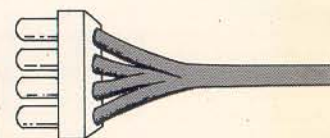# Charles River
Data Systems, Inc.

CRDS

Plug in to CRD
DEC-11 s

When you plug in to Charles River Data Systems for complete DEC-11 computer systems, you're getting engineering excellence built-in.

Available in a variety of configurations, our powerful, multi-user general purpose computers are equally at home as R & D systems, or as the basis for business and process control systems.

Our computer systems
LSI-11/2 or LSI-11/23, with fr
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MF-211

Typical Con

MF-211, with:

LSI 11/2 Processo
32K words MOS
Dual Floppy Sys
DLV-11J Quad Se

o

MF-211, with:

LSI-11/23 Processor
64K words MOS
Dual Floppy System, RX02 Equivalent
DLV-11J Quad Serial Interface
8 Quad Slot Backplane

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Plug in to CRDS for complet DEC-11® systems

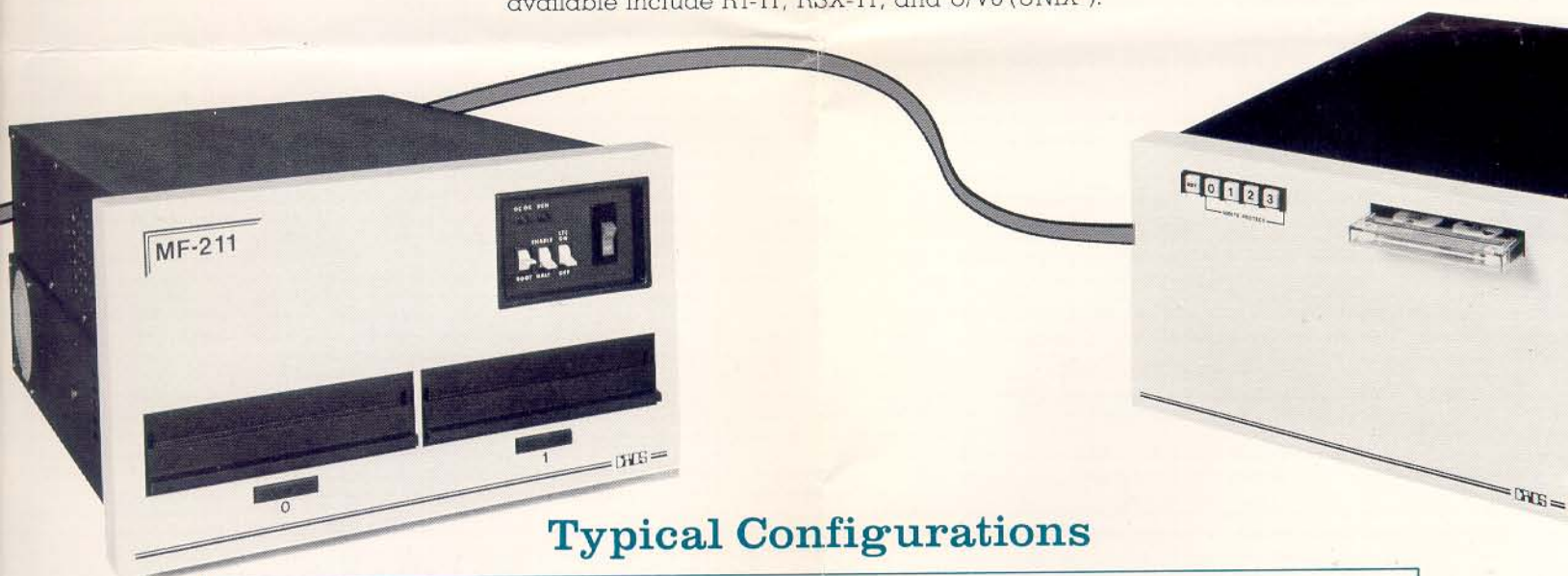lug in to Charles River Data Sys-
e DEC-11 computer systems, you're
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s and process control systems.

Our computer systems are based on the DEC
LSI-11/2 or LSI-11/23, with from 32K to 128K words
of MOS memory. Peripherals available on the sys-
tems include a 21 megabyte Winchester fixed disk
system; single- or double-sided Shugart floppy disk
drives (1 or 2); and a 3M cartridge tape system for
fail-safe back-up of the Winchester disk. Hardware
options include serial and parallel interfaces, as
well as A/D and D/A converters. Software systems
available include RT-11, RSX-11, and U/V6 (UNIX*).

Whichever configuration y
assured of the power, flexibilit
need for your most demanding
also assured of plugging in yo
because CRDS delivers most p

Check our product feature
CRDS Marketing at (617)655-18
discuss the specifications and
configuration that's right for yo

Typical Configurations

MF-211, with:

LSI 11/2 Processor
32K words MOS
Dual Floppy System
DLV-11J Quad Serial Interface

Price: $6480.00

or

MF-211, with:

LSI-11/23 Processor
64K words MOS
Dual Floppy System, RX02 Equivalent
DLV-11J Quad Serial Interface
8 Quad Slot Backplane

HD-11 Winchester Drive with 21 megabyte
capacity

NOTE: Optional DEI cartridge tape back-up
for HD-11 can be ordered in lieu of the Dual
Floppy System.

Price: $15,755.00

DS for complete systems

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...ded Shugart floppy disk
...rtridge tape system for
...chester disk. Hardware
...parallel interfaces, as
...rters. Software systems
...SX-11, and U/V6 (UNIX*).

Whichever configuration you choose, you're assured of the power, flexibility and reliability you need for your most demanding applications. You're also assured of plugging in your system fast, because CRDS delivers most products in **30 days!**

Check our product features inside. Then call CRDS Marketing at (617)655-1800. We'll be happy to discuss the specifications and help you choose the configuration that's right for **you.**

...figurations

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...tem
...rial Interface

Price: $6480.00

...r

...-11 Winchester Drive with 21 megabyte ...pacity

NOTE: Optional DEI cartridge tape back-up for HD-11 can be ordered in lieu of the Dual Floppy System.

Price: $15,755.00

When you plug in to Charles River Data Systems components, you plug in to innovative, reliable solutions to your system design problems. Combined in any of a number of configurations, these parts form our powerful, cost-effective computer systems. And each component can be purchased separately to expand or complete an existing system.

MF-211

RX02 Equivalent Dual Floppy System with LSI-11/2 or LSI-11/23

The MF-211 system combines DEC's LSI-11/2 or LSI-11/23 with the Shugart SA800 flexible disk drives, all within a 10½" rack mountable enclosure. The CRDS controller provides for dual density operation and complete software/media compatibility with DEC's RX02 floppy disk system. Functionally identical in operation to DEC's 11V03L, the MF-211 can be used in a variety of system applications utilizing any of the DEC-11 based software packages, such as RSX-11M or RT-11. The MF-211 system uses DEC H9270 4-quad slot backplane, with an 8-quad slot backplane available as an option in the same 10½" enclosure!

The Standard MF-211 System Contains:

- DEC LSI-11/2 or LSI-11/23 central processor
- Dual floppy disk system, using industry standard Shugart SA800 floppy disk drives with a combined capacity of one million bytes and built-in write-protect.
  > NOTE: Double-sided drive operation is available in the MF-411, providing 2 million bytes of storage. See section entitled "Double-Sided Floppy Disk Option".
- A dual-height controller containing all needed electronics for control functions, interface, bootstrap loader (eliminating need for DEC BDV-11AA card), formatter and self-tester; the controller is completely RX02 equivalent, including software and media compatible.
- A 19" rack mountable enclosure having 10½" panel height and front panel switches for:
  - Enable/Halt
  - Line Time Clock
  - Initialize/boot

  Plus:
  - Indicators for "Run" and "DC OK"
  - Removable front panel allowing front access to all PC cards

- Rack mountable slides
- On-off circuit breaker
- Power supply with needed +5V and +12V power for 4-quad slot or 8-quad slot backplane. Includes options for 110V or 220V, 60Hz or 50 Hz.
- 32K to 128K word MOS memory with self-contained refresh.

Options Available with MF-211:

- Any DEC system components used with the LSI-11/2 or LSI-11/23 microprocessors, including — but not limited to:
  - KEV-11 Extended Arithmetic Unit
  - DLV-11F Serial Line Unit
  - DLV-11J Quad Serial Line Unit
  - Cables for DLV-11F & DLV-11J
  - DRV-11 Parallel Interface
  - KWV-11A Programmable Clock
    NOTE: Terminals for the MF-211, such as video terminals, printers, etc., can be obtained from DEC or local distributors. Terminals must have either RS232 interface or 20ma current loop interface.

n any
mponents

Reliability, software compatibility, solid field performance, and compact packaging are just a few of the key features of the CRDS approach to system design. Read the following specs for further information. Then call CRDS Marketing at (617)655-1800. Today. The sooner you plug in to CRDS, the sooner you'll plug in your DEC-11 system.

Software

- **RT-11 Single User Operating System**

    RT-11 is a small, single-user disk operating system designed for interactive program development and on-line applications on the PDP-11/LSI-11. RT-11 supports both single job and foreground/background modes of processing. The foreground/background monitor allows two programs, a foreground program and a background program, to operate concurrently. The real-time function runs in the foreground, which has priority on use of system resources. Functions that do not have critical response time requirements (program development, for example) run in the background, which operates whenever the foreground is not busy.

    In addition to a variety of system and program development utilities, RT-11 offers optional support of a number of high-level language processors, including FORTRAN IV, FOCAL, APL, and BASIC.

- **U/V6 General-Purpose Interactive Operating System Based on UNIX***

    U/V6 is a general-purpose, interactive operating system which offers a number of features seldom found even in larger operating systems. Some of these features include:
- A hierarchical file system incorporating demountable volumes
- Compatible file, device and inter-process I/O
- The ability to initiate asynchronous processes (tasks)
- User alterable system command language
- Over 100 subsystems including a dozen languages

U/V6 languages include:
- C
- Fortran
- Ratfor
- Basic
- Desk Calculator
- Snobol
- Text Formatter
- Optional Photo Typesetting

    U/V6 is the Yourdan, Inc. packaging of the highly successful UNIX* operating system.

- **RSX-11M Real-Time Operating System**

    RSX-11M is a disk-based real-time operating system which runs on certain PDP-11's and the LSI-11/23 processor. It provides an environment for the execution of multiple real-time tasks using a priority structured event-driven scheduling mechanism. System generation allows the user to configure the software for systems ranging in size from small 16K word systems to 128K word systems.

    RSX-11M can be generated as either a mapped or unmapped system, depending on whether the hardware configuration includes a Memory Management Unit. If the configuration does not include hardware memory management, the system can support up to 30K words of main memory. If the configuration does include hardware memory management, the system can support up to 124K words of main memory. RSX-11M provides the same primary services in mapped and unmapped systems; however, some optional features require hardware configurations larger than the minimum supported systems.

Double-sided Floppy Disk Option

HD-11

RL01 Equivalent Winchester Disk with Cartridge Tape Back-up

The CRDS HD-11 is a 21-megabyte formatted fixed disk system that utilizes Winchester technology to achieve high storage capacity at low cost. It is compatible with both the LSI-11/2 and LSI-11/23 processors manufactured by Digital Equipment Corporation, and is software equivalent to four RL01 disk drives.

The HD-11-T includes an optional tape drive, providing the system with a removable medium. This 3M Cartridge Tape Drive may be used to provide back-up or archival storage. The tape drive mounts inside the HD-11 chassis and utilizes the same power supply and controller/interface as the disk drive.

This unique packaging of a disk and tape drive in the same chassis—sharing common electronics—is a revolutionary concept in the minicomputer field. Combining the new, fast and inexpensive non-removable disk technology with another new technology, the 3M cartridge, provides a method of fail-safing disk drives or allowing large off-line storage (tape libraries) to be created. Error correction (ECC) has been implemented on both the tape and disk peripherals for further reliability.
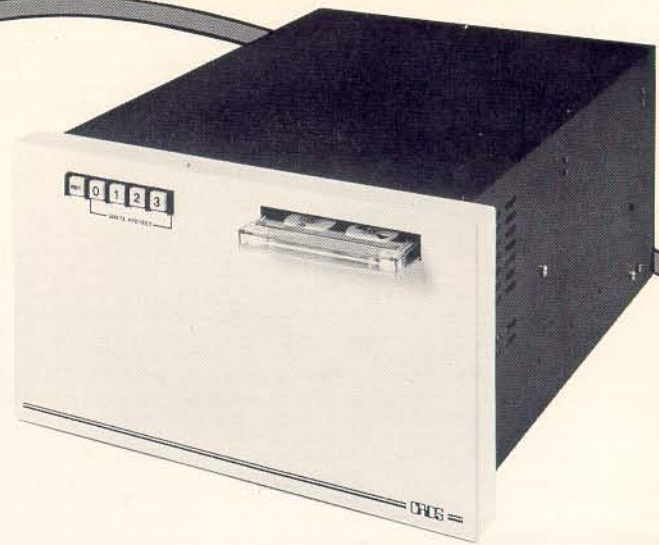
The HD-11 is completely software compatible with the RL01, allowing immediate and easy use of the product. No handlers need to be integrated into your operating system, and the HD-11 executes DEC's RL01 disk diagnostics.

Key Features:
- 21 megabyte formatted disk storage
- RL01 instruction set compatible
- Built in bootstrap loader
- ECC data protect on both disk and tape
- Q-bus and Unibus compatible
- Four write-protect switches
- High-technology controller prevents latency while using bandwidth more efficiently
- 2-way peripheral for most cost-effective, reliable approach to storage applications.

Disk Drive

CRDS selected Shugart Associates' SA4000 as its source for Winchester drives. This drive has been in production for over one year. It is a relatively simple and straight-forward 14 inch drive that does not strain either the limits of Winchester technology or the availability of media and other components.

A band-driven head-actuation assembly provides substantial reliability at a low cost. Compared to voice coils with servos and/or track following logic, this approach is simpler and less costly.

Unlike removable media drives, the SA4000 requires no cumbersome air filtration system. Through the use of fixed media, problems of dust and dirt contamination are eliminated.

The SA4000 represents superior technology by a company that has clearly proven itself by its domination of the floppy disk market. This Winchester disk has already seen its first year of production and is in use by several leading OEM customers.

Tape Drive

The 3M tape cartridge featured in the HD-11 is manufactured by Data Electronics, Inc., and has been in production for over 2 years. It has extensive field experience in small business systems environments.

The removable tape cartridge is a convenient size, is easily stored, and has a formatted data capacity of 15.7 megabytes, or the equivalent of 3 RL01 disk packs. This tape drive is not software compatible with any DEC peripheral.

We suggest that the device be used to back up an entire RL01 disk equivalent, and to restore this tape back onto the disk at a later time. Either operation can be performed in less than six minutes per RL01 unit, and it is not necessary to introduce a new handler into the operating system. A completely independent program is provided to the user, allowing failsafing or restoration of from one to three 5-megabyte RL01 sections, in a maximum of only 6 minutes per RL01 section.

As an added capability, the FD-211 and the MF-211 can be obtained with double-sided, double-density floppy disk drives, thus offering one megabyte of RX02 equivalent storage per drive. Using Shugart SA850 drives, these double-sided systems are designated the **FD-411** and **MF-411** and are software compatible with DEC's LSI-11/PDP-11 series. The system is completely transparent for single-sided media operation. A simple SYSGEN of RT-11 allows double-sided operation. A diskette with a modified RT-11 handler is supplied with each purchased FD-411 or MF-411. This handler allows each of the two drives to be a one megabyte device when a double-sided diskette is in the drive. If a single-sided diskette is installed, the device will appear as a 500K byte device.

Features:
- Hardware, software and media compatible with LSI-11 and PDP-11 series
- One megabyte of storage per drive
- Bootstrap loader, formatter and self-diagnostic with each system
- Latest version of Shugart SA850 double-sided drives
- 3 ms track-to-track access

FD-211

RX02 Equivalent Floppy Disk System

The FD-211 Double Density Floppy Disk System is totally instruction-set compatible with the Digital Equipment RX02 Floppy Disk System. It provides a compact, low-cost and highly reliable solution for all RX02 applications.

This low-profile, 5¼" enclosure houses two floppy disk drives, each providing up to 512K bytes of formatted storage plus the power supply. Controller/interface electronics are contained on one, dual-height card using only half a quad slot of the Q-bus backplane, and a full quad slot of the Unibus backplane. This contributes to the low cost and reliable system performance with reduced interwiring.

Controller Card Features:
Each FD-211 Controller Card offers all of these features:
- Interface, bootstrap and formatter electronics on a single DEC-compatible card
- Complete software/media compatibility with DEC RX02 for Q-bus or Unibus
- Single- and double-density operation with each system
- DMA data transfer on per-sector basis
- Formats sector headers
- Formats single- and double-density marks which allows user to modify density selection of diskettes

- Self-diagnostic
- Bootstrap loader functions automatically on power-up
- Cyclical redundancy check
- 2901 microprocessor controller allows RX02 emulation plus additional "smart" functions

Enclosure Features:
- 5¼" panel height
- Front panel write-protect switches
- On-off circuit breaker
- Modular construction for easy replacement of drives or power supply
- Shugart SA800 series drive with:
  - LED's on each drive to indicate read or write operation
  - Sensor for detection of write-protect hole on diskettes
  - Automatic head unload
    NOTE: Double-sided drive operation is available in the FD-411, providing 2 million bytes of storage. See section entitled "Double-Sided Floppy Disk Option".
- Power supply with optional 110V or 220V AC Input, 50 or 60 Hz operation
- 10 foot ribbon cable

PRICE LIST

MF 211

FD 211

HD 11

Charles River Data Systems, Inc.

HD11 20.8 MEGABYTE WINCHESTER TECHNOLOGY DISK DRIVE
WITH RL01 SOFTWARE COMPATIBILITY

DESIGNATION	DESCRIPTION	1-9	10-24
HD11	Hard Disk System, including: • SA4000 Shugart Winchester Technology Drive with 20.8 megabytes of formatted storage • Controller Card with RL01 Instruction Set compatibility and Bootstrap Loader • Interface Card (quad height) for Q-Bus • Slides for Rack Mounting • Four Front Panel Write-Protect Switches • Power Supply, 110/60Hz • 10' Ribbon Cable & Instruction Manual	$6500.000	$5,975.00
HD11-T	Includes DEI Cartridge Tape Option (15 megabyte capacity)	$8,700.00	$8,000.00
V25	220V/50Hz Operation Option	$ 50.00	$ 50.00
TT2	CRDS transfers the contents of two DEC-RL01 packs onto a Tape Cartridge	$ 100.00	$ 100.00

DUAL FLOPPY DISK SYSTEM FOR LSI-11 & PDP-11 SERIES

DESIGNATION	DESCRIPTION	1-9	10-24
	Each system includes: • Dual Shugart 8" Floppy Disk Drives • Q-Bus or Unibus Interface Circuitry • Controller card with: RX02 Double-Density Instruction Set compatibility & Bootstrap Loader • 5½" Enclosure with On-Off Circuit Breaker • Single & Double Density Data Mark formatter • Power Supply, 110/60Hz • 10' Ribbon Cable • Instruction Manual • Self-Diagnostic		
FD211	Dual Shugart SA800 Single-Sided drives with Q-Bus Interface	$3,250.00	$2,900.00
FD211-P	Dual Shugart SA800 Single-Sided drives with Unibus Interface	$3,250.00	$2,900.00
FD411	Dual Shugart SA850 Double-Sided drives with Q-Bus Interface and RT11 diskette handler for Double-Sided operation	$4,250.00	$3,750.00
V25	220V/50Hz Operation Option	$ 50.00	$ 50.00

MF211 & MF411 SYSTEMS WITH LSI-11/2 OR LSI-11/23 & WITH RX02 COMPATIBLE DOUBLE DENSITY DUAL FLOPPY SYSTEM

DESIGNATION	DESCRIPTION	1-9	10-24
	Each MF211 includes:		
	• Dual Shugart SA800 Floppy Disk System for Double & Single Density Operation • Floppy Disk Controller/Interface Card with Bootstrap, Self-Tester, Formatter & providing complete RX02 software & media compatibility with DEC software • H9270 Four Quad Slot Backplane • Enclosure with Front Panel Console, switches for Enable/Halt Line Time Clock, Initialize,& indicator lights-"DC POWER" and "RUN" • Power Supply, 110/60Hz		
	BASIC CONFIGURATIONS		
MF211-Q2	Includes LSI-11/2 and 32K word memory	$5,980.00	$5,380.00
MF211-Q23	Includes LSI-11/23, memory management chip and 64K word memory (three board set)	$8,180.00	$7,360.00
MF211-Q23M	Includes LSI-11/23, memory management chip, a 32K word memory and MXV-11AC multifunction card. The MXV-11AC includes two serial interface circuits, a Line-Time Clock and 16K word memory. This three board set contains a total of 48K words of memory	$7,780.00	$7,000.00
	MF211 OPTIONS		
E	Extended backplane: an 8 quad slot backplane is supplied in place of the standard four quad slot backplane	$ 575.00	$ 515.00
V25	220V/50Hz Operation Option	$ 50.00	$ 50.00
	NOTE: For Double-Sided Drive Operation, use the designation MF411 in lieu of MF211 and add the shown price to the total system price. A diskette with RT11 handler for Double-Sided Operation is provided.	$1,000.00	$ 800.00
	HOW TO ORDER		
	To order your configuration of the MF211 or MF411, simply add any of the above option suffixes you desire separated by hyphens to the product designation. For example:		
	MF211-Q23-E designates an MF211 with an LSI-11/23, 64K word memory and with an 8 quad slot backplane at the standard US power input of 110V/60Hz.		
	CARD OPTIONS FOR THE MF211 (PARTIAL LISTING)		
M32	Additional 32K word memory	$ 950.00	$ 875.00
KEV-11	Extended Arithmetic Unit for LSI-11/2	$ 180.00	$ 170.00
KEF-11AA	Floating Point Chip for LSI-11/23	$ 375.00	$ 355.00
MXV-11AC	Multifunction Module: 16K words, 60Hz Crystal Clock, 2-serial line units, 2-24 pin slots for proms	$ 560.00	$ 500.00
DLV11F	Serial Interface	$ 275.00	$ 260.00
CB-10	RS232 Cable for DLV11F	$ 50.00	$ 45.00
DLV11J	Four Port Serial Interface	$ 450.00	$ 425.00
CD-10	RS232 Cable for DLV11J	$ 50.00	$ 45.00
DRV11	Parallel Line Unit	$ 240.00	$ 225.00
CG-10	Cable for DRV11	$ 55.00	$ 50.00

DESIGNATION	DESCRIPTION	MEDIA	1-9
QJ013CY	RT11 Operating System	DEC Supplied Floppy Diskettes	$1,175.00
QJ813CY	Fortran/RT11	DEC Supplied Floppy Diskettes	$ 550.00
QJ913CY	Basic/RT11	DEC Supplied Floppy Diskettes	$ 500.00
QJ921CY	Multi-User Basic/RT11	DEC Supplied Floppy Diskettes	$ 540.00
QJ738CXT	RSX11M Operating System	CRDS Supplied 3M Tape Cartridge	$2,900.00
QP240CXT	Basic/RSX11M	CRDS Supplied 3M Tape Cartridge	$ 550.00
QJ918CXT	Basic-Plus-2/RSX11M	CRDS Supplied 3M Tape Cartridge	$3,050.00
QP230CXT	Fortran IV/RSX11M	CRDS Supplied 3M Tape Cartridge	$ 620.00
QP668CXT	Fortran IV-Plus/RSX11M	CRDS Supplied 3M Tape Cartridge	$3,800.00
U/V6	System Based on Unix*	Yourdon Supplied Floppy Diskettes	$2,500.00

*UNIX is a registered trademark of Bell Laboratories

PAYMENT TERMS & CONDITIONS

TERMS: Net 30 Days (upon Credit Approval)

FOB: Natick, MA 01760

Discounts apply to units scheduled out over a twelve month period, with 1/3 of total number of units scheduled for delivery within the first six months.

OEM quantity discounts available on request.

Prices subject to change without notice.

WARRANTY

All equipment purchased directly from CRDS, it's authorized representatives and/or franchised Distributors is warranted on "return-to-factory" basis against defects in workmanship and materials under normal and proper use in its unmodified condition for a period of ninety (90) days from date of initial shipment. As a condition of this warranty, Customer must (1) obtain a CRDS Return Authorization (RA) number, (2) ship the equipment (or sub-assembly) to the designated CRDS Repair point, transportation prepaid, and (3) include with the returned equipment (or sub-assembly) a WRITTEN description of the claimed defect. Transportation charges for the return to Customer on in-warranty repaired equipment (or sub-assembly) shall be paid by CRDS within the fifty (50) United States, District of Columbia, and Canada. Returns to customer of out-of-warranty repaired equipment (or sub-assembly) shall be "Transportation Collect". If CRDS determines that the equipment (or sub-assembly) returned to it for warranty correction is not defective as herein defined, Customer shall pay CRDS all costs of handling and transportation. All repaired or replaced equipment shall be returned only to Customer and not to third parties to whom Customer may have sold, leased or otherwise transferred the equipment. The warranties provided herein are exclusive to the Customer only.

Charles River Data Systems, Inc., hereby warranties all equipments (or sub-assemblies) of first party manufacturers and/or their authorized, franchised representatives and distributors against defects in workmanship and materials, only to the full limits and extent that such items are warranted by CRDS.