

- **The pioneering of a "zero momentum" approach** that allows for spacecraft attitude control with a minimum of fuel expenditure. The DSP satellite is spun about its Earth-pointing axis to provide a scanning motion for the infrared sensor. To reduce the satellite spin momentum to a nominal value of zero, engineers introduced a reaction wheel that achieved an equal and opposite momentum.

- **A simple mechanical solution** that keeps the satellite pointed accurately throughout its life by enabling the vehicle's spin axis to be fine-tuned. This mechanical solution, called the Inertial Properties Adjustment Device (IPAD), also saves large amounts of fuel.

- **Detection of tactical missiles** made possible by sensor, spacecraft, ground and network upgrades that enabled DSP to expand beyond its original mission to the detection of strategic missile launches. This operational ability, demonstrated in the 1991 Gulf War, enabled the U.S. Space Command in Colorado Springs to route data from DSP satellites to coalition forces in the Persian Gulf region in real-time.

- **Signature and phenomenology data** that has provided the intelligence, surveillance and reconnaissance communities with enhanced missile defense.

- **Four significant upgrades** in which Northrop Grumman and its partners have increased performance, survivability, and communication capabilities and expanded DSP missions, users and user utility. Thirty pounds of fuel was added to the last three satellites, to create additional operational life.

###