





# Table of Contents

	Pg.
NITRON OVERVIEW	1
CAPABILITIES AND FACILITIES	2
NITRON QUALITY ASSURANCE PROGRAM	3
FUTURE PATH	4
NITRON PRODUCT FAMILIES	5
COMMUNICATION CIRCUITS	6
NON-VOLATILE MEMORIES (NVMs)	7
DRAWING	8
CUSTOM CIRCUITS	9
DRAWING	10
NITROCHIP SEMI-CUSTOM GATE ARRAYS	11
NITROCHIP CMOS SILICON GATE	12
GENERAL PURPOSE FREQUENCY SYNTHESIZERS	13
CLOCK CIRCUITS	14
ORDERING INFORMATION	15
DOMESTIC SALES REPRESENTATIVES	16
DOMESTIC SALES REPRESENTATIVES (cont.)	17
INTERNATIONAL SALES REPRESENTATIVES	18

Revised 11/81





## Nitron Overview

Nitron is a high technology corporation involved in the design and manufacturing of largescale integrated circuits including standard, custom, and semi custom. Since its inception the company has stressed technological innovation in both manufacturing capabilities and its products.

Nitron utilizes a variety of processes including n-channel, p-channel, CMOS, and a state-of-the-art MNOS (Metal Nitride Oxide Silicon) capability to help maintain a competitive edge in its product line. The unique non-volatile memory (NVM) technology led to the introduction of Nitron's nonvolatile Electrically Alterable Read-Only Memory (EAROM). EAROMs combine the non-volatility of a ROM with the in-circuit alterability of a RAM.

The company was founded in 1972 as a captive supplier for McDonnell Douglas Corporation. Nitron became a division of that corporation in 1976, with worldwide sales of its LSI semiconductor products. In December 1977, Nitron became a wholly-owned subsidiary of Nanon Electronics, Inc. of Cupertino, California. In April 1980, Nitron and Nanon merged their respective operations and became known as Nitron Inc., operating as a privately held firm, largely employee owned.

On May 27, 1980, Nitron Inc., filed with the Securities and Exchange Commission to offer stock for sale to the public. Nitron Inc., is now a public company.



*Computer Controlled Ion Implantation Machine*

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**Nitron**

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## Capabilities and Facilities

Nitron's 50,000 square foot facility is completely integrated providing the capability to bring products from concept through development and into cost-effective manufacturing. Various facilities and assets routinely utilized at Nitron to accomplish this include computer-aided design (CAD), mask making, wafer fab, and assembly. Well-established quality and reliability assurance programs are in place for industrial, consumer and military product requirements.

Combined with offshore assembly facilities, Nitron is able to provide the customer with his high volume requirements while maintaining the responsiveness and dedication to quality that has contributed to the company's growth.

In addition to utilizing the four manufacturing processes previously discussed (n-channel, p-channel, CMOS and MNOS), Nitron is currently in the development stage of exciting new processes which

will lead to the introduction of additional unique and competitive products.

A new water purification system was installed in late 1978 and formed an integral part of Nitron's state of the art facility. Deionized water is used throughout the manufacture of semiconductor devices and unless extremely pure can degrade their reliability and performance. Nitron's excellent processing capability is augmented by a mask facility capable of producing 3, 4, and 5 inch working plates using a laser-controlled step-and-repeat camera. The company has 3- and 4-inch diffusion furnaces, ion implant equipment, and in-house prototype and military assembly, electrical test, and reliability assurance equipment.

Nitron produces custom and standard products for both military and commercial applications. The company's products, outlined in more detail on subsequent pages, represent a wide variety entailing communications, memories, and custom devices.



Portion of Nitron Wafer Fabrication Area



# Nitron Quality Assurance Program

The commitment of Nitron to Hi-Rel quality assurance standards began with the company's founding as a supplier to a major aerospace and military systems contractor. Since that time, Nitron has become a major supplier of Hi-Rel products to programs supporting all branches of military service. Our track record in this area is outstanding and our list of Hi-Rel customers is growing steadily.

Nitron's Quality Assurance standards comply with the major military specifications listed below, but is not limited to them. The company is participating in major custom programs which incorporate qualification and preconditioning testing of various part types.

## TYPICAL MILITARY SPECIFICATIONS

Quality Program System . . . . . MIL-Q-9858A  
 General Specifications for Microcircuits  
 (on a program basis) . . . . . MIL-M-38510  
 Inspection System Requirements . . . MIL-I-45208  
 Test Methods and Procedures . . . MIL-STD-883

The effect of these multiple quality assurance programs at Nitron is to provide military and commercial customers with documented, proven-quality LSI components.

## 100% ENVIRONMENTAL AND ELECTRICAL LOT SCREENING

The purpose of this screen is to assure a high level of quality and reliability within a lot of semiconductor devices. Nitron offers a wide range of Hi-Rel flow alternatives. This fact allows a user to select a Nitron standard flow or create, through the use of a drawing, a custom made screening program to exactly fit his individual needs. Nitron Product Engineering and Quality Groups often assist the user with the development of this documentation.

## QUALITY CONFORMANCE AND QUALIFICATION

Nitron maintains ongoing reliability evaluations per MIL-STD-883 Method 5005, Class B, Groups B, C, and D. Mean life evaluation data is obtained by selecting random samples of product on a periodic basis and subjecting them to operating life tests. Failure analysis is performed on all confirmed re-

jects to assure the results are pertinent and provide timely corrective action. Summary life test data accumulated on Nitron devices is available on request.

## BENEFITS OF HI-REL SCREENING

- Increased system reliability
- Reduced system down time
- Reduced in-house and field repair costs
- Reduced customer dissatisfaction
- Reduced inspection costs
- User screening programs not necessary

Group A — Group A inspection is performed on each subplot or inspection lot and consists of electrical parameter tests.

Group B — Group B inspection is performed on each inspection lot, for each package type and lead finish. Group B consists of mechanical and environmental tests.

Group C — Group C inspection is performed periodically at 3 month intervals on each generic family as a minimum. Group C consists of die-related tests.

Group D — Group D inspection is performed periodically at 6 month intervals for each package type. Group D consists of package-related tests.

## NITRON 883 SCREENING PROGRAMS

REQUIREMENT	Method 5004 CLASS S	CLASS B	Nitron Standard Flow CLASS C
1 Internal Visual (Precap)	2010A	2010B	2010B
2 Stabilization Bake	X	X	X
3 Temp. Cycle and/or Thermal Shock	X	X	X
4 Constant Acceleration	X	X	X
5 Particle Impact			
Noise Detection	X	—	—
6 Seal (Fine & Gross)	OPT	X	X
7 Serialization	X	—	—
8 Interim Electrical	X	—	—
9 Burn-In	240HR	160HR	—
10 Interim Electrical	X	—	—
11 Reverse Bias Burn-in	72HR	—	—
12 Interim Electrical	X	X	—
13 Seal (Fine & Gross)	X	—	—
14 Final Electrical	X	X	X
15 Radiographic	X	—	—
16 External Visual	X	X	X

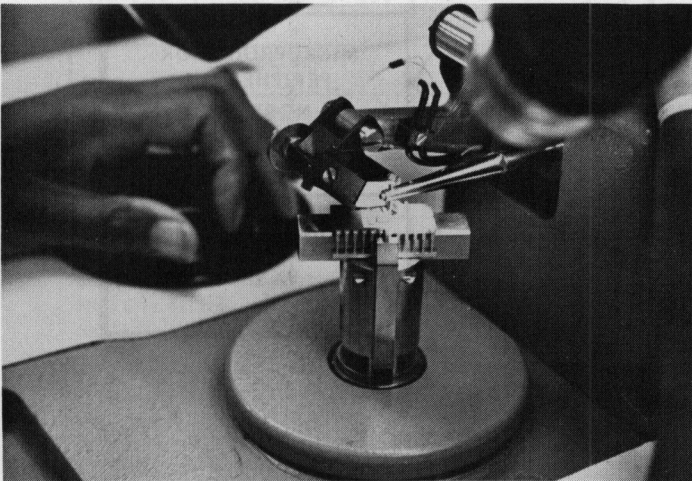
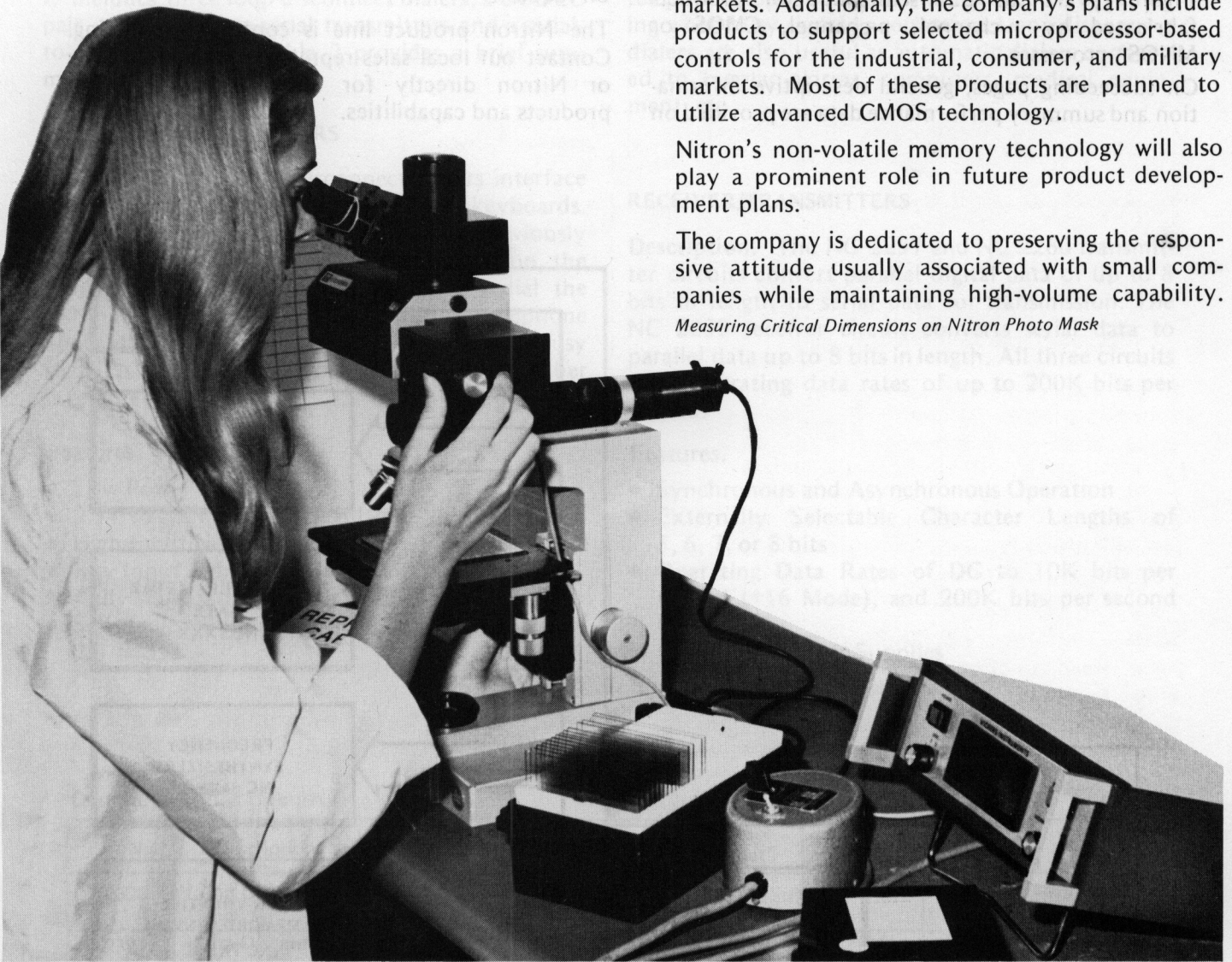
## Future Path

Nitron is committed heavily to support the worldwide OEM data, video, and telecommunications markets. Additionally, the company's plans include products to support selected microprocessor-based controls for the industrial, consumer, and military markets. Most of these products are planned to utilize advanced CMOS technology.

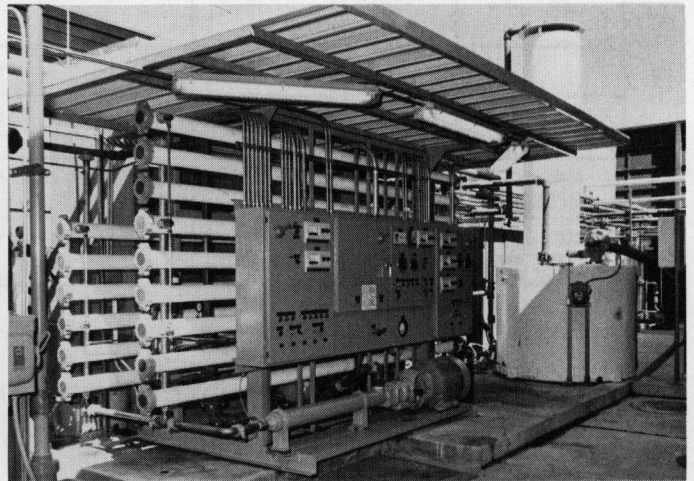
Nitron's non-volatile memory technology will also play a prominent role in future product development plans.

The company is dedicated to preserving the responsive attitude usually associated with small companies while maintaining high-volume capability.

*Measuring Critical Dimensions on Nitron Photo Mask*



*Lead Bonding - Mil 883 Devices*



*Nitron DI Water Facility*

**Nitron**

# Nitron Product Families

The eight Nitron product families illustrated in Figure 1, are all LSI semiconductor products fabricated by n-channel, p-channel, CMOS or MNOS processes.

On succeeding pages, general descriptive information and summary performance data are provided on

each family. More detailed information is available on request.

The Nitron product line is continually growing. Contact our local sales representative in your area or Nitron directly for information on future products and capabilities.

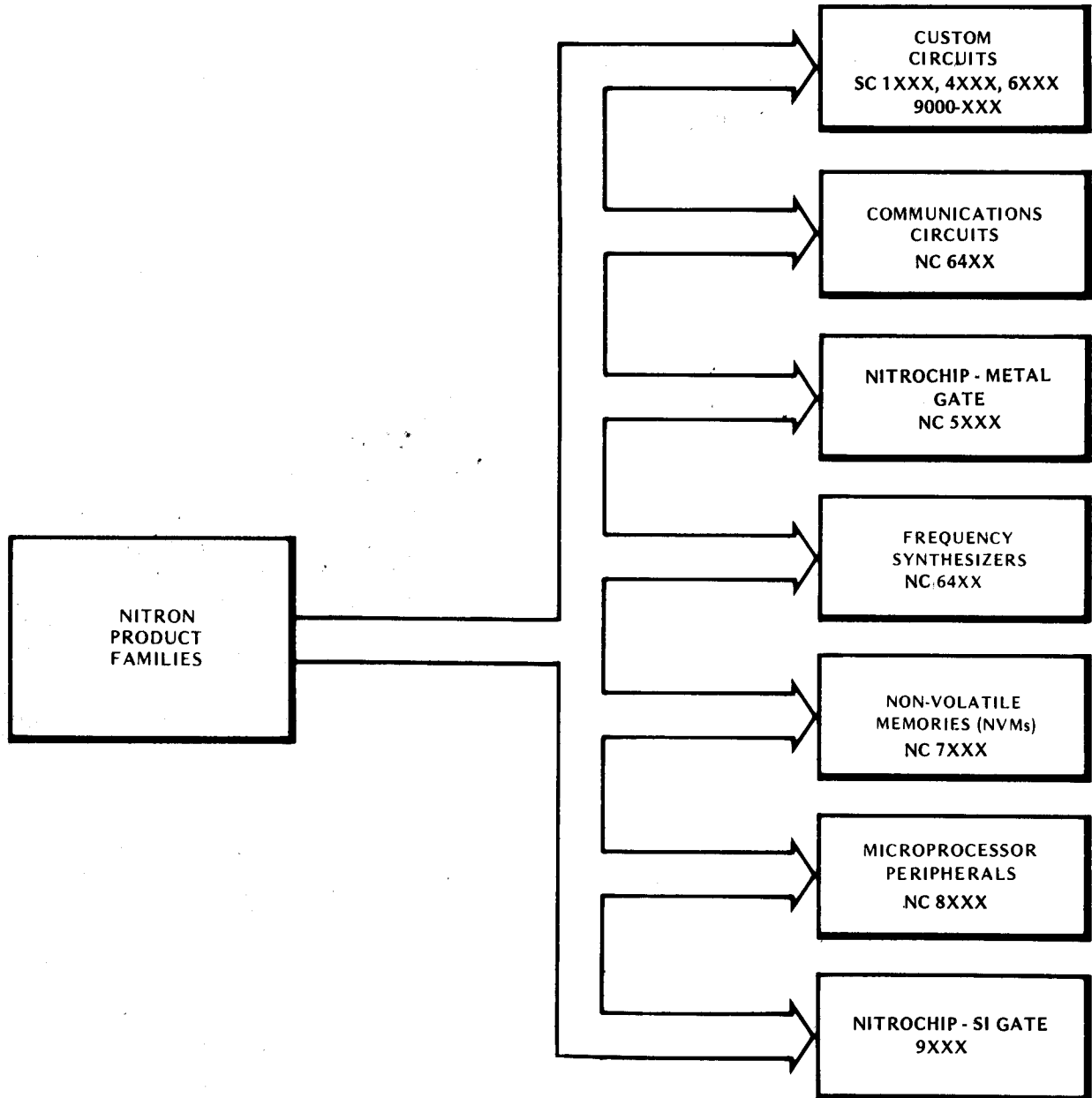


FIGURE 1. NITRON PRODUCT FAMILY

# Communication Circuits

Nitron's family of communications circuits currently includes three loop disconnect dialers, a CODEC pair, two parallel-to-serial transmitters and a serial-to-parallel receiver. Table 2 provides a brief summary of the Nitron line.

## LOOP DISCONNECT DIALERS

**Description.** The loop disconnect dialers interface directly with inexpensive touch tone keyboards. They feature automatic re-dialing of a previously stored number. By depressing a single button, the loop disconnect dialers automatically redial the last number dialed. In a conventional telephone application, this feature is employed when a busy signal is encountered. No reentry of the number is required.

### Features.

- Low Power CMOS
- 2.5V to 5.5V  $V_{DD}$  Unregulated
- High Input Noise Immunity
- Key Input Debounce Circuitry
- Fully static storage up to 20 decimal digits
- Selectable Impulsing Mark/Space Ratios of 2:1 or 3:2

**Applications.** Used in conventional pushbutton telephone applications to eliminate need for redialing when busy signal encountered. Loop disconnect dialers are also useful as automatic dialers connected to burglar alarms, computers, medical equipment, etc.

## RECEIVER/TRANSMITTERS

**Description.** The NC 2257 and NC 2260 transmitter circuits convert parallel digital data of up to 8 bits in length to serial data for transmission. The NC 2259 receiver circuit converts serial data to parallel data up to 8 bits in length. All three circuits offer operating data rates of up to 200K bits per second.

### Features.

- Synchronous and Asynchronous Operation
- Externally Selectable Character Lengths of 5, 6, 7, or 8 bits
- Operating Data Rates of DC to 10K bits per second ( $\div 16$  Mode), and 200K bits per second ( $\div 1$  Mode)
- $\pm 5V, -12V$  Power Supplies

## Communications Circuits

Part No.	Description	Application	Mask Options	Package Pins/Mat'l	Technology	Power Supply	Industry Equivalent
NC2320	Loop Disconnect Dialer	Push-Button Telephone	Note 1	18/P	CMOS	+3	Silconix DF320
NC2321	Loop Disconnect Dialer	Push-Button Telephone	M1, M2, FD, IDP, SYS CLK	28/P	CMOS	+3	DF321
NC2322	Loop Disconnect Dialer	Push-Button Telephone	Note 2	18/P	CMOS	+3	DF322
			<b>Bit Rate</b>				
NC 2257	Transmitter	Parallel to Serial	200kHz	24/C	PMOS	$\pm 5, -12$	Motorola MC2257
NC 2259	Receiver	Serial to Parallel	200kHz	28/C	PMOS	$\pm 5, -12$	Motorola MC2259
NC 2260	Transmitter	Parallel to Serial	200kHz	28/C	PMOS	$\pm 5, -12$	Motorola MC2260

NOTE 1: M1 remains at logic "1" throughout dialing sequence

NOTE 2: M2 is at logic "1" during impulsing

TABLE 2. COMMUNICATION CIRCUITS PRODUCT SELECTION TABLE



# Non-Volatile Memories (NVMs)

**Description.** Nitron's NVM product family is a unique and powerful group of circuits that combine the features of electrical alterability of memory data with non volatility. Unlike conventional RAMs and serial memories, NVMs retain memory data for very long periods of time with no power applied.

Nitron offers two major classes of circuits:

- **EAROM** (Electrically Alterable Read Only Memory) circuits, intended for occasional alterable devices, EAROMs do not have to be removed from the circuit to be erased and reprogrammed. Storage capacities of Nitron EAROM devices range from 336 to 8096 bits.
- **NV** (Non-Volatile) Counter circuits, act like ordinary IC serial counters, except they retain data after power is removed.

Nitron's NVM's are fabricated by the MNOS process, by which charges are trapped in the nitride/oxide gate layer of the device, preserving data for as long as 10 years without power.

Write operations are typically activated by a -30V pulse. Read functions are performed normally, and Erase functions are performed each time before the writing of new data, using the same -30V pulse. The reprogramming of non-volatile chips in circuit is performed by the word, serially, or by the whole chip.

Many of Nitron's non-volatile products are second-sourced, allowing customers greater confidence in the ordering and use of NVM circuits.

## Features

- Access times as short as 0.9 microsecond
- Storage capacities up to 2048 x 4.
- Data retained for as long as 10 years, un-powered or  $\geq 1$  year after  $10^5$  writes.

**Applications.** Electrically Alterable Read Only Memory devices are now being utilized in data processing, test and instrumentation, and military, industrial and consumer products.

They are found in point-of-sale terminals; electronic games; non-mechanical tuners for television, video tape and radio systems; automobile odometers; security systems for hotels and other businesses; and in-flight recorders and navigation systems in the avionics field. Other applications include storage of program and calibration constants, storage of look-up tables, and back-up storage for remote data processing systems.

**Key Parameters.** Retention, the length of time valid non-volatile data can be retained in a device, is one of the important specifications for EAROM circuits. This retention time is inverse to the number of Erase/Write cycles performed by the chip. Nitron specifications are written around worst case conditions of 100,000 Erase/Write cycles. Retention times for Nitron devices vary from one to over 10 years.

The ability of EAROM devices to withstand this great number of Erase/Write cycles is approximately 1,000 times greater than the same capabilities of most UV-erasable PROM devices.

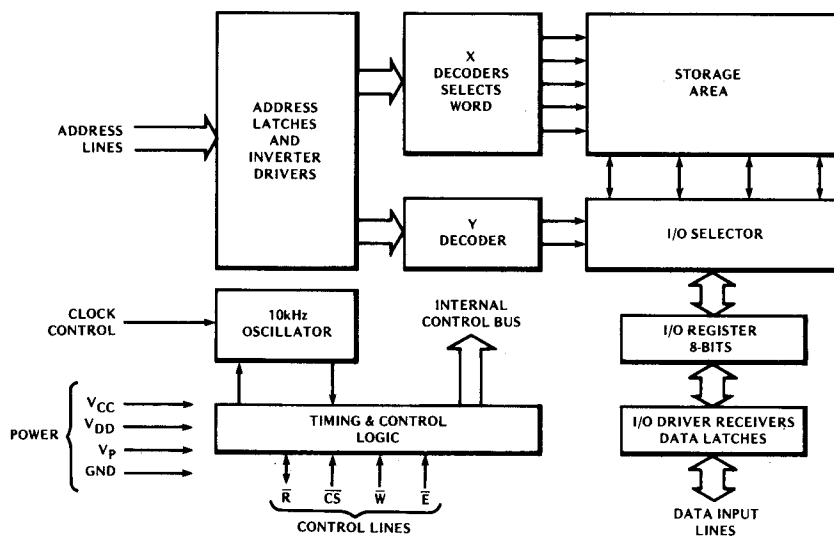


FIGURE 2. BLOCK DIAGRAM - PARALLEL ACCESS EAROM

Part No.	Organization	Read Access Time $\mu$ sec	Write Time msec	Erase Time msec	Power Supplies	Package Pins	Features	Retention Years	Industry Equivalent
NC7033	21 x 16 EAROM	5.0	6.0	450	+10,-20	8	Serial, Word Alterable	1.0 @10 <sup>5</sup> WR	NCR7033
NC7051	32 x 16 EAROM	4.0	40	40	+5,-29	28	Word Alterable MIL version	10 Unpwr	NCR2051 (GI)ER2051
NC7053	128 x 8 EAROM	3.0	1.3	120	+5,-5,-25	24	Word Alterable MIL version	1.0 @10 <sup>5</sup> WR	
NC7055	64 x 8 EAROM	4.0	40	40	+5,-29	22	Word Alterable	10 Unpwr	NCR2055 (GI)ER2055
NC7106	6 Decade Counter	--- 10 kHz ---			+5,-12	8	Serial I/O Ctr	1.0 Stby	
NC7107	6 Decade Counter	--- 10 kHz ---			+5,-12	18	Display Dr IVC Counter	1.0 Stby	
NC7108	Hour Meter	—	—	—	+5,-12	18	Display Drive Hour Meter	1.0 Stby	
NC7400	100 x 14 EAROM	20.0	24	24	-35	14	Serial, Word Alterable	10 Unpwr	NCR1400 (GI)ER1400
NC7451	1024 x 4 EAROM	0.9	1.0	10	+5,-12,-30	22	Word Alterable	10 Unpwr	NCR3400 (GI)ER3400
NC7810	2048 x 4 EAROM	1.4	10	100	+5,-14,-23	24	Chip Eraseable	10 Unpwr	NCR2810 (GI)ER2810

TABLE 1. NON-VOLATILE MEMORY PRODUCTS SELECTION TABLE

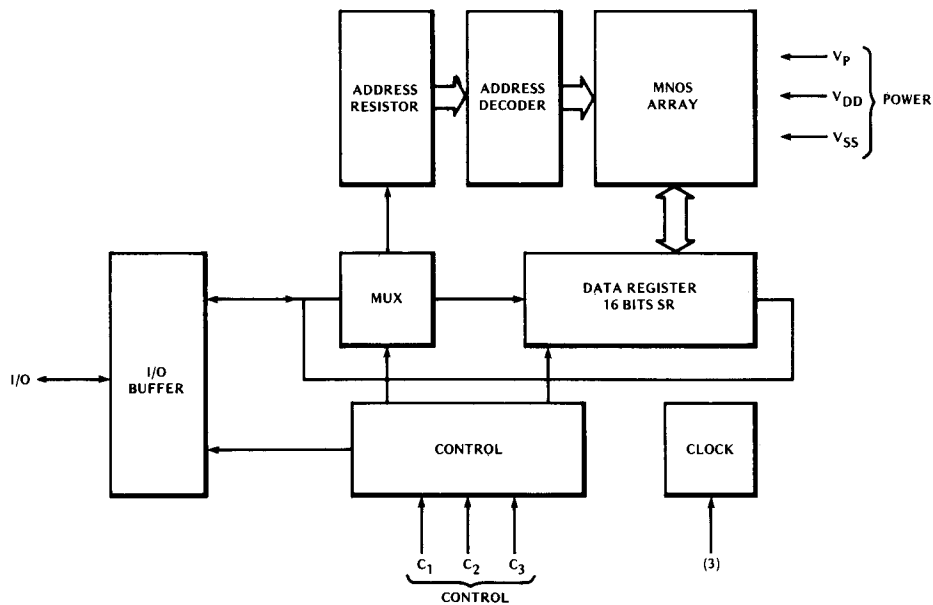


FIGURE 3. BLOCK DIAGRAM – SERIAL ACCESS EAROM

# Custom Circuits

Traditionally Nitron's business has included custom products — both commercial and military. The company's complete design, development, and production capability makes Nitron responsive to virtually any design stage - equally prepared to accept custom products designed elsewhere or to provide complete design service. We are a leader in military custom circuits.

## Customer-Supplied Tooling

For the customer who has already designed his own CMOS or PMOS circuit, Nitron can fabricate wafers or finished product. For either category, the design rules used and design objectives must be confirmed compatible with Nitron's processes. Table 7 identifies typical input information and acceptance criteria. Figure 8 lists nominal process parameters for either wafer fab or finished product.

**WAFER FAB**—Nitron can fabricate wafers for the customer who has assembly and test capability. The first step is to confirm that the required process parameters can be realized and that layout rules are acceptable. Masking inputs can be pattern generator tape, reticle, master or working plates. Masks must meet Nitron's acceptance criteria. A qualification run of 25 wafers will permit customer engineering review and refinement of process parameters for production runs. Wafers are inspected for workmanship and lot process electrical parameters.

**FINISHED PRODUCT**—Finished product requires a thorough statement of work. The process and layout requirements of wafer fab apply, but electrical test, packaging, and processing content must

also be confirmed. Nitron uses Sentry 600 testers to do wafer sort and final test. Test programs, whether Nitron or customer supplied, must be approved by Nitron's program review board for accuracy, completeness, and efficiency. The objective is to optimize performance.

New products are released in three steps designed to catch any problems early:

**STAGE I—Mask Acceptance:** Defect Density and critical dimension criteria must be met. Minor errors or flaws caught at this point will save valuable time. If pattern generator tapes are supplied, customer as well as Nitron Engineering may be involved in acceptance of masks.

**STAGE II—Qualification Run:** Once masks have been accepted, a qualification lot will be run. The process parameters are confirmed and a sample of 20-25 optically good, untested die will be assembled and sent to the customer. This permits initial hands-on exposure. The sample can be inspected at the breadboard, system or tester level depending on what resources are available. Normally if there are no design/layout errors, the customer can confirm basic functionality and parametric performance. The objective is to catch the major errors that can occasionally occur before too great an investment of engineering or materials has been made.

**STAGE III—Release to Production:** With part of the functionally good devices from the sample population returned to Nitron, the necessary test software can be debugged, wafers probed, and product assembled. Stage III is complete when Nitron Engineering releases the product to manufacturing.

ACCEPTANCE CRITERIA:	PREFERRED DESIGN PACKAGE:
<ul style="list-style-type: none"> <li>● Circuits must meet Nitron's standard design rules and process parameters.</li> <li>● Tooling must meet Nitron's minimum acceptance quality criteria and be in Nitron's standard format.</li> <li>● Circuits must be testable using Nitron's standard test procedures and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>● Pattern Generator Tape (or 10X Reticle).</li> <li>● 200X Digitized Plot.</li> <li>● Electrical Specification.</li> <li>● Bonding Diagram.</li> <li>● Logic Diagram.</li> <li>● Packaging Requirements.</li> <li>● Test Specifications (in Sentry Format) or</li> <li>● Debugged Sentry 600 Test Tape and Listing Tape.</li> <li>● Sentry Test Board and Probe Drawings.</li> </ul>

TABLE 7. CUSTOMER-SUPPLIED TOOLING

High Voltage Process Parameters				Low Voltage Process Parameters					
High Voltage	P-MOS		C-MOS		Low Voltage	P-MOS (Isoplanar)		C-MOS	
			P-Channel	N-Channel			P-Channel	N-Channel	
V <sub>DD</sub> = 12V typ. Enhancement Threshold (Extrapolated)	1.0V min.		.4V min.	.4V min.	V <sub>DD</sub> = 5V or Less Enhancement Threshold (Extrapolated)			.4V min.	.4V min.
Fld. Threshold (Extrapolated)	Depending on Implant		Depending on Implant		Fld. Threshold (Extrapolated)			4V min.	4V min.
BV <sub>dss</sub> @ 1 μa (S-D spacing 8 μmin.)	20V min.		20V min.	20V min.	BV <sub>dss</sub> @ 1μa (S-D spacing 7.5 μ min.)			8V min.	8V min.
x <sub>j</sub> (typ)	2.5 μ		2.0 u	2.0 u	x <sub>j</sub> (typ.)			2.0 u	2.0 u
Gate Oxide Capacitance	3.4x10 <sup>-4</sup> pf/μ <sup>2</sup> (max.)		3.4x10 <sup>-4</sup> pf/μ <sup>2</sup> (typ.)		Gate Oxide Capacitance			3.4x10 <sup>-4</sup> pf (typ) (typ)	
Fld. Oxide Capacitance	.225 pf/μ <sup>2</sup> (max.)		.45x10 <sup>-4</sup> pf/μ <sup>2</sup> (typ.)		Fld. Oxide Capacitance			.45x10 <sup>-4</sup> pf (typ)	

TABLE 8. CUSTOM CIRCUIT - TYPICAL PROCESS PARAMETERS

# Nitrochip Semi - Custom Gate Arrays - Metal Gate

As a result of CMOS custom circuit activity, Nitron is prepared to support semi-custom Logic Array configurations of up to 600 equivalent gates (185 gates plus 72 dedicated flip-flops). These arrays are offered in standard plastic and ceramic dual-in-line packages. Other packages are available on request. Lead count depends on array size and I/O utilization.

Nitrochip arrays are based on groups of cells of three (3) and two (2) pairs of NMOS and PMOS transistors which are connected at the metal mask level to form CMOS logic..

Nitron's full-custom IC development and production capabilities offer complete flexibility to meet changing customer needs or design problems. A complete custom IC starting from "black box" specifications can be developed or a working bread-

board prototype can be reduced to a monolithic chip. Alternately, if you have the facilities and resources to do the IC design and the layout, Nitron will provide you with the device characteristics and IC layout rules for the particular process suitable to your design.

## Nitrochip Features

- Reliable Metal Gate CMOS Technology
- Low Power Operation
- Wide Tolerance of Operation:  
TA = -55°C to +125°C  
VDD = 3 to 15 Volts
- Fast Design Cycle
- Low Development Cost
- Volume Production Capability
- Second Source Available

Part Number	Equivalent Two Input Gates	Driver Cells	Buffer Cells	Bonding Pads	Minimum Package Size	Industry Equivalent
NC5050	50	10	18	22	14 Pins	ML50
NC5100	100	14	15	32	14	ML100/MCA
NC5150	150	18	16	38	16	ML150/MCB
NC5200	200	18	22	44	16*	ML200/MCC
NC5350	350(200+32FF)	16	30	53	24	ML350/MCD
NC5500	500(450+24FF)	20	42	69	24	FE500
NC5600	600(185+72FF)	20	42	69	24	FE600

\*Orientation must be In-Line with cavity.

TABLE 5. SEMI-CUSTOM CMOS LOGIC ARRAY PRODUCTS SELECTION TABLE

# Nitrochip CMOS Silicon Gate

A second generation Nitrochip is now available using high density, high speed, CMOS Si-gate technology. Configurations from 350 to 1,500 equivalent gates are available.

As is the case with the earlier CMOS Metal Gate Nitrochip, the new Nitrochip family can readily be designed by Nitron working from a customer supplied schematic and specification.

## Nitrochip Features

- High speed, high density CMOS Si-gate processing
- 25 MHz Operation
- Metal and contact programming for added density and speed
- Symbolic layout for easier design
- Wide tolerance of operation  
VDD from 3 to 15 volts  
Temperature range from -55°C to +125°C
- Lower Power dissipation
- High Noise immunity
- Second Source available
- TTL compatible outputs

Part Number	Equivalent Two Input Gates	Number of Bonding Pads	Industry Equivalent
NC9360	360	50	Universal Semi HCM 360
NC9540	540	60	Universal Semi HCM 540
NC9720	720	68	Universal Semi HCM 720
NC9960	960	78	Universal Semi HCM 960
NC91200	1200	86	Universal Semi HCM 1200
NC91500	1500	96	Universal Semi HCM 1500

TABLE 6: NITROCHIP SI-GATE PRODUCT SELECTION TABLE



# General Purpose Frequency Synthesizers

**Description.** Nitron's general purpose frequency synthesizers generate up to 500,000 channel frequencies. These synthesizers permit highly accurate tuner frequency control with a single crystal. They provide an economical means of controlling any frequency desired up to the limits of prescaler technology.

Table 4 provides summary descriptive data for Nitron's general purpose frequency synthesizers. Figure 5 illustrates the organization of these circuits.

## Features.

- Serial Control
- Dual Modulus Synthesis
- Low Power Consumption
- Funk to 6.5 MHz at 5V
- Single Supply 5-10V operation
- Crystal Oscillator on Chip

**Applications.** General purpose frequency synthesizers are used in virtually all communications applications where control of a wide range of frequencies is required.

Part No.	Description	Application	Modulus Output	Package Pins/Mat'l	Technology	Power Supply
NC 6423	Serial Load Program PLL	Any	Logic "0" for programmed A count	18/P	C	+5

TABLE 3. GENERAL PURPOSE FREQUENCY SYNTHESIZER PRODUCT SELECTION TABLE

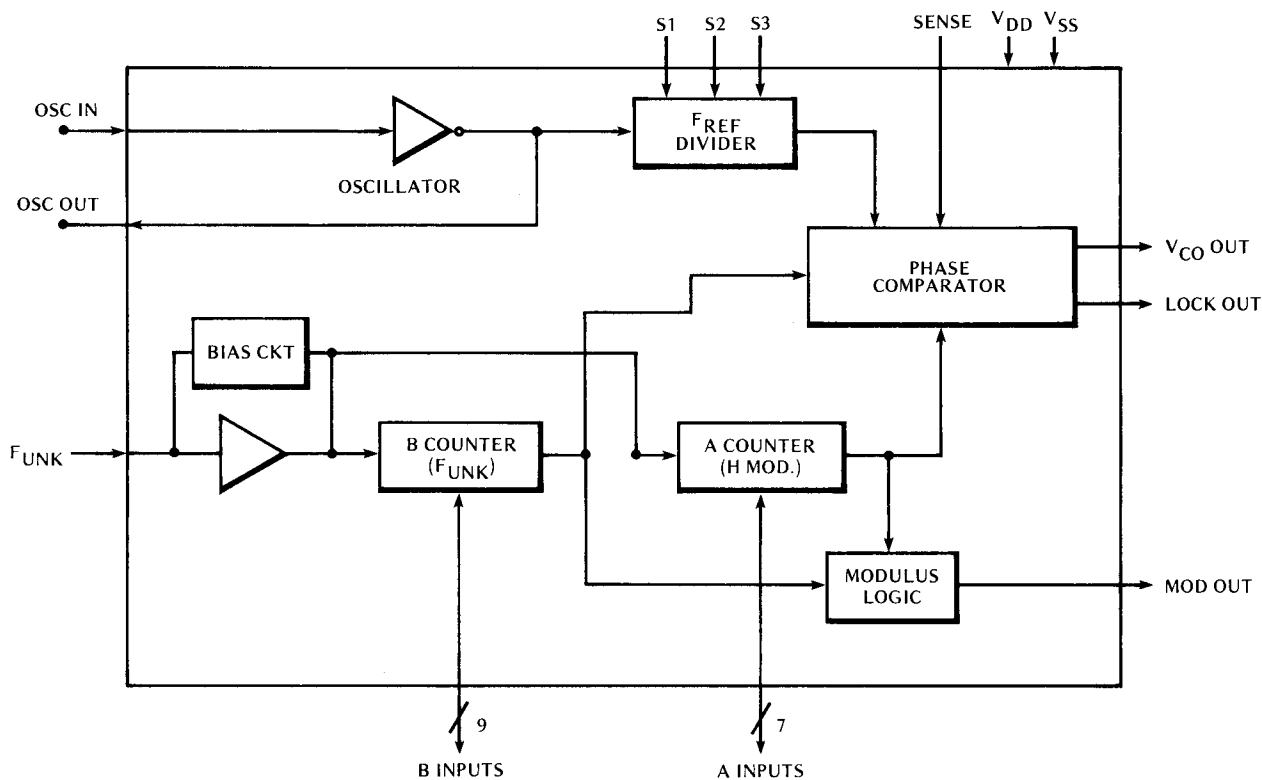


FIGURE 4. BLOCK DIAGRAM — GENERAL PURPOSE FREQUENCY SYNTHESIZER

# Clock Circuits

**Description.** Nitron is a licensed second source for the HOLT 8000 REAL TIME CLOCK CIRCUIT which has been designed for utilization within microprocessor systems for time keeping functions.

The Nitron NC8000 microprocessor bus oriented REAL TIME CLOCK features a maximum count of 128 years and a maximum resolution of 15.3 microseconds. The clock has three programmable prescalers, four buffered clock outputs and an alarm interrupt. In addition, the REAL TIME CLOCK has automatic leap year compensation and operates in a twelve hour mode with AM/PM indicators in a 24 hour mode. Mode selection is under software control. All clock registers count in a binary mode. The NC8000 interfaces easily with microprocessor systems that use multiplexed address/data bus'es like the MC14685, MC6801, MC8085, MC8048, and MC8086 and is especially well suited in applications where standby power and battery backup are of concern.

## Features.

- Multiplexed Bus compatible with MC146805, MC6801, MC6805, & Intel 8086.
- Counts seconds, minutes, hours, day of week, date, months, and years.
- Maximum count is 128 years with 15.3  $\mu$ s resolution.
- On Chip Oscillator
- 3 Microprocessor Clock Drivers
- 1 Hz output
- Low Power Battery Standby
- 16 Bit Clock, Independent Timer Counter with On-Chip Oscillator, Interrupt and Square Wave Output.
- 12/24 Hour Mode
- Leap Year Compensation
- Programmable Prescaler to 1 Hz (21 bits)

Part Number	Description	Application	Package Pins	Technology	Power Supply	Industry Equivalent
NC8000	Microprocessor Real-Time Clock	Clock/Timer/ Alarm/Calendar/ Stop watch/ Event Counter	28	CMOS	+5V	HI-8000

TABLE 4. CLOCK CIRCUIT PRODUCT SELECTION TABLE

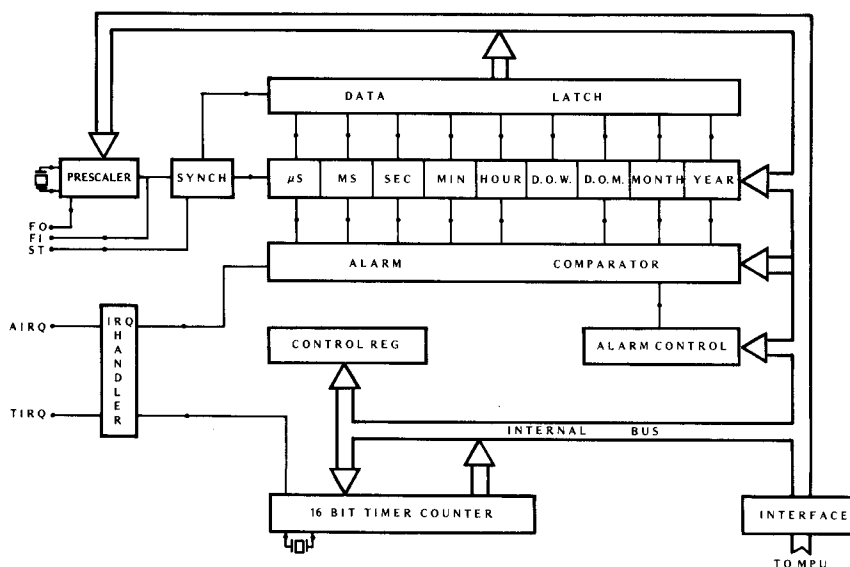


FIGURE 5. BLOCK DIAGRAM - REAL TIME CLOCK

# Ordering Information

All orders should be placed directly with the factory.

Orders can be placed by phone or TWX, but should be followed up by a formal purchase order. Orders however placed **MUST** contain all of the information below. (Items that are not applicable must be entered N/A.)

## TWX/TELEX ORDER ENTRY FORMAT

1. CUSTOMER NAME
2. COMPLETE SHIPPING AND BILLING ADDRESSES
3. PURCHASE ORDER NUMBER
4. REQUESTED ROUTING
5. GOVERNMENT CONTRACT NUMBER AND PRIORITY RATING
6. NITRON CATALOG PART NUMBER
7. QUANTITY ORDERED AND PRICE
8. CUSTOMER PART NUMBER OR MARKING REQUIRED
9. REQUESTED DELIVERY DATES
10. BUYER'S NAME AND TELEPHONE NUMBER
11. SPECIAL INSTRUCTIONS:
  - a. Certificate of Compliance
  - b. Insurance Required
  - c. Taxable
  - d. Source Inspection Required

Our normal credit terms are net 30, pending credit approval.

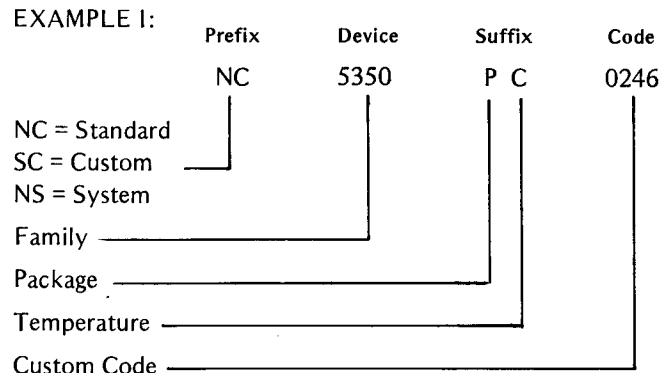
California orders will be charged applicable sales tax unless resale certificate is received.

Our minimum order is \$100, even though the customer may be ordering evaluation samples.

Nitron's Standard Terms of Sale shall be observed.

## DEVICE MARKING — Standard Products

The following marking system has been chosen for all Nitron products.



## EXAMPLE II:

NC6405PC-0246 YYWW LLLLLL
------------------------------

YYWW = Last 2 digits of year and week manufactured, e.g., 7818

LLLLLL = 6-digit lot code

## STANDARD PRODUCT FAMILIES

2XXX	Communications
64XX	Frequency Synthesizers
7XXX	MNOS Memories
8XXX	Microprocessor Peripherals

## TEMPERATURE SUFFIXES

C = Commercial	0°C to +70°C
T = Telecom/Auto	-40°C to +85°C
M = Military	-55°C to +125°C

## PACKAGE SUFFIXES

D = Cer-Dip (Glass/Glass) Hermetic
F = Flat Pack
L = Ceramic (Glass/Metal) Hermetic
P = Plastic (Epoxy B)
T = TO-5 Type Metal Can
W = Wafers/Probed and Inked
X = Die in Waffle Carriers

## CODE SUFFIXES

B = Meets Mil-Std-883B Screens
XXXX = ROM Specific Mask Set

## SHIPPING INFORMATION

Unless instructed otherwise at time of order placement the following shipping instructions will be followed:

- **DOMESTIC:**  
UPS Blue where available, otherwise Federal Express. UPS shipments will be prepaid and billed on the invoice. All Federal Express and air freight shipments will be sent collect.
- **INTERNATIONAL:**  
Less than \$500 . . . . . Air parcel post, prepaid and billed  
More than \$500. . . . . Air freight — collect  
Insurance to be provided by buyer. All shipments are F.O.B. factory.

# Domestic Sales Office

**HEADQUARTERS &  
WESTERN REGION**  
NITRON, INC.  
10420 Bubba Road  
Cupertino, CA 95014  
TEL: (408) 255-7550  
TWX: 910-338-0220

## Domestic Sales Representatives

**ARIZONA**  
SHEFLER-KAHN  
2017 North Seventh Street  
Phoenix, AZ 85006  
TEL: (602) 257-9015  
TWX: 910-951-0659

**ARKANSAS**  
DELTA COMPONENTS  
2520 Electronic Lane  
Suite 807  
Dallas, TX 75220  
TEL: (214) 358-4288  
TWX: 910-861-4248

**NORTHERN CALIFORNIA**  
PACIFIC ELECTRONICS  
548 Division Street  
Campbell, CA 95008  
TEL: (408) 866-0203 or 0204  
TLX: 172760

**SOUTHERN CALIFORNIA**  
RELCOM, INC.  
20335 Ventura Blvd.  
Suite 203  
Woodland Hills, CA 91365  
TEL: (213) 340-9143  
TWX: 910-494-4961

**SAN DIEGO COUNTY**  
LITTLEFIELD & SMITH  
ASSOC.  
11772 Sorrento Valley Road  
Suite 235  
San Diego, CA 92121  
TEL: (714) 455-0055  
TWX: 910-322-1730

**COLORADO**  
COMPONENT SALES, INC.  
5925 East Evans Avenue  
Suite 204B  
Denver, CO 80222  
TEL: (303) 759-1666  
TWX: 910-931-2644

**CONNECTICUT**  
DATCOM, INC.  
1 Evergreen Avenue  
Hamden, CT 06518  
TEL: (203) 288-7005  
TWX: 92-3462

**DELAWARE**  
JADE ELECTRONICS  
ASSOC., INC.  
Hollow Road  
Birchrunville, PA 19421  
TEL: (215) 296-3800

**FLORIDA**  
LAWRENCE ASSOCIATES,  
INC.  
711 Turnbull Avenue  
Altamonte Springs, FL 32751  
TEL: (305) 339-2828  
TWX: 810-853-0260

**Branch Office**  
1932 Drew Street  
Clearwater, FL 33515  
TEL: (813) 443-2698

**Branch Office**  
2200 N. Federal Highway  
Suite 223  
Boca Raton, FL 33432  
TEL: (505) 368-7373

**Branch Office**  
5435 Balsam Avenue  
Melbourne, FL 32901  
TEL: (305) 724-8294

**GEORGIA**  
DIMARK  
1128 Tusculum Blvd.,  
Suite C  
Greenville, TN 37743  
TEL: (615) 639-0113

**IDAHO**  
COMPONENT SALES  
2520 South State Street  
Salt Lake City, UT 84115  
TEL: (801) 466-8623  
TWX: 910-925-4073

**ILLINOIS**  
(Northern)  
HEARTLAND TECHNICAL  
MARKETING  
5105 Tollview Drive  
Suite 212  
Rolling Meadows, IL 60008  
TEL: (312) 577-9222

(Southern)  
DYTRONIX, INC.  
(Branch Office)  
13700 East 42nd Terrace  
Suite 202  
Interstate Plaza Building  
Independence, MO 64055  
TEL: (816) 373-6600  
TWX: 92-3462

**INDIANA**  
(Southern)  
Corporate Headquarters  
INSUL-REPS, INC.  
8606 Allisonville Road  
Suite 103  
Indianapolis, IN 46250  
TEL: (317) 842-5203

**IOWA**  
DYTRONIX, INC.  
23 Twixt Town Road  
Suite 201  
Cedar Rapids, IA 52402  
TEL: (319) 377-8275  
TWX: 910-525-1337

**KANSAS**  
DYTRONIX, INC.  
23 Twixt Town Road  
Suite 201  
Cedar Rapids, IA 52402  
TEL: (319) 377-8275  
TWX: 910-525-1337

**KENTUCKY**  
INSUL-REPS, INC.  
8606 Allisonville Road  
Suite 103  
Indianapolis, IN 46250  
TEL: (317) 842-5203

**LOUISIANA**  
DELTA COMPONENTS  
2520 Electronic Lane  
Suite 307  
Dallas, TX 75220  
TEL: (214) 358-4288  
TWX: 910-861-4248

**MAINE**  
DATCOM, INC.  
27 Spruce Street  
Waltham, MA 02154  
TEL: (617) 891-4600  
TLX: 92-3462

**MARYLAND**  
BURGIN-KREH  
7000 Security Blvd.  
Suite 330  
Baltimore, MD 21207  
TEL: (301) 265-8500  
TWX: 710-862-1450

**MASSACHUSETTS**  
DATCOM, INC.  
27 Spruce Street  
Waltham, MA 02154  
TEL: (617) 891-4600  
TLX: 92-3462

**MICHIGAN**  
GREINER ASSOCIATES  
15324 East Jefferson Avenue  
Grosse Pointe Park, MI 48230  
TEL: (313) 499-0188, 9  
TWX: 810-221-5157

**MINNESOTA**  
S & R COMPONENT SALES  
3030 Harbor Lane  
Minneapolis, MN 55441  
TEL: (612) 559-3090  
TWX: 910-576-3471

**MISSOURI**  
DYTRONIX, INC.  
11190 Natural Bridge  
Bridgeton, MO 63044  
TEL: (314) 731-5799  
TWX: 910-762-0651

**Branch Office**  
DYTRONIX, INC.  
13700 E. 42nd Terrace  
Suite 202  
Interstate Plaza Building  
Independence, MO 64055  
TEL: (816) 373-6600

**NEW JERSEY**  
(Northern)  
LRC ASSOCIATES  
209 Route 9W  
Congers, NY 10920  
TEL: (914) 268-4435  
TWX: 710-577-2680

(Southern)  
JADE ELECTRONICS  
ASSOC., INC.  
Hollow Road  
Birchrunville, PA 19421  
TEL: (215) 296-3800

**NEBRASKA**  
DYTRONIX, INC.  
11190 Natural Bridge  
Bridgeton, MO 63044  
TEL: (314) 731-5799  
TWX: 910-762-0651

**NEVADA**  
Clark County  
RELCOM, INC.  
20335 Ventura Blvd.  
Suite 203  
Woodland Hills, CA 91365  
TEL: (213) 340-9143  
TWX: 910-494-4961

**Reno**  
PACIFIC ELECTRONICS  
548 Division Street  
Campbell, CA 95008  
TEL: (408) 866-0203 or 0204  
TLX: 172760

**NEW HAMPSHIRE**  
DATCOM, INC.  
1 Evergreen Avenue  
Hamden, CT 06518  
TEL: (203) 288-7005  
TLX: 92-3462

**NEW MEXICO**  
SHEFLER-KAHN  
10200 Menaul, N.E.  
Albuquerque, NM 87112  
TEL: (505) 296-0749

**NEW YORK**  
**(Metropolitan)**  
LRC ASSOCIATES  
209 Route 9W  
Congers, NY 10920  
TEL: (914) 268-4435  
TWX: 710-577-2680

**(Upstate)**  
OSSMAN COMPONENT  
SALES CORP.  
280 Metro Park  
Rochester, NY 14623  
TEL: (716) 424-4460  
TWX: 510-253-7584

**Branch Office**  
1540 Pickard Building  
Syracuse, NY 13211  
TEL: (315) 455-6611

**OHIO**  
CREST COMPONENT SALES  
8505 Tanglewood Square  
Chargin Falls, OH 44022  
TEL: (216) 543-9808  
TLX: 980232 (MARTASSOC,  
BADG)

**OKLAHOMA**  
DELTA COMPONENTS  
2520 Electronic Lane  
Suite 307  
Dallas, TX 75220  
TEL: (214) 358-4288  
TWX: 910-861-4248

**OREGON**  
ES/CHASE COMPANY, INC.  
4095 S.W. 144th  
Beaverton, OR 97005  
TEL: (503) 641-4111

**PENNSYLVANIA**  
**(East)**  
JADE ELECTRONICS  
ASSOC., INC.  
Hollow Road  
Burchrunville, PA 19421  
TEL: (215) 296-3800

**(West)**  
CREST COMPONENT  
SALES  
8505 Tanglewood Square  
Chargin Falls, OH 44022  
TEL: (216) 543-9808  
TLX: 980232  
(MARTASSOC, BADG)

**RHODE ISLAND**  
DATCOM, INC.  
1 Evergreen Avenue  
Hamden, CT 06518  
TEL: (203) 288-7005  
TWX: 92-3462

**SOUTH DAKOTA**  
S & R COMPONENT SALES  
3030 Harbor Lane  
Minneapolis, MN 55441  
TEL: (612) 559-3090  
TWX: 910-576-3471

**TENNESSEE**  
INSUL-REPS, INC.  
9047 Executive Park Drive  
Suite 219  
Knoxville, TN 37923  
TWX: (615) 356-6238

**TEXAS**  
DELTA COMPONENTS  
2520 Electronic Lane  
Suite 307  
Dallas, TX 75220  
TEL: (214) 358-4288  
TWX: 910-861-4248

**Branch Office**  
6006 Bellaire Blvd.  
Suite 118  
Houston, TX 77081  
TEL: (713) 664-6777

**Branch Office**  
La Promenade Center  
7113 Burnett Road  
Suite 217  
Austin, TX 78757  
TEL: (512) 458-4288

**UTAH**  
COMPONENT SALES, INC.  
2520 South State Street  
Salt Lake City, UT 84115  
TEL: (801) 466-8623  
TWX: 910-925-4073

**VERMONT**  
DATCOM, INC.  
27 Spruce Street  
Waltham, MA 02154  
TEL: (617) 891-4600  
TLX: 92-3462

**WASHINGTON**  
ES/CHASE COMPANY,  
INC.  
2101-112th Street, N.E.  
#110  
P.O. Box 3565  
Bellevue, WA 98009  
TEL: (206) 453-0765  
TWX: 910-444-2298

**CANADA**  
MUNRO ELECTRONIC  
COMPONENTS  
2244 Drew Road Unit 5  
Mississauga, Ontario  
Canada L5S LB1  
TEL: (416) 676-1042  
TWX: 610-492-8970

**Branch Office**  
11 Crofters Grove  
Torwood Estates  
Dunrobin, Ontario  
TEL: (613) 832-1640

**Branch Office**  
599 Tarlson Dr.  
Port Moody, EH481  
TEL: (604) 461-9205  
TWX: 610-492-8970

# International Sales Office

## UNITED KINGDOM

Robin Reynolds  
Timbers Park Drive  
Ashtead Park  
Ashtead, Surrey, U.K. KT21 1JB  
TEL: Ashtead (03722) 72741  
TLX: 851-928680 (RINJON)

# International Sales Representatives

## AUSTRALIA

T-MAC ELECTRONICS  
51 Scott Street  
Punchbowl 2196 NSW  
Australia  
TLX: AA24755 (CIDEPOT)  
TWX: 790-24964 (SEFEX)

## AUSTRIA

BURISCH GMBH U.CO KG  
Scheydgasse 31  
A-1210 Vienna  
Austria  
TEL: 0222 (wien) 387638  
TWX: 847-132655

## BENELUX-NETHERLANDS

**BELGIUM, LUXEMBOURG**  
FAMATRA BENELUX  
P.O. Box 721  
4803 AS Breda, Netherlands  
TEL: 076-222660  
TWX: 844-54521 or  
610-4928970

## DENMARK

ADVANCED ELECTRONIC  
55, Mariendalsvej  
DK-2000  
Copenhagen F  
Denmark  
TEL: 45-1-194433  
TWX: 855-22431 (ADVEL DK)

## ENGLAND

PETER GRAY ELECTRONICS, LTD.  
21/23 Station Road  
Henley on Thames  
Oxfordshire, England  
TEL: Henley 6543  
TWX: 857-1224-1 (SWI SF)

## FINLAND

SW INSTRUMENTS  
Karstulantie 4A  
SF-0055-Helsinki 55  
Finland  
TEL: (90) 738265  
TWX: 857-1244-1

## FRANCE

REA RADIO EQUIPMENT ANTARES  
Boite Post 5, 92301  
Levallois-Perret  
France  
TEL: 01-7851111  
TWX: 842-620630

## GERMANY

INFRATRON GMBH  
Postfach 650173  
2000 Hamburg 56  
Sandmoorweg 22  
West Germany  
TEL: 040/817578  
TWX: 841-213531

## ISRAEL

EIM INTERNATIONAL  
ELECTRONICS  
10, Oded Street  
Tel-Aviv 67198 Israel  
TEL: (03) 761423, 767251  
TWX: 342362 EIM IL

## Branch Office

380 Wyandanch Avenue  
North Babylon  
New York, NY 11704  
TEL: (516) 643-5700  
TWX: (510) 227-1063

## ITALY

COMPREL, SRL  
Viale Romanga, 1  
20092 Cinisello Balsamo (Milano)  
Italy  
TEL: 02 6120641, 42, 43, 44, 45  
TWX: 843-332484 (COMPREL 1)

## JAPAN

JEPICO CORPORATION  
Shinjuku Dai-ichi Seimi Building  
P.O. Box 5016  
Nishi-Shinjuku 2-7-1  
Shinjuku, Tokyo 160  
Japan  
TEL: Tokyo (03) 348-0611  
TWX: 781-2323167 (JEPICO J)

## KOREA

DUKSUNG TRADING CO.  
Room 301 Hiniwan Bldg.  
507-30 Sinrim 4 Dong  
7 Wanak-Ku  
Seoul, Korea  
TEL: 854-5831  
TWX: 787-23459 (DUKSUNG)

## LATIN AMERICA

INTECTRA  
2629 Terminal Blvd.  
Mountain View, CA 94943  
TEL: (415) 967-8818  
TWX: 345545 (INTECTRA MNTV)

## NORWAY

A/S KJELL BAKKE  
Nygata 48  
P.O. Box 143  
N-2011 Strommen  
Norway  
TEL: 02-71 18 72  
TWX: 856-19407 (BATEK N)

## SOUTH AFRICA

DESATRON (PTY) LTD.  
58-68 Rosetten Ville Road  
Newcentre, Johannesburg  
South Africa  
TEL: 836-3851 (INT 2711) 2011  
836-5351  
TWX: 960-80080  
960-83659

## SPAIN

INTERFACE S.A.  
Ronda San Pedro 22, 3.0  
Barcelona 10  
Spain  
TEL: 93-301 78 51  
TWX: 831-51508

## SWEDEN

SVENSK TELEINDUSTRIE  
Box 5024  
S-162-05  
Vallingby, Sweden  
TEL: 08-890435  
TWX: 853-13033

## SWITZERLAND

ELLYPTIC AG  
Fellenbergstrasse 281/283  
Ch-8047 Zuerich  
Switzerland  
TEL: 01-541100  
TWX: 845-56835 (ELLYP CH)

## TAIWAN

GALAXY FAR EAST CORP.  
Room No. 4 (Second Floor)  
No. 312 Section 4  
Chung Hsaio East Road  
P.O. Box 36-12  
Taipei  
Taiwan, ROC  
TEL: (02) 7811895-7  
TWX: 785-26110 (GALAXYER)

# Domestic Distribution

## ALABAMA

WORLD DISTRIBUTORS, INC.  
2913 Governors Drive  
Huntsville, AL 28505  
TEL: (205) 533-9108

## ARIZONA

WESTERN MICROTECHNOLOGY  
7740 East Redfield Road #105  
Scottsdale, AZ 85260  
TEL: (602) 948-4240

## CALIFORNIA

WESTERN MICROTECHNOLOGY  
10040 Bubb Road  
Cupertino, CA 95014  
TEL: (408) 725-1660

## COLORADO

ACT-ROCKY MOUNTAIN  
2640 Youngfield Road  
Lakewood, CO 80215  
TEL: (303) 233-4431

## ILLINOIS

REPTRON ELECTRONICS, INC.  
2200 Higgins Road  
Hoffman Estates, IL 60195  
TEL: (312) 882-0900

## MARYLAND

MS ELECTRONICS  
322 North Stonestreet Avenue  
Rockville, MD 20850  
TEL: (301) 340-6400

## MICHIGAN

(Detroit/Main Office)  
REPTRON/MICHIGAN  
34403 Glendale Avenue  
Livonia, MI 48150  
TEL: (313) 525-2700

## NEW YORK

ACI ELECTRONICS  
200 Newtown Road  
Plainview, NY 11803  
TEL: (516) 293-6630  
TWX: 510-224-6550

## OHIO

REPTRON/OHIO  
830 Bush Court  
Columbus, OH 43229  
TEL: (614) 436-6675

## PENNSYLVANIA

SHAP ELECTRONICS  
421 Pike Road  
Huntingdon Valley, PA 19006  
TEL: (215) 322-7150





