

Our products play an important role in the following programs:

### Space

GPSII  
TAOS  
GLAS  
TacSat-2  
MUOS  
C/NFOS Aquarius  
Mars Science Lab (MSL)  
Phoenix  
Mars Exploration Rovers (MER)  
Mars Reconnaissance Orbiter (MRO)  
Cassini/Huygens  
Space Shuttle and Space Station  
ROCSAT  
ACE  
Hubble  
INTEGRAL

### Aircraft

F-22 Raptor  
F-35 Lightning II, Joint Strike Fighter (JSF)  
B-2 Spirit  
V-22 Osprey  
F/A-18 Hornet  
E-2C Hawkeye  
Typhoon (Eurofighter)  
Nimrod 2000  
RC-135 Rivet Joint  
AWACS  
F-16 Falcon  
Hawk  
Mirage 2000  
U-2  
B-52 Stratofortress  
B-1B Lancer  
AH-64 Apache  
RQ-4A Global Hawk  
Watchkeeper UAV (UK)  
X-45 (UAV)  
X-47 (UAV)  
Shadow (UAV)

### Precision Munitions

AMRAAM  
CALCM  
Patriot / PAC-3  
Tomahawk  
Paveway II  
Evolved Sea Sparrow Missile (ESSM)  
IRIS-T  
Taurus  
Harpoon  
Joint Air-to-Surface Standoff Missile (JASSM)  
Dual Mode Guided Bomb (DMGB)  
Small Diameter Bomb (SDB)  
Wind Corrected Munition Dispenser (WCMD)  
Standard Missile II  
SeaRam  
Longbow  
AGM-88 HARM

### C4ISR

AEGIS (radar)  
Firefinder/Sentinel  
JTIDS/MIDS  
MILSTAR  
JSTAR

### Radar/Electronic Warfare

APG-63  
APG 81  
ALQ-131  
Airborne Self-Protection Integrated Suites (ASPIS)  
Directional Infrared Counter Measure (DIRCM)  
SLQ-32  
AN/AAR-57 Common Missile Warning System (CMWS)

### Land Systems

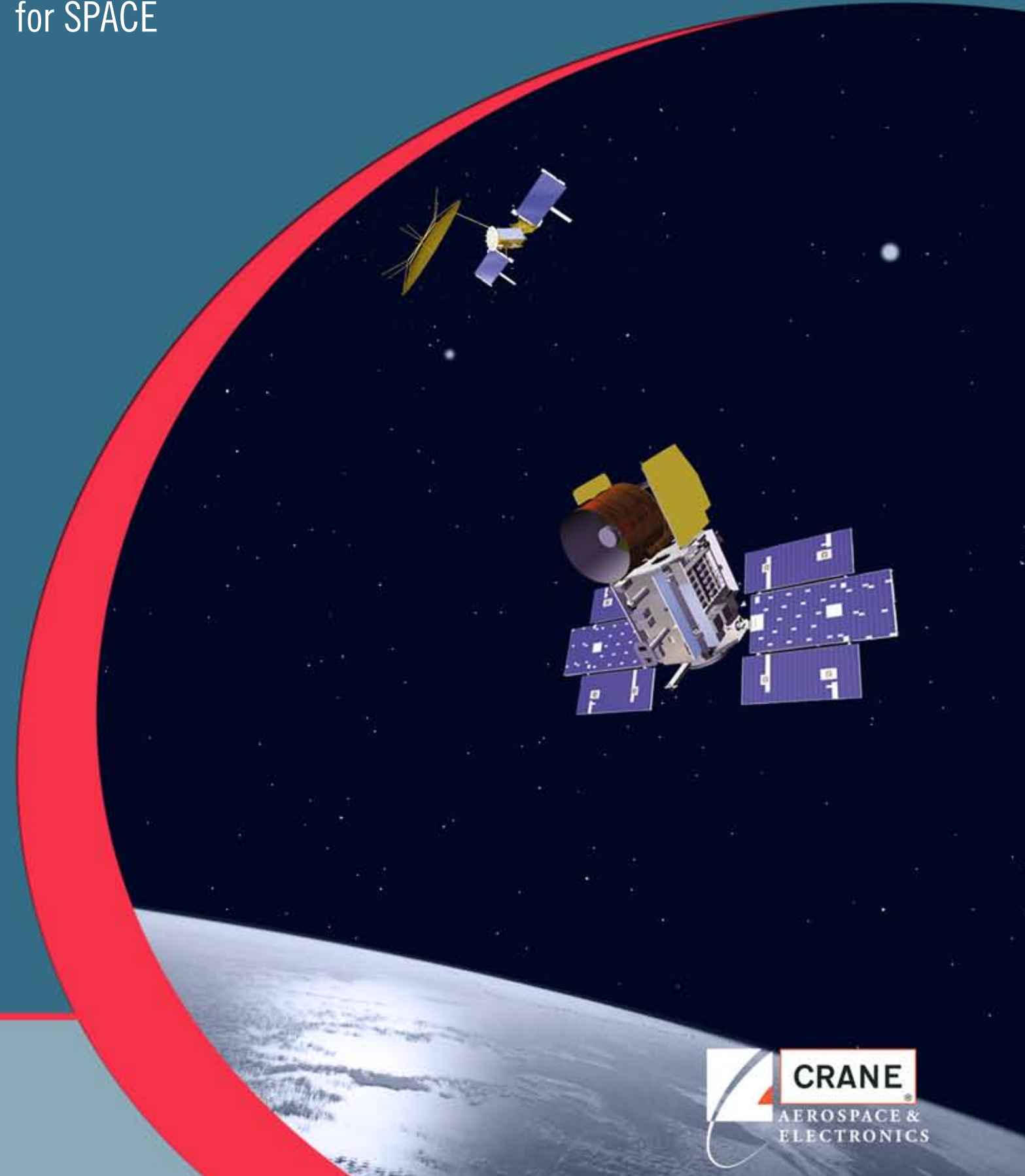
M1A1 Abrams  
Challenger  
Leopard  
Multiple Launch Rocket System (MLRS)

### Naval Platforms

CVN-68 (Nimitz Class)  
DDG-51 (Arleigh Burke Class)  
Trident Class Fleet Ballistic Missile Submarine  
SSN-774 Virginia-Class New Attack Submarine (NSSN)  
LHD & LHA Amphibious Assault Ship (Wasp and Tarawa Class)  
DD(X)

# Electronics Group

## Microwave Systems Solutions for SPACE



**Crane Aerospace & Electronics**  
**Electronics Group - Microwave Systems Solutions**

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## PRODUCT EXAMPLES

Microwave Systems - Space

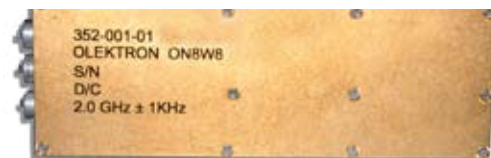
### Injection Locked Oscillator

- 10.23 MHz. output
- free-run or locked mode
- quartz based (swept)
- 8 dB lock power range
- 100 ms maximum lock delay
- hermetic construction
- Class K



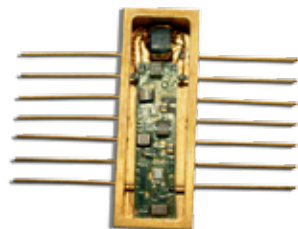
### High Stability Reference Oscillator

- 2 GHz output frequency
- 10 MHz thermally stabilized reference
- internal comb type frequency multiplier
- low Allen variance (~5x10<sup>-11</sup>)
- excellent aging stability over 2 year operational period (<0.2 ppm/yr actual measurement)



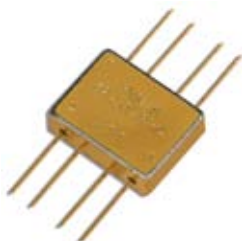
### UHF Coupler/Detector

- single package provides directional coupler and signal level detection
- 10.23 MHz. operating frequency
- -15 to -8 dBm threshold limit adjustment
- 1.3 dB maximum insertion loss
- hermetic hybrid, Class K construction



### Quadrature Hybrid

- frequency 305 MHz ±5%
- insertion loss 0.1 dB maximum
- VSWR 1.2:1 maximum
- ±2° phase balance
- hermetic flatpack housing



### Crystal Bandpass Filter

- center frequency 10.23 MHz
- 3 dB bandwidth ±6.5 kHz minimum
- 30 dB bandwidth ±15 kHz maximum
- insertion loss 4 dB maximum
- hermetically sealed, swept quartz



### SPDT RF Switch

- frequency range DC - 500 MHz
- insertion loss 0.8 dB maximum
- compression point +26 dBm minimum (500 MHz)
- GaAs technology (radiation tolerant)



## CAPABILITIES AND COMPANY INFORMATION

Microwave Systems - Space

### Product Capability

Crane Aerospace & Electronics Microwave Systems Solutions supplies a wide range of custom products for space flight applications including passive RF components such as

- quadrature hybrids
- crystal oscillators
- crystal filters
- LC type bandpass filters
- couplers/detectors
- isolators/circulators

Product capability for space qualified products includes most of the range of our non-space product offerings. Our experience and expertise provide exceptional design capability for custom products for space flight applications.

Devices are designed and manufactured to the strict controls of specific program requirements such as MIL-PRF-38534 Class S and Class K level products. The Class S and K requirements include destructive physical analysis (DPA), lot sampling, screening and product controls.

### Facility Capability

Our dedicated space manufacturing facility, which is certified to ISO9001:2000 and AS9100B, provides:

- 750 square foot manufacturing floor that operates separately from the main facility
- laminar flow hoods for reduced particulate
- paperless documentation system
- lot and materiel control
- program management
- strict quality control



### Company Information

#### Microwave Systems Solutions

Our business is highly focused on the development and production of extremely complex integrated microwave assemblies including transceivers, up and down converters and other high performance assemblies. These products, built under the Signal Technology and Olektron brands, are enabled by our traditional core products which range from single function components to more complex assemblies. Our component products include ferrite isolators and circulators, detectors, limiters, mixers, switches, power dividers and attenuators. We also feature higher value added products including voltage controlled, dielectric and coaxial resonator oscillators; detector log video amplifiers (DLVA); successive detection log amplifiers; frequency discriminators; phase detectors; comb generators; phase locked, frequency locked, and digitally tuned oscillators; solid state amplifiers and frequency synthesizers. For more information visit [www.craneae.com/mw](http://www.craneae.com/mw), call 978-524-7290 or email [electronics@craneae.com](mailto:electronics@craneae.com).

#### Electronics Group

The Electronics Group of Crane Aerospace & Electronics designs and manufactures high-density, high-reliability electronics for aerospace, space, military, medical, industrial, and commercial applications. Our brands in addition to the ones listed above are Eldec, General Technology, Interpoint, and Keltec. For more information on the Electronics Group of Crane Aerospace & Electronics, please visit [www.craneae.com/electronics](http://www.craneae.com/electronics).

#### Crane Aerospace & Electronics

Crane Aerospace & Electronics is a segment of Crane Co. and a major supplier of critical aircraft and electronic systems and components. In addition to the brands named above, the segment includes the Hydro-Aire, Lear Romec, and P.L. Porter brands. For more information on Crane Aerospace & Electronics, please visit [www.craneae.com](http://www.craneae.com).

#### Crane Co.

Crane Co. is a diversified manufacturer of engineered industrial products. Founded in 1855, Crane provides products and solutions to customers in the aerospace, electronics, hydrocarbon processing, petrochemical, chemical, power generation, automated merchandising, transportation and other markets. The Company has five business segments: Aerospace & Electronics, Fluid Handling, Engineered Materials, Merchandising Systems and Controls. Crane has 10,500 employees in North America, South America, Europe, Asia and Australia. Crane Co. is traded on the New York Stock Exchange (NYSE:CR). For more information, please visit [www.craneco.com](http://www.craneco.com).