FACILITIES BROCHURE

AMERICAN MICRO-SYSTEMS, INC.
3800 HOMESTEAD ROAD, SANTA CLARA, CALIFORNIA 95051 ▲ (408) 246-0330


AMERICAN MICRO-SYSTEMS, INC.
3800
HOMESTEAD
ROAD

ABOUT AMI

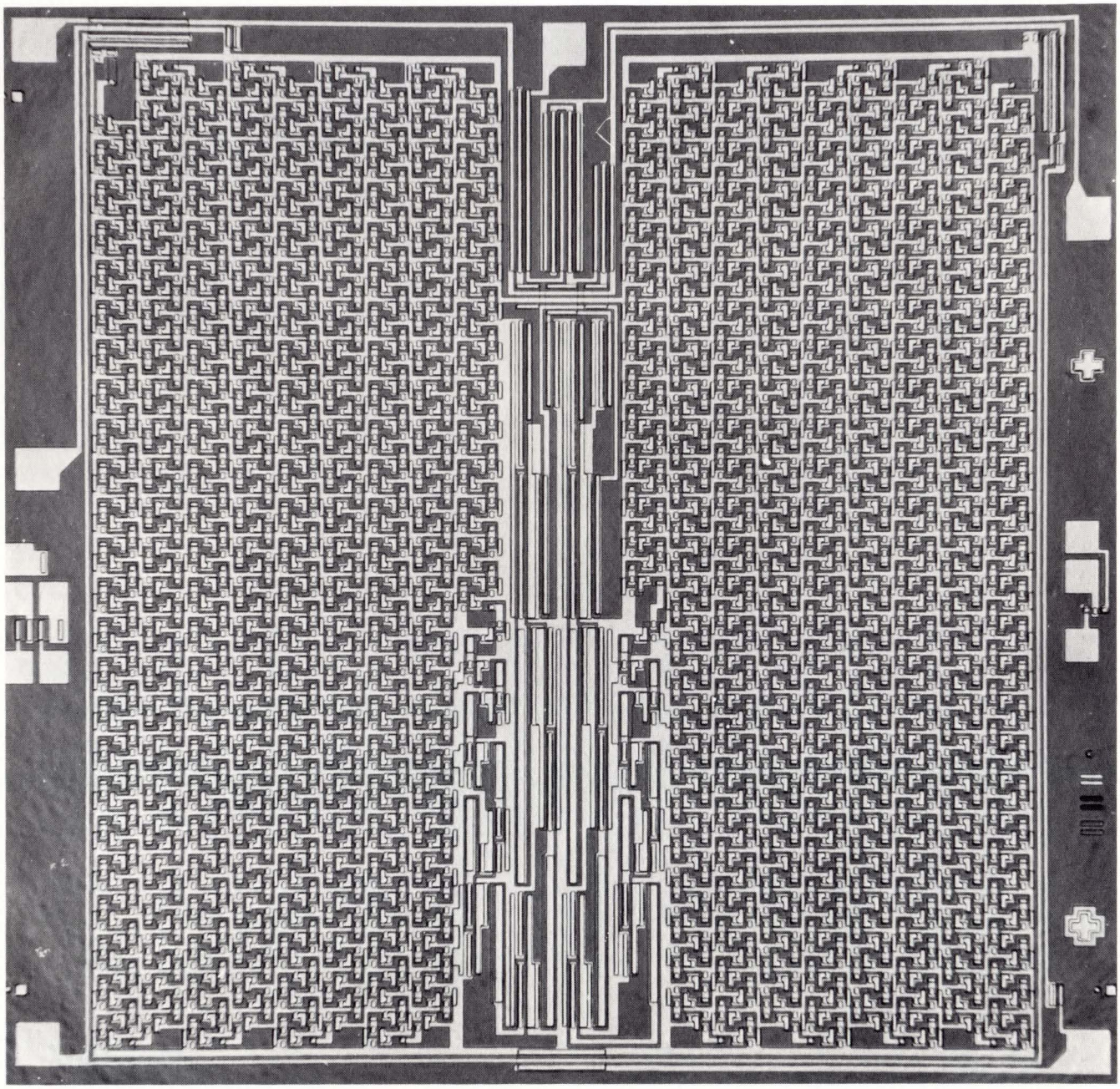
American Micro-systems, Inc. was founded in mid-1966 specifically to design, develop and produce state-of-the-art microelectronic integrated circuit solid state components, large scale arrays, assemblies and highly sophisticated electronic equipment for military-space, industrial, medical, educational and consumer applications.

Fundamental to the Company's operation is the efficient management of all facets of activities from research and development through production into marketing. In keeping with this philosophy, the technical staff consists of a well balanced group of specialists in the semiconductor field, particularly in MOS, who are dedicated to the advancement of the technology yet are keenly attuned to the practical requirements of systems design.

AMI has a total capability which ranges from research in MOS technology to the production of developmental devices and standard products. AMI's services may be tailored to specific requirements of the customer at any desired interface point, be it system organization, system partitioning, composite layout, artwork and mask making, processing, packaging, testing or failure analysis. This approach offers economy of design effort, privacy of design during development, timely delivery, low production costs, high-level technical competence and complete control of design philosophies and quality.

To maintain its technological leadership, the Company supports continuing programs devoted to in-depth studies on system and subsystem designs, to the development of advanced processing techniques and to the improvement of existing design and processing techniques. These programs are augmented by a substantial volume of R&D programs under contract with military agencies and industrial concerns.

AMI has received the National Venture Capital Award in recognition of its growth potential, technical competence and management capability. The Company was the only electronics firm of the five industrial organizations that were awarded citations in 1968.



426-Bit Register
with 2567 transistors on a 105 x 106 mil chip.

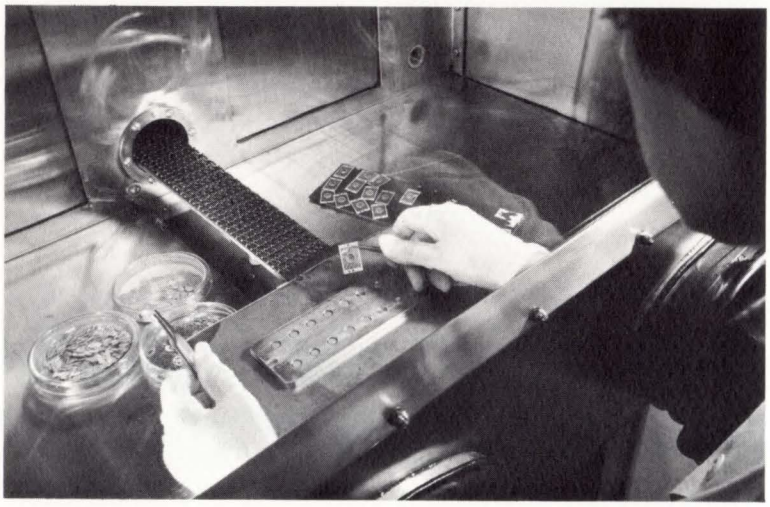
MOS TECHNOLOGY

MOS large scale integrated arrays, laboratory curiosities for many years in the absence of a suitable production process, are today the most prominent in the field of microelectronic integrated circuitry. The development of a practical production process in 1960 marked the emergence of MOS arrays from the laboratory. This breakthrough sparked the development of MOS devices that could economically duplicate the functions of vacuum tubes and bipolar transistors. Four years later, 1964, the first reliable and reproducible MOS discrete and integrated circuit devices were produced in quantities.

The entire process of MOS production is a blend of chemistry, metallurgy, physics and electrical engineering. The MOS microelectronic integrated circuit itself is contained on a silicon chip no larger than the O in MOS and consists of as many as 2500 individual transistors interconnected to perform complex functions. Typically, such circuits incorporate 10 to 100 times the functional complexity of other integrated circuits. Functionally, the MOS array combines the most attractive features of the transistor and the vacuum tube at a great reduction in size, weight, power dissipation and cost.

MOS arrays are particularly suitable for digital applications such as timers and counters of all types, from consumer products to precision artillery fuzes; communications and data transmission and switching equipment; tape recorders; business machines; industrial controls; small scientific computers; computer peripheral equipment; and instrumentation. Linear applications include analog switching devices, low power amplifiers, and active filter networks.

The ease with which low-cost complex assemblies — such as analog to digital and digital to analog converters, frequency synthesizers, time division multiplexers, variable time delay lines, character generators for reprinting CRT and solid state displays, random access and read only memories — can be developed leaves all the products of consumer, industrial and military electronics open to new developments of revolutionary design.



FACILITIES

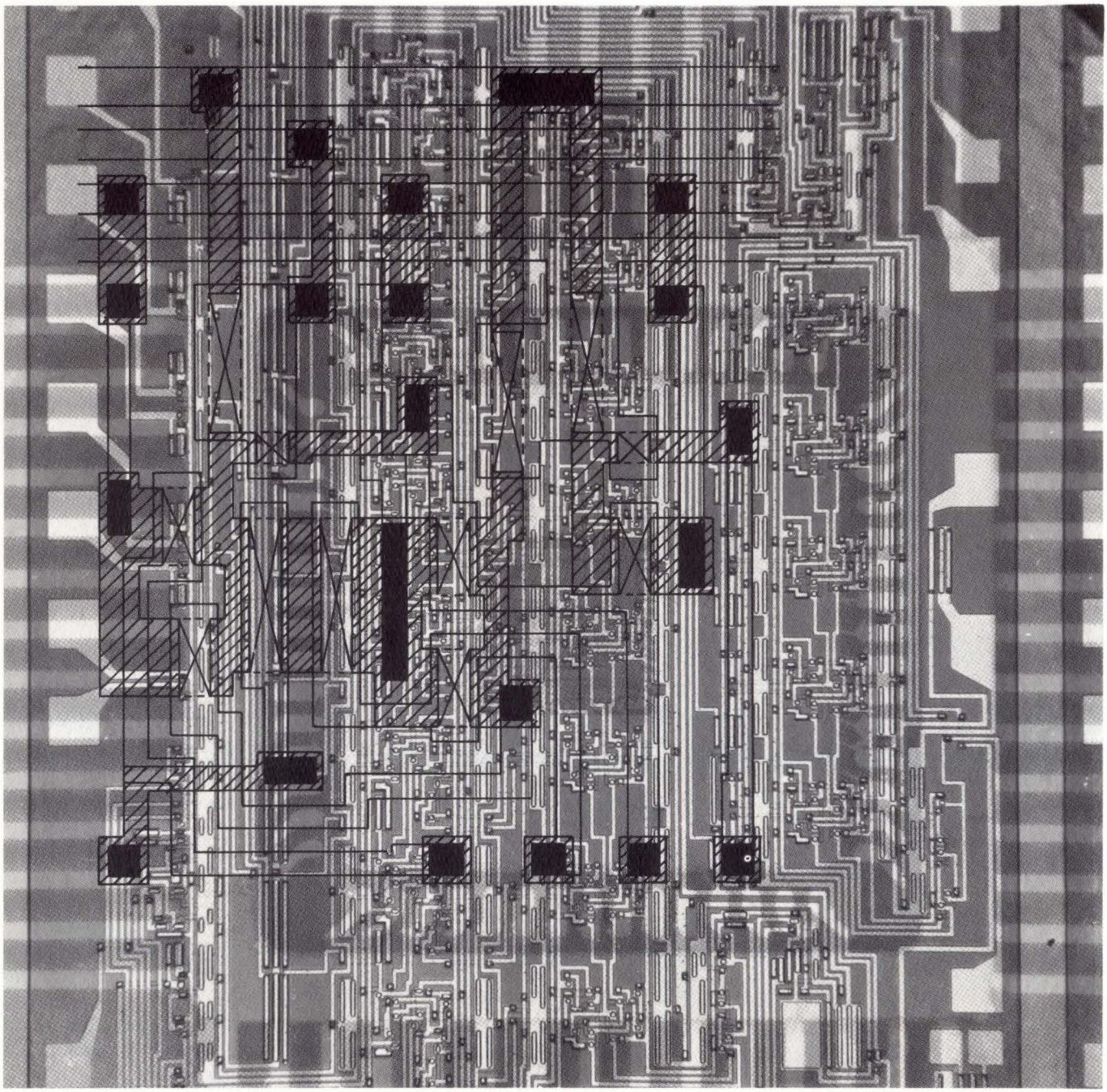
American Micro-systems, Inc. is located in the Vallco Industrial Park, Santa Clara, California, in close proximity to major technical support industries and to the confluences of the main arteries of the Peninsula and the Santa Clara Valley. Modern engineering and manufacturing areas have been specifically designed to provide the highly specialized facilities that are essential for the development and production of MOS microcircuits. The facility has been specially constructed to provide the vibration-free environment required for the extremely close-tolerance manufacturing process employed. Other provisions include equipment for close control of temperature and humidity as well as equipment for maintaining a particle-free atmosphere.

The ultra clean room (Class 100) facilities for diffusion, photoresist, wet chemistry, metallization and mask making are the most advanced and efficient that technology can provide. Interfaces between activities have been carefully designed to minimize contamination, with least impingement on efficient production of quality devices. Separate air conditioning and laminar air flow systems insure that the temperature is controlled within the critical tolerances required in the industry and that the ultimate in dust-free environments is achieved.

For some high reliability applications, devices must be burned-in or operated at rated loads at elevated temperatures for periods from 24 to 1000 hours. A large facility for burning in complex arrays under functional test conditions at high temperature is available for life testing as many as 13 different types of devices or packages at one time and in large quantities at temperatures high as +150°C. The devices under test are activated at temperature such that every logic function within a chip is exercised and functional conditions are monitored. Computerized data processing allows rapid evaluation of results to establish reliability, determine parameter distributions, and assure conformity to customer specifications.

Much of the major equipment in the production, product assurance, process development, and photolithography areas are automated to assure high, uniform yields. Automated wafer map and sort equipment, functional testers, furnace sequencing, photoresist operations and artwork generators are on line or in process of incorporation.

AMI has a Secret Facility Clearance from the Defense Contract Administration Services Region, San Francisco.



CAPABILITIES

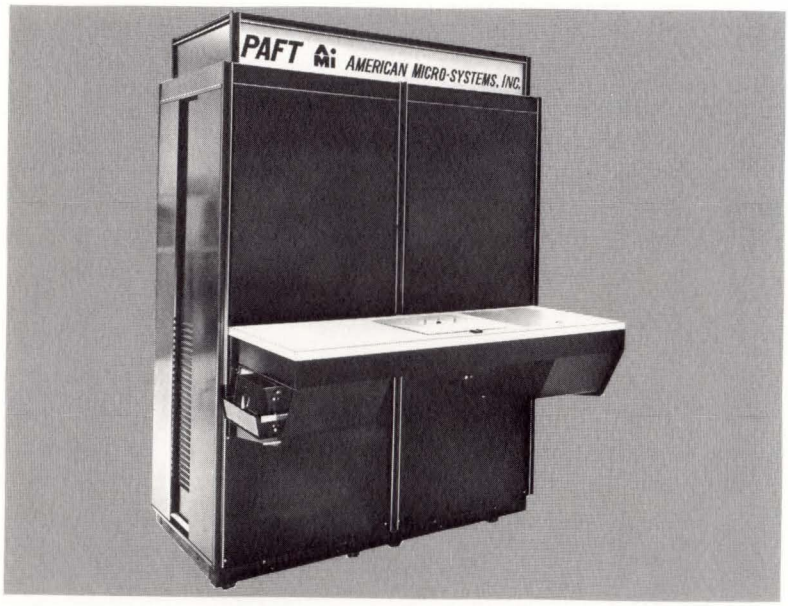
RESEARCH & DEVELOPMENT

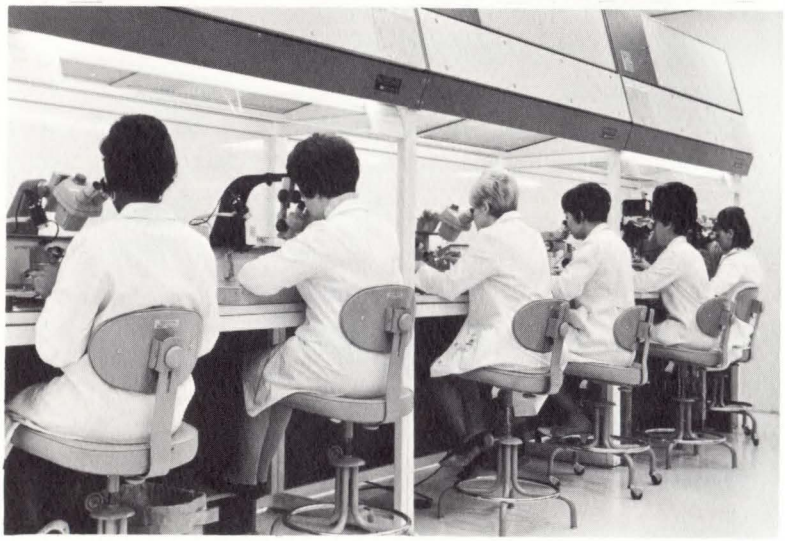
AMI's scientists and engineers are highly skilled in MOS technology and excel in their chosen fields. Most of these personnel have been actively engaged in the semiconductor field since the early years of its development and have made significant contributions in the design and development of MOS microelectronic devices. As a natural consequence, the R&D staff engages in advanced company-sponsored programs and in sophisticated government and industrial programs that deal with MOS applications in such areas as large scale memory arrays, complex data acquisition and processing, and advanced satellite systems.

The efforts of the technical staff are augmented by those of experienced liaison engineers who are based in various parts of the country. These engineers acquaint customers with the uses of MOS and assist the customer in exploiting MOS technology in his application. In addition the Company conducts an engineering course in MOS technology to provide customer engineers with a comprehensive background in the theory and design of complex arrays.

Other company supported activities have included the development of ultra-logic elements and microcomposites as a step toward design automation. These incorporate well-defined, fully characterized standard MOS functional cells. The ultra-logic elements comprise a compatible family of functional building blocks for economically prototyping complex circuits before integration, while microcomposites constitute graphical building blocks for producing topological layouts of integrated microcircuits.

As a further step towards design automation of MOS circuits, AMI has incorporated a computer system. This system has two modules – a circuit element placement and routing module and an artwork generation module. The first module, which is currently operational, is interfaced with AMI's standard functional cells and generates the coordinates for the circuit topology. Coordinate information will be passed to the artwork generation module which will convert the data to command sequences for automatic plotting equipment. The complete system will reduce circuit design time by a factor of 6.


PAFT
AMERICAN MICRO-SYSTEMS, INC.



MANUFACTURING

Of paramount importance in the manufacture of MOS complex arrays and field effect transistors are precision, uniformity and reliability. Consistent with these requirements, AMI maintains a well-controlled, stable process, and every step of production is controlled by a series of exacting procedures, tests and inspections to insure the quality of the finished product. These controls are implemented by documenting parameters of the process, documenting circuit parameters, designing arrays to conform to circuit parameters, monitoring process parameters, and controlling the process. This assures a uniformly excellent product over extended production runs.

As a result of continuing efforts to refine existing techniques and develop new techniques, AMI's processing engineers have developed the ultra thick oxide (UTO) process which produces higher yields, higher density and more reliable circuits than are possible with other methods. Another process has been developed for the production of low voltage MOS (LMOS)© devices which are directly compatible with DTL and TTL devices for a hybrid approach.

As an addition to the multiplicity of processing and testing equipment, most of which have been custom-built to AMI's rigid specifications, the manufacturing group has designed and constructed a programmable automatic functional tester (PAFT). This equipment provides many channels of output data with output word lengths to meet the exacting test requirements for complex arrays. This tester has a capability of 64 channels of 200 bit length with full comparison. A photoelectric tape reader has been incorporated for rapid register program loading, which makes it possible to load a customer's test program, sent to AMI by TWX, directly into the tester. Paper tape generated by a computer may also be used. Furthermore, the PAFT is compatible with automatic sorting and handling equipment which, in most cases, increases device productivity by more than 10 times.

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Product Assurance Division

100% Back Bias Burn-In Analysis (100 Hours)

AMI Part Number C1004

Lot Traceability Code: AEH722XXX

Sample Size: 205

July 20, 1967

	0 HOURS	100 HOURS	ΔV_{T_1}
V_{T_1} (V_{DC}) I_{DS} = 10μA	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.5 4.3 4.1	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.5 4.3 4.1	>200 180 140 100 (+) 80 40 195 0 mV 40 80 100 (-) 140 180 >200
	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0
	0 HOURS	100 HOURS	ΔV_{T_2}
V_{T_2} (V_{DC}) I_{DS} = 10μA	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.5 4.3 4.1	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.6 4.3 4.1	>200 180 140 100 (+) 80 40 197 0 mV 40 80 100 (-) 140 180 >200
	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0
		100 HOURS	ΔV_{T_3}
V_{T_3} (V_{DC}) I_{DS} = 10μA	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.5 4.3 4.1	6.1 5.9 5.7 5.5 5.3 5.1 V 4.9 4.7 4.5 4.3 4.1	>200 180 140 100 (+) 80 40 197 0 mV 40 80 100 (-) 140 180 >200
	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0 f	100 90 80 70 60 50 40 30 20 10 0
	0 HOURS		
WORST CASE V_T MATCH Within One Device	>200 185 165 145 125 105 mV 85 65 45 25 5	BURN-IN CIRCUIT T_A = 125°C	-15V
	100 90 80 70 60 50 40 30 20 10 0 f		

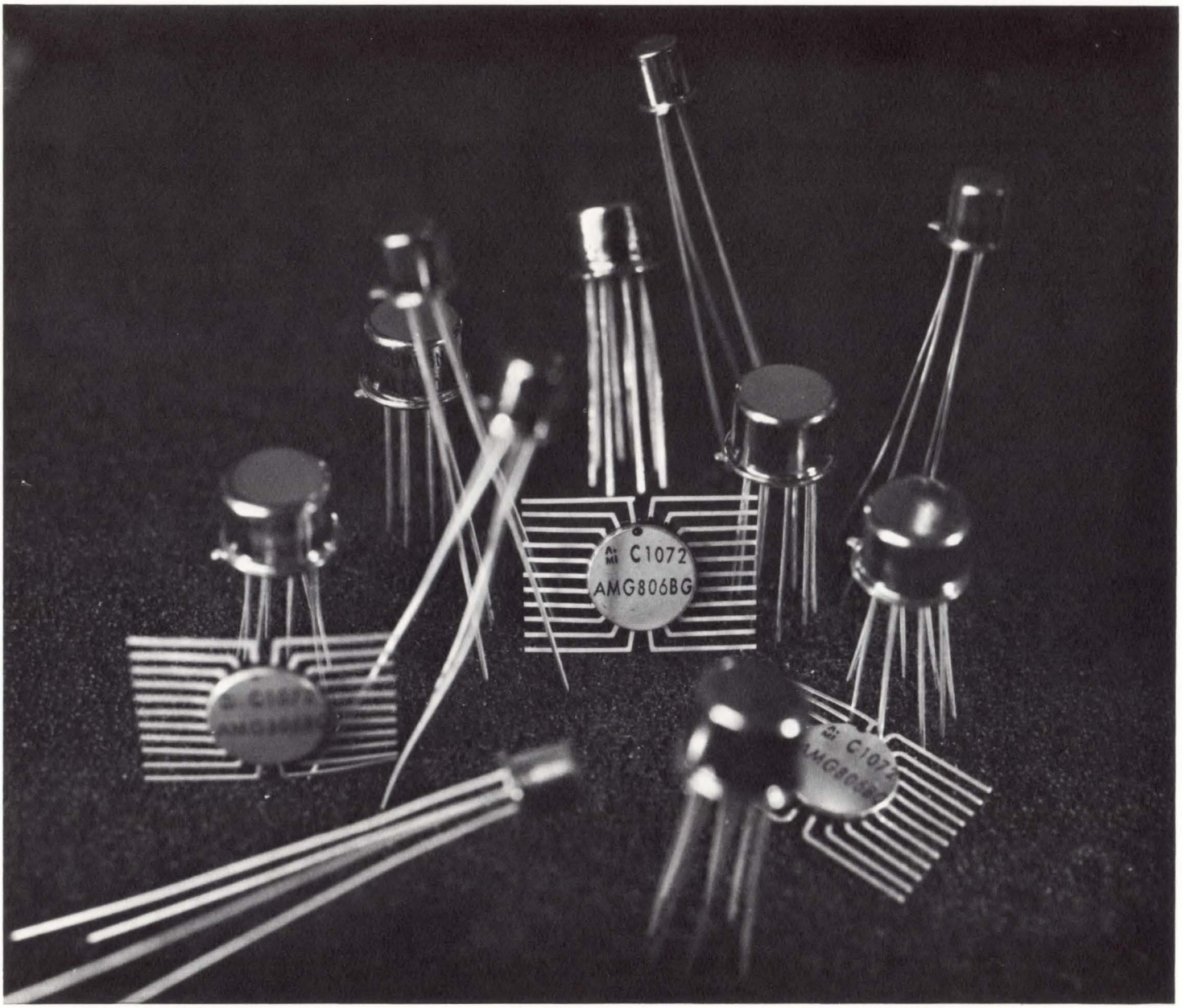
PRODUCT ASSURANCE

Supporting all phases of research and development and manufacturing is the Product Assurance Division. This group maintains the integrity of AMI's products. by enforcing rigid inspection and test controls from the inspection of vendors' facilities and materials to final testing and inspection of the finished MOS product. All manufacturing operations, tests and inspections are fully documented to provide complete traceability of raw materials, processes and devices. As a result, the standards used at AMI exceed the specifications of even the most demanding system requirements.

While MOS offers advantages of decreased size and increased packing density, reliability testing has become increasingly difficult. As a solution to this problem, AMI has developed a special test chip, called the Rel-Chip,© for quantitative evaluations of the reliability of individual elements within the MOS device. Such chips are placed in each production wafer at strategic points and are tested at several stages in the manufacturing process. Computerized data processing allows rapid evaluation of test results.

For complete dimensional and continuity checks on MOS products a full complement of metallurgical microscopes, accurate to 20 millionths of an inch, are available within a clean room atmosphere. Also available are sectioning, staining and polishing apparatus and a wafer grooving machine for determining the depth of oxides and diffusions.

In full scale operation, the reliability of AMI devices had been proved in NASA's Interplanetary Platform (IMP) satellites as part of the spaceborne telemetry system. Thousands of MOS microcircuits incorporated in two IMP systems have proved highly reliable after 10,000 hours in space.


C1072
AMG806BG

STANDARD PRODUCTS

In addition to AMI's capability in custom arrays, its standard product base consists of a broad line of compatible MOS LSI complex arrays and MOS FETs. These products are designed for optimum performance and economy and low-power, high-speed applications over the full military temperature range. The superior quality of these products is a direct reflection of the excellence of the Company's production facilities and its overall technical capabilities. Favorable reactions received from systems manufacturers as well as sophisticated users are indices of the integrity of these products.

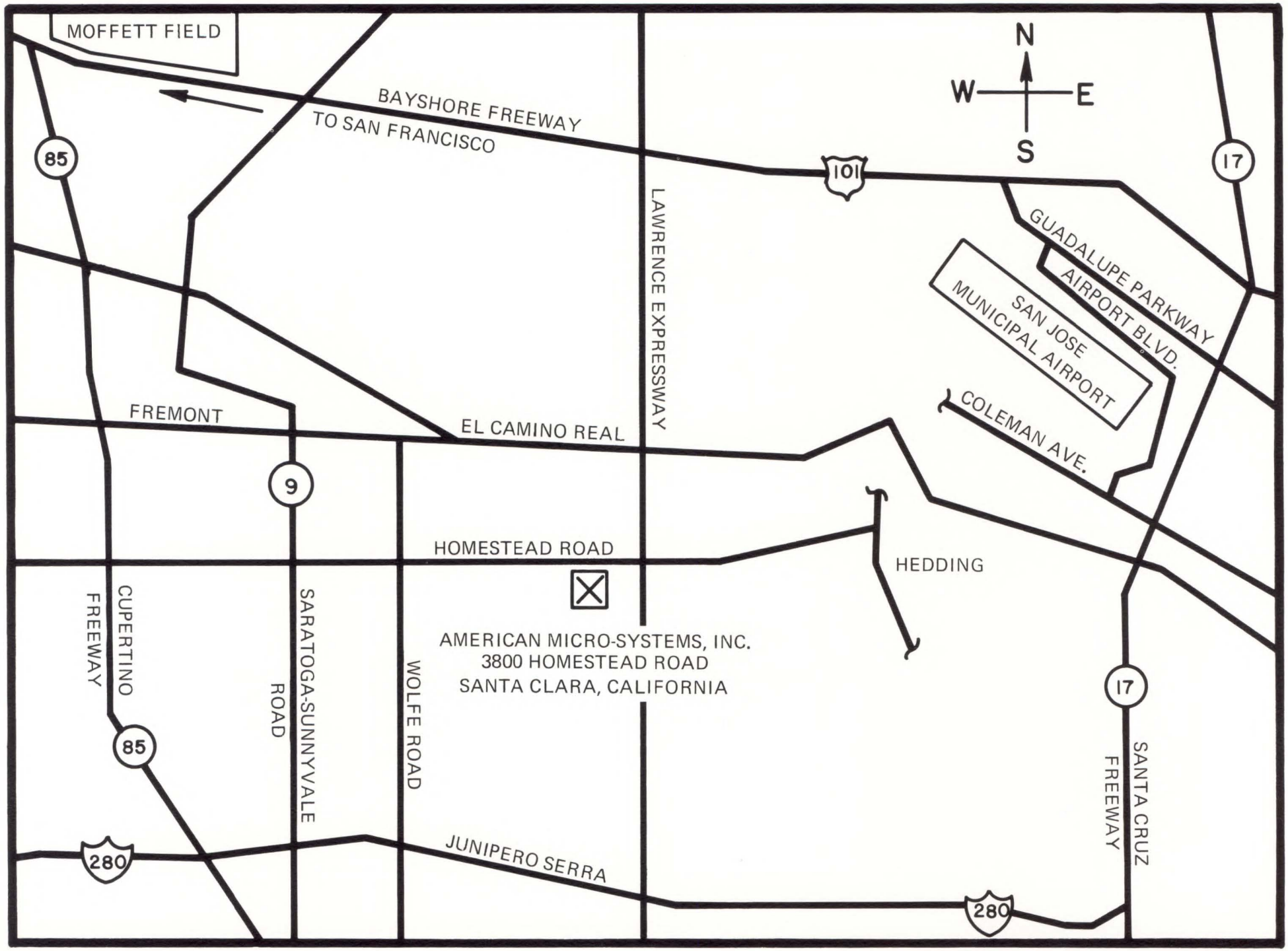
Standard products include dynamic shift registers, ultra-logic building blocks, serial to parallel converter, multiplexers and field effect transistors. The dynamic shift register family consists of single or dual versions and may be used individually or combined into longer registers. These elements feature two-phase logic for selective variation of power versus speed, zener diode gate protection and precharge buffers for driving larger capacitive loads.

The ultra-logic building block family consists of externally programmable devices which can be used individually or to expand other ultra-logic circuits. They are compatible with other AMI devices and are useful for prototyping more complex MOS circuits. Two-phase logic is employed and zener diode gate protection is provided.

The 12-bit serial to parallel converter is a useful tool for many complex systems applications and, as a complement to the ultra-logic line, it offers a register stage that will store data indefinitely when the clocks are in the proper state. This element converts serial data to 12-bit parallel output and may be used as a 12-channel commutator of a digital to analog converter ladder driver.

The multiplexer family consists of MOS devices with a wide range of applications. Each of these will switch 10 mA when the gate drive voltage is −20 V. Zener diode gate protection is featured on all inputs. These diodes are returned to the body to prevent extraneous currents in switching applications.

The field effect transistor family consists of dual matched devices and medium conductance discrete devices. Applications of the dual matched transistors include electrometer input stages, high impedance operational amplifiers, analog switches and buffer devices for digital MOS circuits. The discrete devices were designed primarily for linear wideband amplifiers and high speed switching and commutating applications.


MOFFETT FIELD
BAYSHORE FREEWAY
TO SAN FRANCISCO
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LAWRENCE EXPRESSWAY
GUADALUPE PARKWAY
AIRPORT BLVD.
SAN JOSE
MUNICIPAL AIRPORT
COLEMAN AVE.
FREMONT
EL CAMINO REAL
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SANTA CLARA, CALIFORNIA
CUPERTINO
FREEWAY
85
SARATOGA-SUNNYVALE
ROAD
WOLFE ROAD
280
JUNIPERO SERRA
280
17
SANTA CRUZ
FREEWAY

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