MESSAGE FROM THE PRESIDENT

The 21st century electronics industry is characterized by rapidly changing technologies. This dynamic environment requires that participating companies develop and maintain extreme flexibility with regard to the development of technological competencies which meet the demands of the marketplace. Micropac Industries is positioned to provide Electronics Packaging and Optoelectronic products and services for "Mission Critical" applications in the Military, Space, Medical and Industrial markets. Our customers rely on Micropac to provide solutions to their most challenging electronics design demands. Micropac has the experience, resources and qualifications to meet these expectations.

With over forty years of experience, Micropac Industries has provided our customers with products that are included in space probes, satellites, high performance aircraft, implantable cardiac systems, high performance robotics and many other applications in which the system depends on the quality of its components for the success of its mission. Micropac has invested in the equipment, personnel and quality systems to ensure that these demands are met on a continual basis. As a public company, Micropac has successfully navigated the extreme volatility of the electronics markets in which it participates and has established a record of performance that is without peer.

Micropac welcomes the challenges provided by our diverse customer base. As the President and Chief Executive Officer of Micropac, I pledge to continue to provide products and services that will meet or exceed our customer's most demanding "Mission Critical" applications.

Mark W. King
President and Chief Executive Officer
Micropac - Helping You Build the Road to Your Future

Whether your product is destined to be used in a probe to the edge of the solar system or implanted in a patient’s body to sustain life, you must use the very best electronics packaging resources on earth in order to meet your “Mission Critical” requirements. When failure is not an option, Micropac is there to provide world class electronics packaging reliability and functionality.

• Micropac’s engineers integrate with your design team to explore the electronics packaging options that will help you accomplish your mission.

• Micropac will provide the packaging solutions, however stringent, that will ensure that your product meets its objectives for mission success.

• Micropac’s extensive range of high reliability standard microcircuit and optoelectronic products provide additional consistent, highly reliable solutions for your demanding applications.

• Micropac’s quality and reliability credentials, extensive technical capabilities and decades of “Mission Critical” electronics packaging experience become the resource that you need in order to build the road to your future.

Micropac – “Solutions through Technology”
**Micropac - Providing High Quality Microelectronic and Optoelectronic Solutions**

**Microcircuits and Multi-chip Modules** - Micropac designs and manufactures custom and standard microcircuits and multi-chip modules. Using our design and electronics packaging expertise, Micropac will work with the customer to create solutions for the most demanding applications.

**Analog and Digital Designs** - Analog/Digital designs include custom and standard 200°C operating temperature microcircuits, multi-chip modules, optoelectronic components and assemblies used in a variety of harsh environments.

**Wide Range of Electronics Packaging Capabilities** - Micropac provides a wide range of electronics packaging capabilities that provide solutions for the customer’s most demanding applications. These capabilities include multi-layer thick film circuits, surface mount, chip-on-board, and multi-chip modules. Package sealing includes seam welding, resistance welding, non-hermetic resin encapsulation and conformal coating.

**Wide Range of Testing Capabilities** - Micropac offers a wide range of environmental and electrical testing capabilities including temperature cycling, gross and fine leak testing, PIND testing, constant acceleration testing, burn-in, digital and analog electrical parametric testing and elevated temperature electrical testing.

**Qualifications and Certifications** - Micropac is qualified to MIL-PRF-19500 JANS level (space level for semiconductors), MIL-PRF-38534 K level (space level for microcircuits), MIL-PRF-28750 (relays), and NASA - STD-8739.3 Soldered Electrical Connections. Micropac is certified to ISO 9001 and is a NASA core supplier.
**Optoelectronic Solutions for Extreme Environments**

**Engineering Experience** - Micropac's experienced engineering staff provides services from design concept and prototypes to full scale production. With over 40 years of experience, Micropac’s experience in electronics packaging design ranges from Military and Space applications to the Medical and High Reliability Industrial markets.

**Wide Range of Applications** - Micropac provides electronics packaging solutions ranging from single die to complex circuits. Micropac's experience with customer’s “copy exact” production requirements ensures that the customer’s production requirements meet the most stringent standards.

**Standard Products** - Micropac provides standard microcircuit and optoelectronic products that have been used in diverse applications such as implantable cardio defibrillators, oil industry downhole tools that operate in harsh environments, satellites and space probes as well as many military and aerospace systems. Included in these products are tempest filters and radiation tolerant optocouplers, optically coupled power control products with isolation voltage up to 40 KV DC isolation, optoelectronic interrupter and reflective sensors, surface mount optocouplers in various packages including LCC and gullwing packages. Micropac manufactures high reliability visible and infrared LEDs and LED displays. Micropac’s standard products also include voltage regulators, solid state relays, power op amps, and proportionately controlled heaters.
Custom Packaging and Outsourcing

• The Microcircuits and Optoelectronics Divisions of Micropac Industries, Inc. offer custom packaging services for single-chip and multi-chip packaging applications. Hermetic or non-hermetic packaging can be provided.

• Components can be processed to a range of screening requirements from commercial to MIL-PRF-38534 or MIL-PRF-19500.

• Obsolete electronic components present a serious challenge to the sustenance of legacy military programs. Micropac offers customers the qualifications, technical expertise and experience to provide solutions to difficult obsolescence issues. Micropac can package commercially available die in hermetic packages and screen the device to customer specifications. When single die solutions are not available, Micropac can often create microcircuits which meet the critical parameters of the obsolete device.

• Micropac can provide packaging for small signal and power devices.

• Micropac is an excellent source for outsourcing of internal hybrid manufacturing and other specialized packaging requirements.

Industrial Applications

Micropac is a significant supplier to the industrial market with standard and custom products. These products include hybrid microcircuits, solid state relays and optoelectronic devices. Micropac’s technical experience and capabilities enable the customer to expect innovative, cost effective solutions for the most challenging applications.

Micropac is a Certified ISO-9001 manufacturer.
Radiation Tolerant Products

- Radiation tolerant products are available from Micropac Industries, Inc. as standard and custom product designs. Custom single chip and multi-chip packaging can be provided.

- Standard products include solid state relays, solid state power controllers, power operational amplifiers and optocouplers. These devices can be screened to specific MIL-PRF-38534 and MIL-PRF-19500 criteria to meet specific customer needs.

- Radiation test data on specific samples of the standard products can be made available.

High Temperature Electronics

- Micropac Industries, Inc. has provided custom and standard high temperature products for over 25 years. Standard products include devices that operate at 200°C case temperature.

- Single-chip and multi-chip designs packaged and screened to meet the requirements of harsh environments can be provided. Standard high temperature designs include three terminal linear voltage regulators, hall effect devices, instrumentation amplifiers and current-to-current optocouplers.

- Micropac offers extensive experience in the assembly, test and screening of components and modules for use in harsh environments, including oil and gas related and aircraft engine related applications. Capabilities include FPGA programming at the die level.
Custom Optoelectronic Assemblies

- Micropac’s experience in the manufacture and test of optoelectronic components coupled with the capability to assemble surface mount and thru-hole circuits enables Micropac to provide complex optoelectronic assemblies, i.e. encoder read heads.

- Micropac will continue to develop new capabilities as the state of the art in optoelectronics evolves. The Micropac engineering staff will continue to work with customers to develop the products and Modules needed in the years to come.

Hall Effect Position Sensors

- Micropac provides hermetically sealed, high reliability Hall Effect Sensor and Hall Effect Sensor assemblies to the military, space, automotive and industrial markets. Our customers require operation in “Mission Critical” harsh environments. Standard as well as custom components and assemblies are available. Micropac provides ruggedized high temperature (200°C) devices which are used in severe environments where other position sensors cannot be used.
Standard Optoelectronic Products

• Micropac's Optoelectronics Division offers the broadest line of standard high-reliability optocouplers, visible light emitting diodes, and optoelectronic components available today. Micropac is qualified to MIL-PRF-19500 and MIL-PRF-38534.

• The Optoelectronics Division is proud of the high quality and reliability which has earned it the Qualified Products Listing for numerous types of hermetically sealed high reliability optocouplers and LEDs.

• Micropac's Optoelectronics Division is also certified and qualified to the K (space) level requirements of MIL-PRF-38534 and is an approved supplier to DSCC Standard Military Drawings for various multi-channel optocouplers.

• The Company’s semiconductor front-end capabilities include silicon phototransistors, silicon photodiodes, silicon photo darlontons, GAALAS Infrared LEDs, GAASP on GAP visible LEDs, GAP on GAP visible LEDs and patterned GAASP visible LED die.

• The Company provides a full line of optocouplers and other optoelectronic components processed to JAN through JANS level.
Solid State Relays

- Micropac designs and manufactures Custom and Standard Solid State Relays. Micropac has the capability to manufacture to specific aspects of MIL-PRF-28750 and/or MIL-PRF-38534.

- Micropac has the capability to manufacture compliant devices or screen to specific aspects of MIL-PRF-28750 and/or MIL-PRF-38534

- Designs include AC and DC versions, single pole/single throw, single pole/double throw, double pole/single throw.

- Multiple relays in a single package.

- Custom and standard squib firing relays.

- Optical or inductive coupling

Solid State Power Controllers (SSPC)

- Solid state power controllers are the next generation in the evolution in “systemizing” of solid state/ smart solid state relay technology. The SSPC typically is a smaller, lighter and more reliable replacement for the combined functions of a circuit breaker, associated intelligent SSR combinations and output power requirements. The SSPC provides internal “self protection” in addition to protecting the ultimate load and associated interconnect system.

- Standard and custom AC and DC versions as well as radiation tolerant versions are available.

- Available in a variety of configurations, Micropac SSPC’s are incorporated into state-of-the-art military and commercial aircraft, shipboard and space programs.
**Power Products**

- Custom and standard power hybrids and power modules are manufactured in the ISO 9001 and QML qualified facilities of the company. A wide range of hermetic and non-hermetic packaging methods are available.

- Micropac offers high power, high density and a high functionality-to-volume ratio on power hybrid designs.

- Custom power hybrids, power op amps, special packaging including FET’s, bipolar transistors, IGBTs, rectifiers, three terminal voltage regulators, FET switches with up to 1000 Watts of dissipation.

- Custom packaging of single and multi-chip designs is available from Micropac. This service can include hermetic packaging of power devices no longer available from the original manufacturer. Non-hermetic encapsulated power modules can be provided to meet specific customer requirements. Hermetic packaging for Industrial through MIL-PRF-38534 Class K is available from Micropac.
Solid State Thermostat Controllers

- Custom and standard solid state thermostat designs for military, Aerospace, space and high reliability industrial applications
- Precise temperature sensing utilizing external thermistor temperature sensor
- Solid state switching providing current-to-external of external heating element
- Output is either “ON” or “OFF”
- Adjustable setting of temperature from -30°C to +30°C with external resistor Temperature Accuracy ±1°C
- Temperature hysteresis ±1°C

Proportionally Controlled Heaters

- Proportionally controlled heaters available in a wide variety of standard versions up to 50 Watts power dissipation — custom designs available as needed.
- AC and DC designs that are programmable via a single external resistor.
- Custom designs include addition of heater circuit into existing circuit design in a single temperature controlled enclosure.
**Space Products**

- Micropac’s participation in U.S. space programs goes back to the early 1970’s (Mark XII Re-entry vehicle and Viking Lander). Space programs became a major market for Micropac in the late 1980’s. By the mid 1990’s, Micropac was an approved and active supplier of hybrid microcircuits, optoelectronics components, and solid state relays on the International Space Station, all major U.S. launch vehicles, DoD/NASA satellites and other space programs.

- Micropac is a certified and qualified supplier of various custom and standard hybrid microcircuit and optoelectronic devices to the “K” Level of MIL-PRF-38534 and optoelectronic devices to the JANS Level of MIL-PRF-19500. Micropac is included in the NASA “Core Supplier” listing for these products and technologies.

**Medical Electronics**

- Micropac provides custom and standard hybrid and optoelectronic circuits and assemblies for use in high reliability medical applications including implantable medical devices.

- Applications utilizing Micropac designs include heart pacemakers, implantable cardio-defibrillators, bone-growth stimulators, nerve stimulators, blood oximeters, Holter recorders, transcutaneous nerve stimulators (TENS), miscellaneous electronic surgical equipment, voltage isolation applications and more.

- Micropac hybrid and optoelectronic components offer reduced size, space and weight, increased reliability and can add increased functionality in a small space.

- Micropac also offers ruggedized designs for “harsh environments” such as Autoclave used in sterilization.
Micropac Facilities

Electrical Test work stations for product testing.

Computer-aided test capabilities utilized in 100% electrical testing and Group A sample testing.

Destruct and non-destruct bond pulls are process controls used in the manufacturing process and utilized in Quality Conformance Inspections.
Solder assembly work station utilized in the production of High Reliability Industrial Hybrids.

Hermetic sealing capabilities include parallel seam welding. Precise sealing schedules and pre-seal vacuum/nitrogen bake-out are performed using a microprocessor-aided sealing system.

Micropac’s wafer fab area produces LED’s, and Phototransistors.
Micropac Facilities

Environmental screening of Micropac’s products includes burn-in. Visible LED’s manufactured to the requirements of MIL-PRF-19500 are pictured.

A programmable temperature cycle chamber is utilized in the screening of Micropac’s high reliability products.

Micropac has both aluminum and gold wire bonding capabilities in all of its facilities. One of Micropac’s automatic thermosonic gold wire bonder is pictured here.
Computer-aided passive laser trimming of thick film resistors utilizing ESI laser. Also, two active trim work stations are utilized.

Each of the three Micropac facilities in Garland has Pick and Place Equipment.

Quad ZCR reflow soldering system.

CAD circuit layout/design/simulations.
Military and Space Program Experience

F35 JSF        SDO
F16            LRO
F15            Titan
F111           Delta
F22            Atlas
B2             Sea Launch
Joint Common Missile  EELV
Trident         MILSTAR
PAC 3           AEHF
TOW             Hubble Space Telescope
HELLFIRE        International Space Station
Standard Missile 2/3  Galaxy
RAM             Deep Impact
ATACMS          New Horizons
Viking Lander   BSAT
Mars Rover

* Photo Courtesy of U.S. Army
* Photo Courtesy of U.S. Air Force
* Photos Courtesy of NSSDC
Micropac Industries, Inc. has been involved in microelectronics manufacturing since 1963. The Company is qualified to MIL-PRF-19500 JANS, MIL-PRF-38534, Class K and MIL-PRF-28750. Micropac is qualified to ISO 9001. Custom and standard components, modules and next level assemblies are designed and manufactured for use in a wide range of markets and applications. The Company has two Divisions, Microcircuits and Optoelectronics, which design and manufacture standard and custom products. Markets served include military, space, medical hi temperature (oil, gas, avionics and other harsh environments) and Hi Rel Industrial.

Micropac is dedicated to supporting “Mission Critical” applications and will continue to develop the products and processes needed to support its customers applications.

Micropac Industries, Inc. has ISO 9001 and DSCC QML approved facilities in Garland, Texas and Juarez, Mexico. The facilities include class 100,000 climate controlled clean room assembly area. The manufacturing, including test and environmental screening of products is conducted in these facilities.

With its trained, highly-skilled management, production and technical staff, the facility is equipped to produce custom multi-chip components and assemblies for higher volume industrial applications, as well as the QML/Military products.

Micropac Industries, Inc. - Quality Policy

It is the policy of Micropac that every individual is responsible for improvement of quality and the level of customer satisfaction through a continuous drive to improve products/services and assure that they consistently exceed the reasonable expectations of customers.

Additionally, Micropac will supply products and services that fully conform to all specified requirements for quality, reliability, product performance, schedule, and cost.

Concurrent with this overall policy, the Micropac quality management program meets or exceeds all contractually required standards for quality and workmanship. This quality management program implements the fundamentals of a Total Quality Management (TQM) Program, including: customer satisfaction, both internal and external; continuous improvement and variability reduction; employee involvement and training; supplier participation; and management commitment to the above fundamentals.
Micropac Industries, Inc.

Capabilities Overview
Technological Expertise in
Design and Implementation of:

Thick Film Substrate System
Thick Film Hybrids
Hybrid Microelectronics/MCMs
Optoelectronic Devices
  Standard and Custom
Power Modules
  Standard and Custom
Solid State Controllers
Solid State Relays
Custom Packaging

Market Place:
  Aerospace
  Military / Space
  Medical
  Industrial
  Instrumentation
  Harsh Environments

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