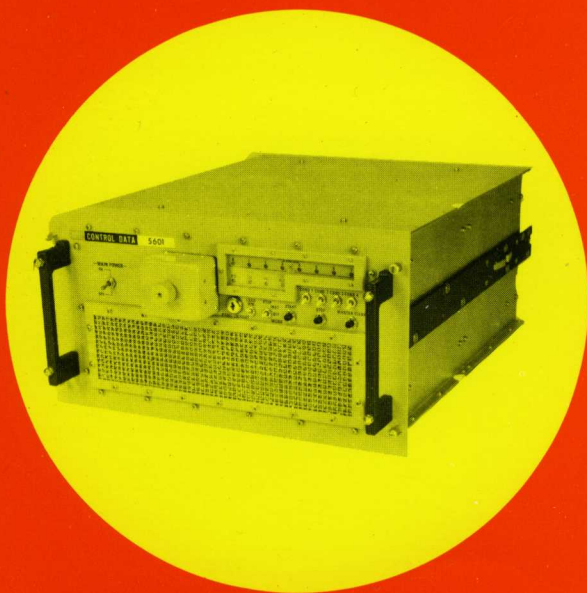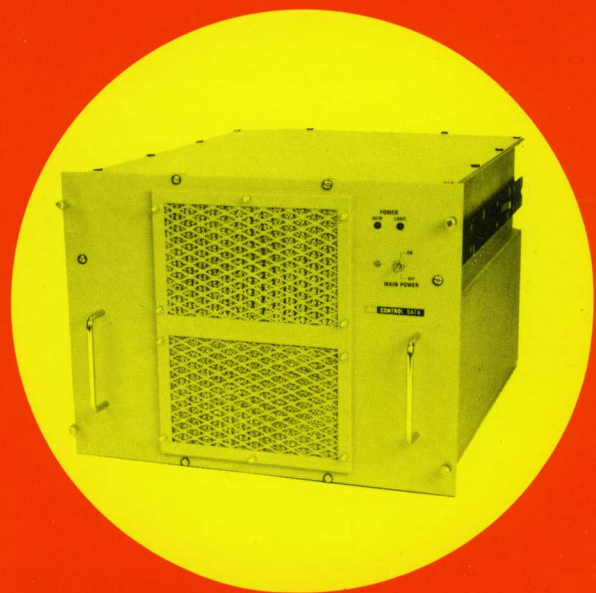# MP·60 System

Family of Processors

Industrial Applications • Military Applications • Emulation • Special Processor/Controller

AN/UYK-25 Processor
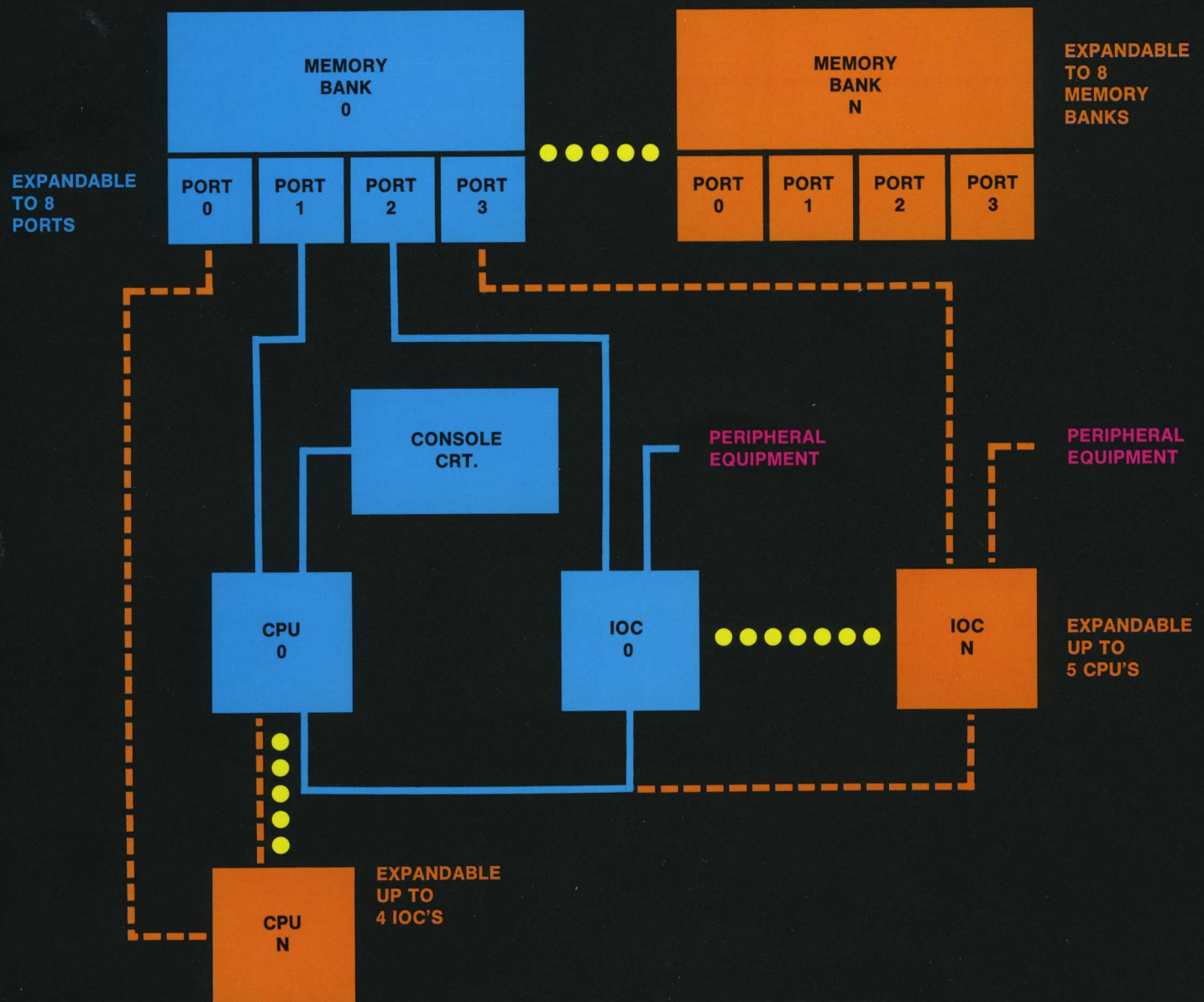

AN/UYK-25 Memory

Industrial System

Industrial Processor

Put Flexibility On Your Side

Put flexibility in your application design with the CONTROL DATA® MP-60 Computer family architecture. The MP-60 is a 32-bit based, solid state, general-purpose digital computer family. Advanced concepts in the field of microprogrammable architecture are used throughout the system to provide a flexible, extendable, compact and high-performance configuration for use in scientific, real-time and data management applications. Modular packaging of the MP-60 facilitates expansion of the configuration elements to accommodate increased user needs.

Flexibility for the applications designer is provided by the Aerospace Division of Control Data and its MP-60 products. The MP-60 concept is applications-oriented with these unique features:

- User microprogrammable processors which allow expansion of the baseline MP-60 instruction set to include application-dependent algorithms in single operations

- Memory systems with capacity to 8 million bytes

- Multiprocessing configurations supported by Control Data software — the MPX/OS operating system

- Standard I/O interfaces for a wide variety of peripheral devices, plus the ability to add custom features without affecting the software.

- Flexibility in system environment — either our ruggedized industrial hardware or full military specification equipment, with software compatibility

MP-60 Configuration Flexibility

AN/UYK-25 (V)

In its military configuration, the MP-60 is the AN/UYK-25. For MIL-E-16400 and MIL-E-4158 environments the MP-60 provides system flexibility for your high performance system requirements. Standard MP-60 I/O features include NTDS channels (16- and 32-bit) and various mil qualified peripheral equipments. Unique system I/O requirements are easily supported by the MP-60 IOC element. Aerospace Division supports your mass storage needs through its MD640 Military Disk.
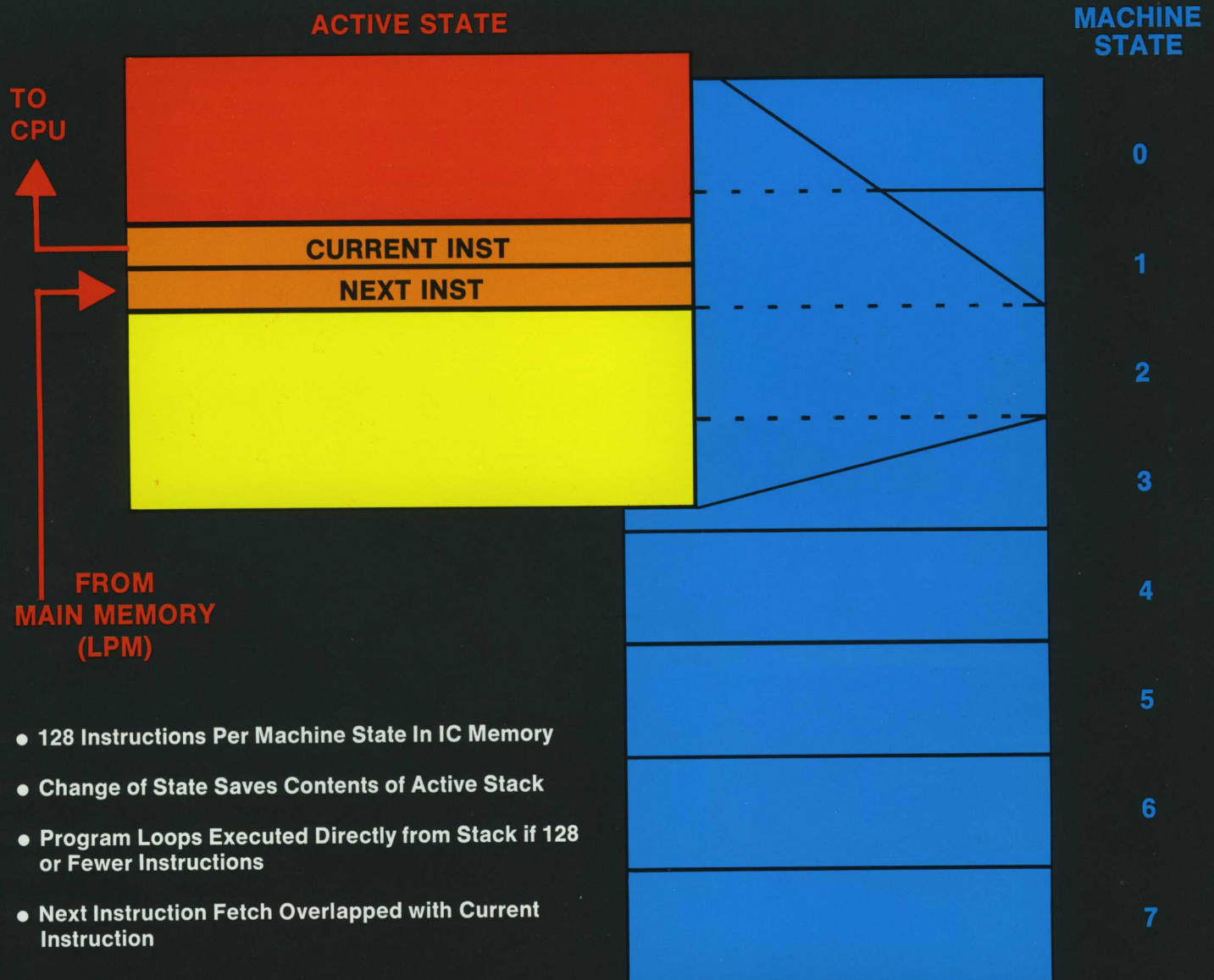
Industrialized

For the less severe environment the ruggedized MP-60 addresses your needs for a lower cost development system, software support facility, or for operation in the industrial environment. Control Data offers a wide range of commercial and industrial peripheral equipment for the MP-60, both stand-alone and rack mountable. The militarized and industrial MP-60 products are fully compatible.

Put Performance On Your Side

Performance with an MP-60 is brought to bear on application requirements through the CPU architecture, microprogramming, software products, I/O structure and support services of Control Data. The MP-60 CPU offers many unique architectural elements.

- Eight operational program states, with 32 general-purpose registers in each state — no need for register swapping

- 32-bit and 64-bit precision, fixed-point and floating-point arithmetic

- Paging hardware to support large memory systems (up to 8 million bytes); memory protection between the processor states

- Expandable instruction set through micro-programming (firmware) to include application algorithms; micromemory is loadable under program control

- Built in test diagnostics; both executable under program control and executable from the maintenance panel for fault isolation

- Firmware in the IOC can accommodate new peripheral devices without affecting software; in addition, data editing/manipulation processes can be incorporated into the IOC

ACTIVE STATE

MACHINE STATE

TO CPU

CURRENT INST

NEXT INST

FROM MAIN MEMORY (LPM)

0
1
2
3
4
5
6
7

- 128 Instructions Per Machine State In IC Memory

- Change of State Saves Contents of Active Stack

- Program Loops Executed Directly from Stack if 128 or Fewer Instructions

- Next Instruction Fetch Overlapped with Current Instruction

The MP-60 Look-Ahead Stack

Look-Ahead Stack Architecture

Look-ahead stack hardware of the CPU provides a fast, local, integrated circuit memory for each processor state. Programmed DO-LOOPS are executed directly from the stack without references to memory for instructions. This brings fast execution to bear on the time-critical portions of the application code.

Standard Software Products

Software for the MP-60 is extensive and field proven. The MPX/OS operating system supports real-time, multiprogramming and multiprocessing applications. In addition, standard software products of the MP-60 will be expanding as Control Data continues its ongoing development efforts. The currently available products include:

- MPX/OS — real-time, multiprogramming, multi-processing, disk file base operations system

- ANSI FORTRAN compiler

- Macro assembler (COMPASS)

- Micro assembler (MICRO)

- Source program maintenance package (COSY)

- On-line CRT debugging package (PCC)

- System maintenance package (PRELIB)

- System utilities and diagnostics

Software is more than listings and tapes, it's also designer experience. Aerospace personnel have applied the MP-60 for customers in the sophisticated areas of real-time data collection, emulation design centers, range/flight safety processing, data processing centers and real-time tactical systems. After system delivery, the MP-60 products are supported by Aerospace programming personnel.
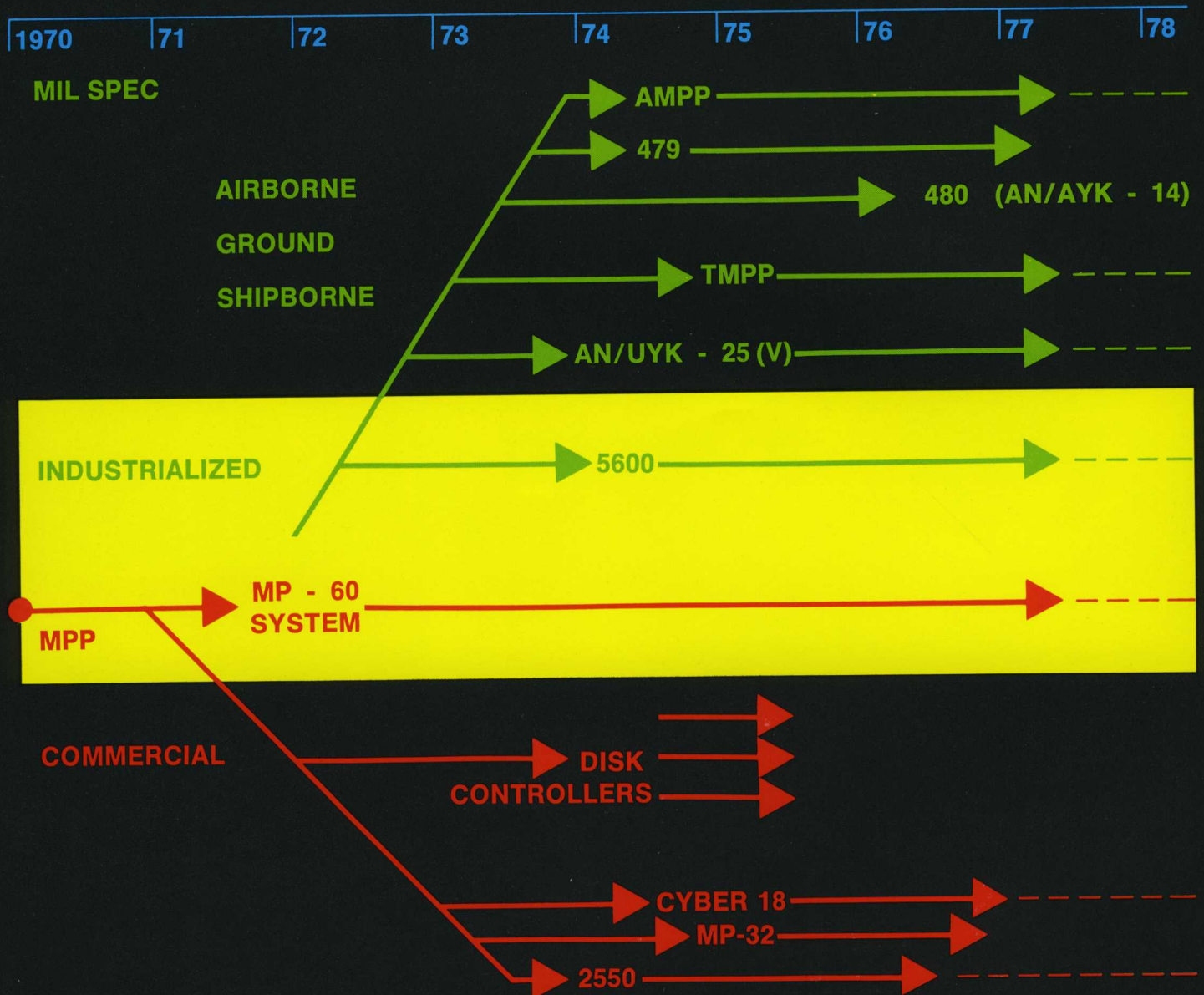
Put Emulation On Your Side

If —

Your system has a large investment in software, an outdated, obsolete or overloaded processor, limited growth potential, or a need to move from commercial to rugged or military specification environments . . .

Then —

Emulation, using the standard MP-60 hardware elements, is your answer.

What Is Emulation?

Emulation is the process of posturing the MP-60 hardware elements, via the microprogrammed firmware, to take on the identity of another computer system. With emulation, existing software can be executed on the MP-60 without software modification.

1970	71	72	73	74	75	76	77	78

MIL SPEC

AMPP

479

AIRBORNE

480 (AN/AYK - 14)

GROUND

TMPP

SHIPBORNE

AN/UYK - 25 (V)

INDUSTRIALIZED

5600

MPP

MP - 60 SYSTEM

COMMERCIAL

DISK CONTROLLERS

CYBER 18

MP-32

2550

Microprogrammable Processor Evolution

In addition, emulating allows the designer freedom to expand the capabilities of the existing system in such areas as address range, instruction set, peripheral equipments, etc. For the older, slower processor, emulation can lead to increased performance through state-of-the-art hardware. Control Data's extensive experience in microprogrammable processors is illustrated below. A partial list of current emulations is as follows:

CONTROL DATA Products

• 160A	• 469	• 924	• ALPHA
• 1700	• MP-30	• 5400B	• 8090
• 5100	• 3300	• MP-60	

Other Products

• GYK-12	• UYK-15
• UYK-20	• UYK-19
• IEC 1010	• H 516
• ROLM 1602	• USQ-20
• IBM 360 (Sub Set)	

Put Control Data and the MP-60 on your side for applications spanning industrial to militarized environments. Gain the advantage of proven hardware and software products, application performance and knowledgeable system designers. The Aerospace Division of Control Data offers many unique solutions to your problems. Let us help you in solving your system and application requirements.

MP-60 Environmental Capability

	INDUSTRIALIZED	MIL - E - 16400 CLASS 4	MIL - E - 4158
	TESTED TO	TESTED TO	TESTED TO
TEMPERATURE			
- NON-OPERATING	−35°C TO +65°C	−54°C TO +71°C	−62°C TO +75°C
- OPERATING	0°C TO +50°C	0°C TO +50°C	0°C TO +55°C
ALTITUDE			
- NON-OPERATING	15,000 FT	50,000 FT	50,000 FT
- OPERATING	6,000 FT	10,000 FT	10,000 FT
VIBRATION	NORMAL TRANSIT LOADS	2 - 50 Hz, 1.25 g HALF - WAVE	5 - 500 Hz 4 g HALF - WAVE
SHOCK	5 g, 11 mSec PERPENDICULAR	50 g, 11 mSec HALF - WAVE	15 g, 11 mSec HALF - WAVE
HUMIDITY	40% to 90% RELATIVE NO CONDENSATION	UP TO 95% RELATIVE WITH CONDENSATION	UP TO 95% RELATIVE WITH CONDENSATION

CONTROL DATA