

CONTROL DATA
CORPORATION

5100

Computer
System

5100

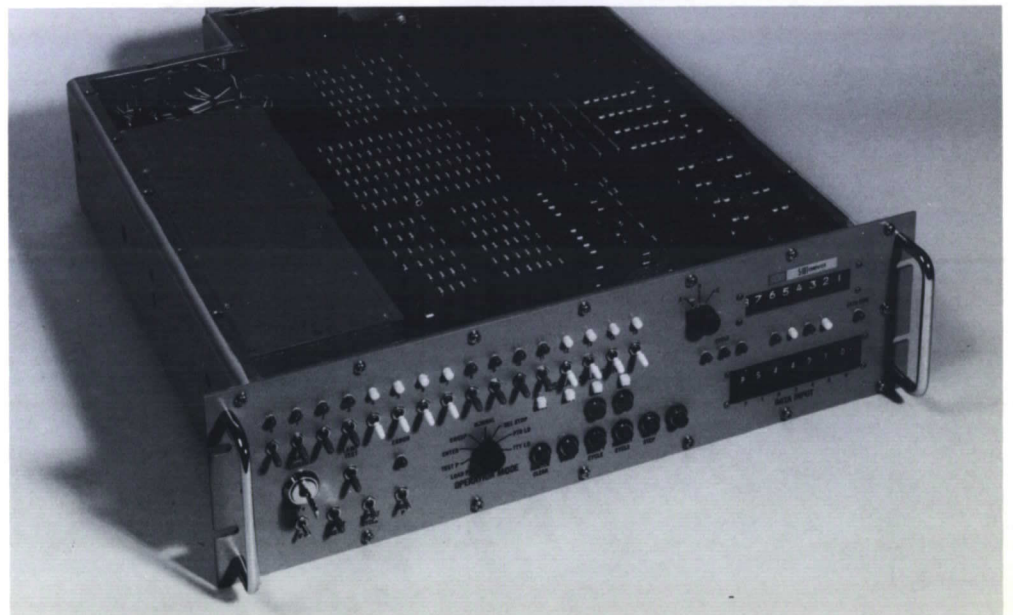
Computer System

Cover: Enlargement of a 5100 core memory plane showing core attachment to board with bonding material.

A logic card being removed from the 5100 panel-mount model using a card extractor.



Memory loader/maintenance console is used with both rack-mount and panel-mount models.



CDC 5100 rack-mount configuration.

The 5100 rack-mount model in computer cabinet.



CONTROL DATA® 5100 Computer System

Control Data has consistently produced quality computer systems for our nation's major defense programs. Under the direction of our Space and Defense Systems group, Control Data has installed fire control systems for the Phoenix, Polaris, and Poseidon programs, radar warning and homing systems, tactical air command and control systems, and monitoring systems for the Apollo spacecraft.

The systems designed for these programs have met the exacting quality, environmental, and reliability requirements of military specifications. Based on this background of successful military system design, Control Data has developed a highly-compact, general-purpose computer for governmental and commercial use. The CDC® 5100 is versatile enough for a wide range of applications, and flexible enough to be readily modified for each user's specific needs.

The 5100 meets the need for a low-cost system arising from the military economic climate of the 70's. It also matches the special reliability needs of commercial users. Designed especially for extreme environments, 5100 systems operate efficiently under the widely varying conditions that standard commercial computers could not withstand.

Typical applications of the 5100 include:

- High-accuracy navigation systems
- Data acquisition systems
- Control systems
- Message switching
- Programmable displays
- Process control
- Electronic warfare

Unique Features

The 5100 is designed and constructed to operate in MIL-E-16400 Class 4 environments. All electronic circuits are contained in either ceramic or metal glass-sealed packages. All parts, including plug-in modules, are treated or coated to protect them from corrosive atmosphere. The memory core stack, for example, uses wide-temperature range lithium ferrite cores which are solidly affixed to panels and film-coated to protect them from shock, vibration, and the atmosphere. Easily replaceable pluggable modules and a high MTBF suit the 5100 ideally to remote locations where the availability and quality of maintenance is limited.

Although high reliability greatly reduces the need for maintenance, Control Data has developed special techniques for any maintenance that may be necessary. With these techniques, personnel who have had minimal training in computer technology can repair 90% of all failures on the 5100.

Memory Orientation

The 5100 is designed with four basic computer register files in memory. This

yields a simple design with few parts, making for high reliability, ease of training and maintenance, and low cost.

The random access, coincident-current core memory, available in 4,096 or 8,192 word capacities, is characterized by a pluggable stack and power protection system.

Double Addressing Capability

The 5100's double addressing capability, a feature usually associated with larger-scale computers, provides efficient use of program memory and efficient throughput. For example, during a single instruction the 5100 can add the contents of two memory locations together and store the results away in memory.

Register File Architecture

Four 32-word, memory-located file registers provide fast, efficient inter-file operations and real-time clock capabilities. Each file is associated with a different program state: normal, (no interrupt active) interrupt 1, interrupt 2, and I/O select codes. These interrupt levels have corresponding sets of accumulators and control registers. Each program state has its own area in the register for fast interrupt response. Such assignment suits the 5100 excellently for processing external interrupts and permitting a powerful instruction repertoire.

The 5100 interfaces with standard 1700 Series peripherals.



Input/Output Flexibility

The 5100 can communicate with a variety of input/output devices through a general-purpose 16-bit I/O channel. This channel is adaptable to the customer's special system requirements. A 1700 interface provides communication with the full range of CONTROL DATA® 1700 Series peripherals. Standard peripherals include a memory loader/maintenance console, a stand-alone paper-tape reader, an ASR Teletypewriter, and a satellite navigation receiver.

Customer System Development Support

Control Data Corporation maintains a staff of specialists who use sophisticated management analysis and operations analysis techniques to help customers determine the best hardware and software for solving a given type of problem. These specialists will, on a consulting basis, help determine the exact needs of a particular system. If necessary, Control Data will take full responsibility for development and delivery of special hardware or software — tailored to meet customer specifications.

The highly-trained Control Data Field Service staff also provides such service as maintenance and technical support at the customer's site if required. Training courses in maintenance and programming are also available to the customer.

System Expansion Options

To meet new requirements, Control Data provides options through which the 5100 can be easily and economically modified or expanded. Several variations of the basic 5100 configuration are offered. For example, the external interrupt levels can be expanded by the addition of interrupt registers to the system input/output. Central memory is expandable to 65,536 words with the addition of a memory expansion interface.

Other pre-wired internal expansion options include:

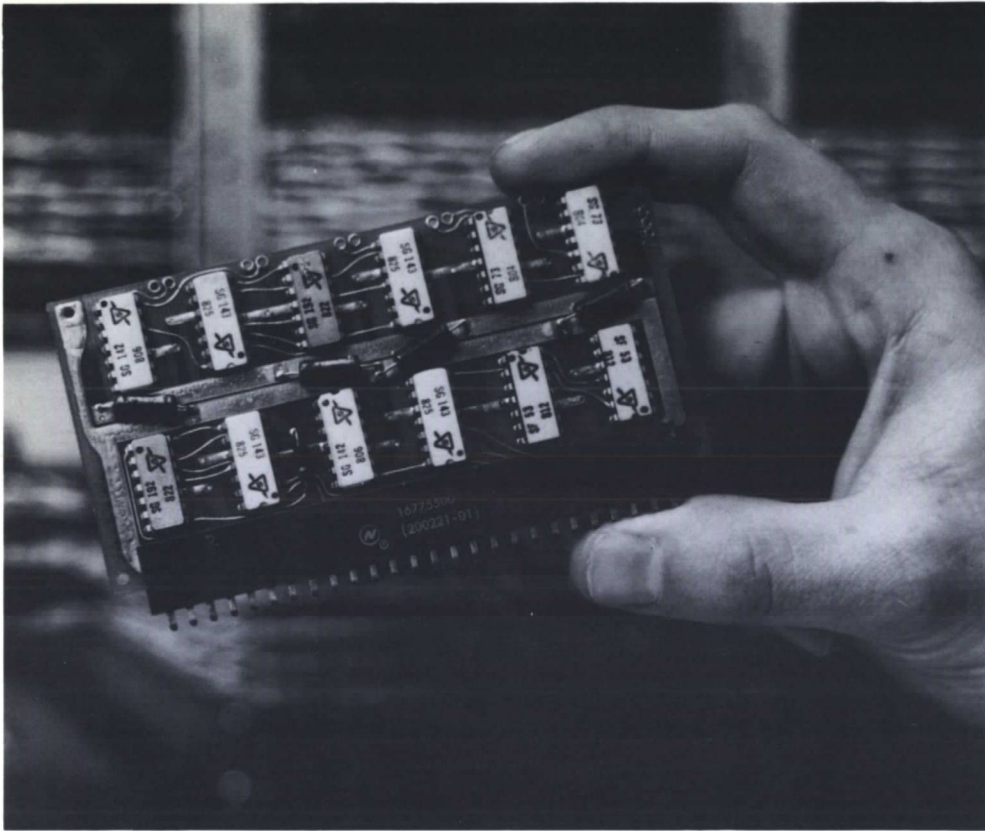
- A hardware multiply/divide, which provides a fast double or single precision multiply and divide capability
- A Direct Memory Access Channel which enables equipment, either peripherals or another computer, to access memory directly
- An ASR Interface which includes a controller mounted inside computer cabinet interfaced with either an ASR 33 or an ASR 35 Teletypewriter
- Eight Displays and seven Thumbwheel switches which mount on front panel
- An Integrated Maintenance Panel which consists of various switches and indicators that control and monitor computer functions and data. The panel can be used for maintenance and program debugging (available on rack-mount configuration only)
- A Power Supply which mounts inside the computer and is capable of driving the computer with 8K of internal memory (available for rack-mount configuration only)

Software

Through versatile 5100 support software, the customer can achieve ease of program generation, efficient methods of program checkout, and a fully-operational system. To produce operational programs, the customer can either use the 5100 on-line, or he can use a large-scale data processing host computer for this purpose. The host computer software is designed for easy installation on computers having USASI Basic FORTRAN capabilities.

The customer can produce all required 5100 software on data center machines using efficient high speed peripheral devices. If he does not have data center facilities within his own organization, Control Data will make its Data Centers available to him. Control Data has Data Centers throughout the U.S. and in many foreign countries. When the support software is installed on a Control Data Real-Time Data Center Network, individual customers at remote terminals have access to large-scale computer capability.

The host computer 5100 support software provides many capabilities which are not normally available to computer users of this category. These include, in addition to assembly capabilities, program debugging and simulation and tape preparer capabilities. With this added potential, the customer can flag programming errors, simulate the 5100 program operation, and completely prepare 5100 programs off-line.



Ceramic packages are standard on all CDC 5100 circuits. Integrated logic and wire wrap chassis (background) provide total reliability.



Control Data analysis specialists provide the operational support and technical advice necessary to tailor a system to customer requirements.

Specifications

	5100R	5100P
Size	19" w x 5¼" h x 21" d (Depth behind panel)	6" w x 7¼" h x 20½" d (Depth behind panel)
Volume	0.9 cu. ft.	0.5 cu. ft.
Weight	45 lbs. including power supply	30 lbs.
Power (Basic configuration)	115 VAC, 50-400 Hz 140 watts (Max)	+ 5 VDC, -5 VDC + 14 VDC 70 watts (Max)

Summary of Features

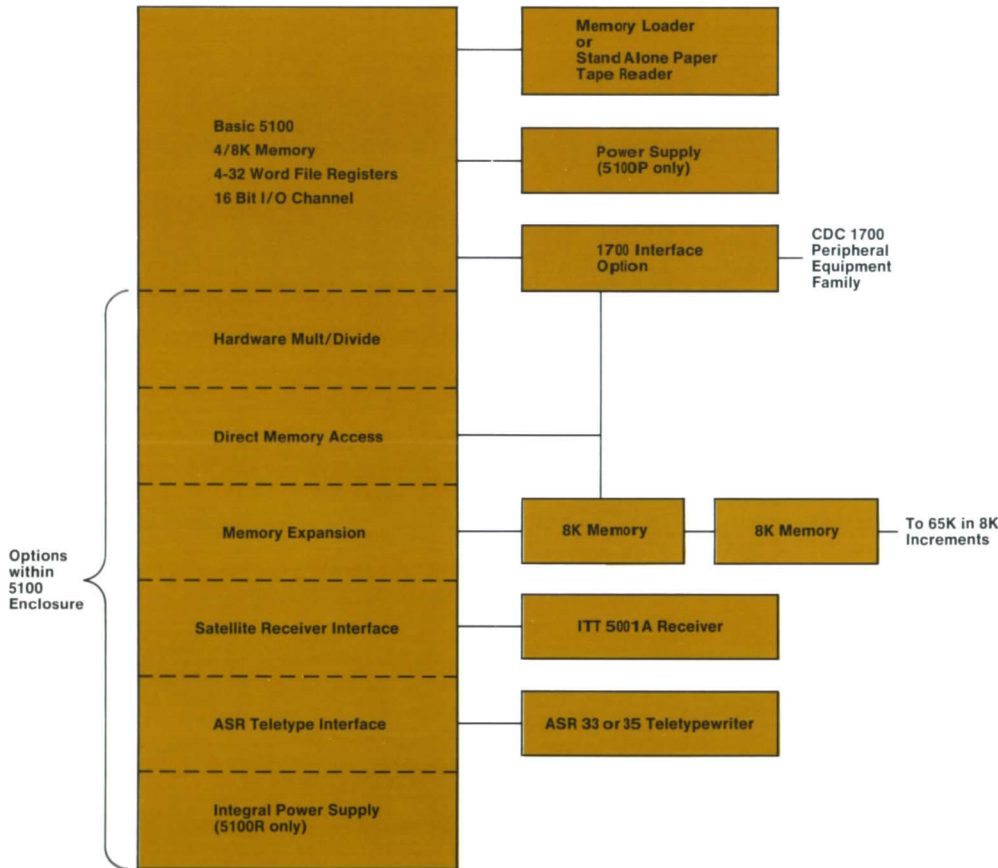
- Militarized design and construction
- Mil quality and reliability standards
- 65,536 words of memory directly addressable
- Three program states with 32 file registers each state
- 16-bit word length with double precision capability on all arithmetic operations
- Double addressing capability
- Processor pre-wired for pluggable options
- Maintainable by persons with minimal computer knowledge
- Designed to operate in environments where standard commercial computers will not
- All circuits use ceramic or metal glass-sealed packages.
- Lithium ferrite cores used in memory stack
- Memory cores bonded to solid P.C. boards and coated with epoxy
- All parts are treated or coated for protection against a corrosive atmosphere
- Small size, low weight
- 50-400 HZ 120 V or DC power input
- Compatible with full line standard computer peripheral devices
- 34 basic instructions which include arithmetic, control, logical, branch, shift and input/output
- Four groups of 32 16-bit file registers available for use as accumulators, index registers, real-time clock register, select codes, or storage

MNEMONIC	HEX CODE	INSTRUCTION	EXECUTION TIME (μ sec)	
			16-bit	32-bit
DIO	00	Disable Interrupt 1	9	—
DIT	02	Disable Interrupt 2	9	—
EIO	04	Enable Interrupt 1	9	—
EIT	06	Enable Interrupt 2	9	—
CIO	08	Clear Interrupt 1	9	—
CIT	0A	Clear Interrupt 2	9	—
DTC	0C	Disable Real-Time-Clock	9	—
ETC	0E	Enable Real-Time-Clock	9	—
ENF	01	Enter file	9	12
INF	03	Increase file	9	12
RSF	05	Right shift file	12 + 6n	15 + 9n
LSF	07	Left shift file	12 + 6n	15 + 9n
LDC	09	Load constant	15	21
SRJ	0B	Subroutine jump	21	—
HLT	0D	Halt	21	—
JMP	4B	Jump	21	—
CPO	0D	One's complement	9	12
CPT	0F	Two's complement	9	12
NZJ	10	Nonzero jump	9	12
NJP	18	Negative jump	9	12
ADF	20	Add file	12	18
SBF	22	Subtract file	12	18
AFS	24	Add file skip	12	18
MPF	26	Multiply file	*204	*574
TRF	28	Transfer file	12	18
IOR	2A	Inclusive OR file	12	18
CMF	2C	Complement mask file	12	18
CFS	2E	Compare file skip	12	18
ADM	30	Add memory	18	24
SBM	32	Subtract memory	18	24
AMS	34	Add memory skip	18	24
MPM	36	Multiply memory	210	600
LDF	38	Load file	18	24
STF	3A	Store file	18	24
INP	3C	Input data	18	—
OUT	3E	Output data	18	—

*Execution time reduced by Hardware Multiply/Divide option.
Specifications subject to change without notice



System Configurator



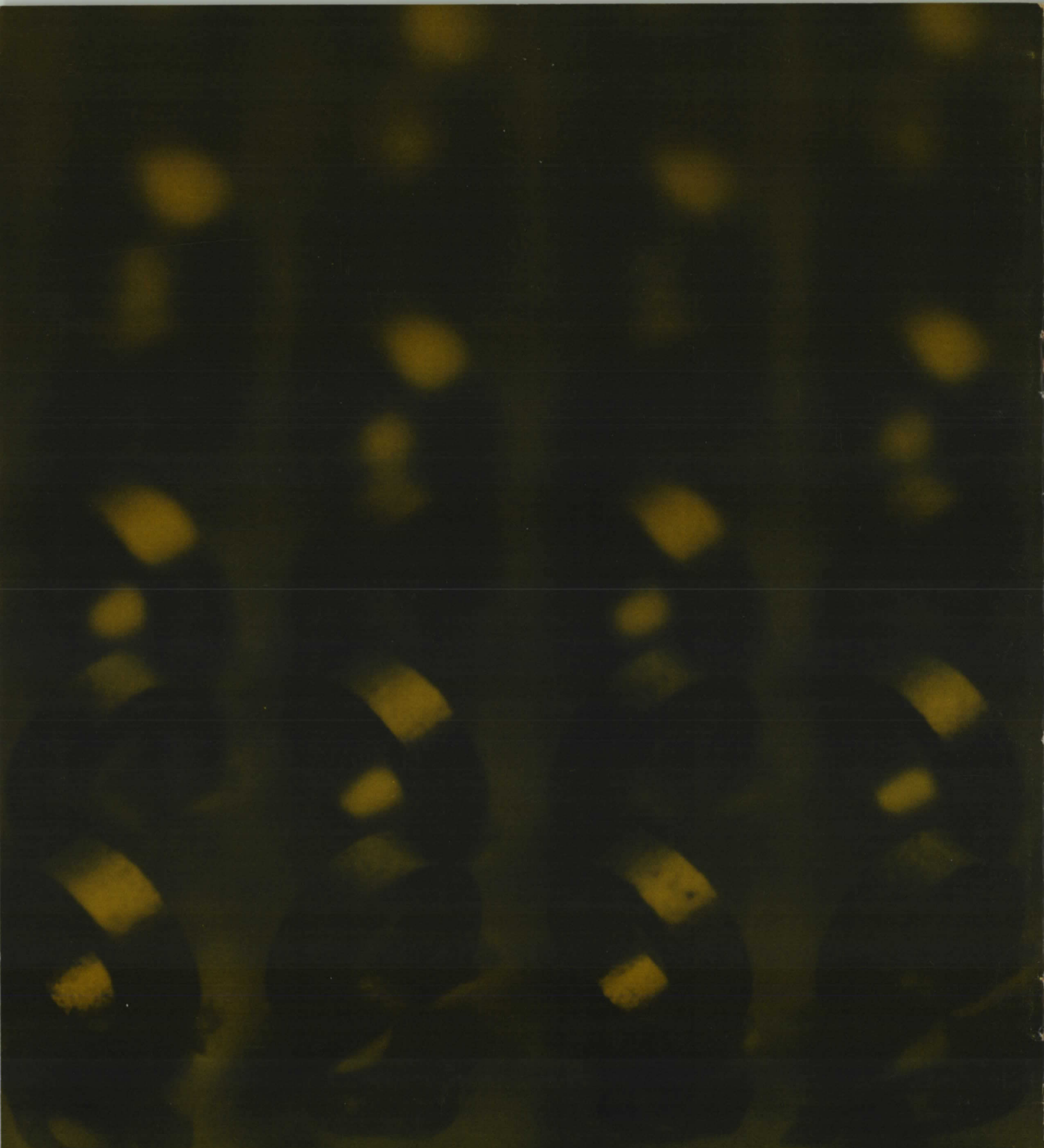
Detailed Technical and Application Information is Available from . . .

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