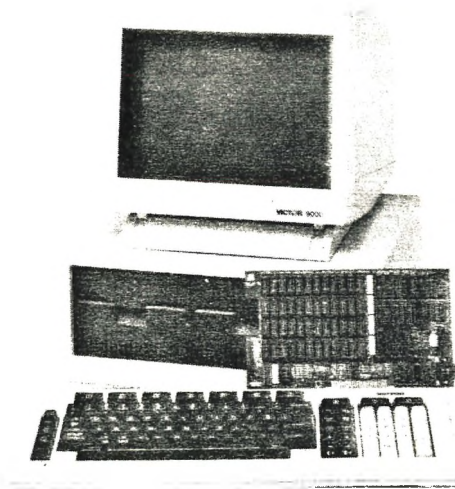


ESCORT V/S



USER'S MANUAL



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ESCORT Memory Bank 0
ESCORT Memory Bank 1
ESCORT Memory Bank 2
ESCORT Memory Bank 3
ESCORT Memory Bank 4
ESCORT Memory Bank 5

U32

MEMORY ADDRESSING SWITCH

CLOCK INTERFACE

MEMORY EXPANSION

MOUSE

EXTERNAL SASI

VICTOR INTERFACE CONNECTOR

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1. INTRODUCTION

Thank you for choosing the Western Automation Escort subsystem for the upgrade of your Victor 9000/Sirius computer.

This manual provides the necessary instructions for configuring and installing your Escort multifunction products for the Victor 9000/Sirius computer.

Section 1--contains information on compatibility, radio frequency interference, and system options.

Section 2--contains an inventory checklist for each item in the ESCORT subsystem.

Section 3--contains information regarding the installation of Escort products and trouble-shooting the system hardware.

Section 4--contains information regarding the installation and use of all software included with the Escort subsystem.

The Western Automation Escort V/S is a versatile multifunction board designed to enhance the performance of your Victor 9000/Sirius computer.

The Escort V/S is available in two versions. The V1 version of the board utilizes 64K DRAM chips and is user-expandable from 0-384K. The V2 version of the board utilizes 256K DRAM chips and is user-expandable from 0-1536K. V1 models can be upgraded to accept the 256K chips. Both Escort V/S models feature a SASI compatible interface bus capable of supporting up to eight external Escort storage devices. An optional battery-backed real time clock board that attaches to the Escort V/S board is also available.

Western Automation offers memory expansion boards for both the V1 and V2 models of the Escort multifunction board. The V1 expansion module is available with either 128K or 256K of additional RAM. A 384K Escort V1 with the 256K expansion module and the 256K of memory on the system motherboard will raise the system to its full 896K capacity. For the Escort V2, Western Automation offers memory expansion boards with 512K or 1024K. All system memory over the 896K capacity may be utilized as an ultra-fast RAMdisk.

1.1 COMPATIBILITY

Components of the Escort subsystem are completely compatible with the Victor 9000/Sirius computer.



1.2 TELEVISION OR RADIO INTERFERENCE

This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. This equipment has been tested and is expected to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. There is no guarantee, however, that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception (determined by turning the equipment off and on and observing effects on reception), the user is encouraged to try to correct the interference by one or more of the following measures.

Make sure that:

The system cover has been securely attached to the system and that all screws have been replaced.

If using an external storage system, make sure that the cover is securely attached to the external drive cabinet.

If you have any questions or problems with radio or television interference and have tried all of the above suggestions, contact the Technical Support Department at Western Automation Laboratories. The phone number is (303) 449-6408.

1.3 ESCORT SUBSYSTEM OPTIONS

The basic ESCORT system component is the Escort V/S multifunction board with or without memory installed, a SASI interface, and a mouse interface. Memory on the Escort V/S board can be installed from 0-384K in 64K increments on the model and 0-1536K in 256K increments on the V2 model.

Other options include:

External Hard Disk System

composed of: hard disk drive with SASI interface
cabling for external drive
drive cabinet w/ controller
power supply for drive

External Floppy Disk System

composed of: floppy disk drive with SASI interface
cabling for drive
drive cabinet w/ controller

Escort Memory Expansion Modules.

V1: 128K, 256K
V2: 512K, 1024K

Escort Real Time Clock.

composed of: real time clock board
lithium battery backup

2. INVENTORY CHECKLIST

After receiving any components for your Escort subsystem you should use the following inventory checklist to determine if you have received all the necessary parts.

2.1 ESCORT V/S MULTIFUNCTION BOARD

--Escort V/S Board

--Escort Subsystem Manual

--Diskette with Diagnostics, RAMdisk program, Clock program, and documentation on any new options or software

2.2 ESCORT V1, V2 EXPANSION BOARDS

--Escort V1 or V2 expansion board

--Escort Subsystem manual

2.3 ESCORT EXTERNAL HARD DISK SYSTEM

--External disk drive assembly

--Dual Connector Cable for attaching drive to Escort board

--Power cable

2.4 FLOPPY DISK SYSTEM

- Floppy disk drive in external cabinet
- Dual Connector Cable for attaching drive to Escort board

2.5 REAL TIME CLOCK OPTION

- Battery-backed real time clock board
note: software for clock is included on Escort disk
- Lithium battery

3. INSTALLATION INFORMATION

This section contains all the information necessary to install any components of your ESCORT subsystem.

3.1 TOOL REQUIREMENTS

The only tools required to install any component of your Escort system are:

- a medium sized phillips screwdriver
- a medium sized flat-blade screwdriver

3.2 REMOVING THE SYSTEM UNIT COVER

In order to install any component of your ESCORT subsystem you must first remove the system unit cover. Follow the steps below to prepare your unit for ESCORT installation.

1. Remove power from the unit by disconnecting the AC line cord from the rear of the unit.
2. Remove all peripheral interface cables (printers, disk drives, etc.) and the CRT and keyboard connectors from the rear of the unit.
3. Remove the CRT and swivel base from the main unit by lifting vertically.
4. Remove the system unit cover by loosening the four (4) screws located on the rear of the cover. Disconnect the reset switch connector. The rear cover can now be removed and the system unit cover can be lifted off of the assembly (see figure 3-1).

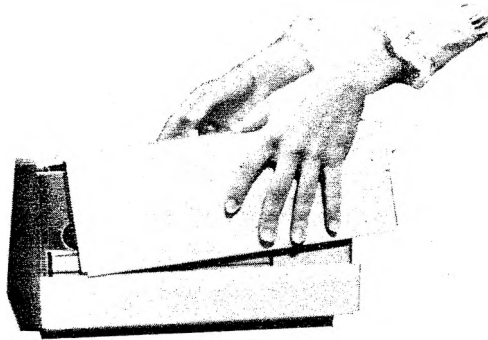


Figure 3-1 Removing the System Unit Cover

3.3 CONFIGURING ESCORT MEMORY

Memory configuration of the Escort V/S multifunction board is determined by setting the dip switches on the right hand side of the board. Dip switch settings are determined by the amount of memory already present in the system. Table 3.1 illustrates the required dip switch settings.

Table 3.1

<u>Amount of memory in computer (before Escort installation)</u>	<u>Switch Settings</u>			
	#1	#2	#3	#4
128K	off	off	off	on
192K	off	off	on	off
256K	off	off	on	on
320K	off	on	off	off
384K	off	on	off	on
448K	off	on	on	off
512K	off	on	on	on
576K	on	off	off	off

640K	on	off	off	on
704K	on	off	on	off
768K	on	off	on	on
832K	on	on	off	off

Do not attempt the following settings:

off	off	off	off
on	on	off	on
on	on	on	off
on	on	on	on

3.3.1 UPGRADING ESCORT MEMORY

Western Automation provides sockets on the Escort V/S board to facilitate easy upgrade and/or exchange of memory chips.

Upgrading the memory on the V1 version of the Escort V/S board requires the use of 4164 DRAM memory chips having speeds of 200 nanoseconds or faster.

Upgrading the memory on the V2 version of the Escort V/S board requires the use of 41256 DRAM memory chips with speeds of 200 nanoseconds or faster.

NOTE: RAMs of varying sizes and/or speeds may not be intermixed.

The chips must be properly oriented into the sockets so that pin-1 of the memory chip is properly inserted into pin-1 on the memory socket. Pin-1's location on the chip is indicated by a notch, stripe, small circular indentation, or a combination thereof. Pin-1 on the socket is shown by a notch at the end of the socket. After selecting the correct socket, line up the pins with the holes in the socket (pin 1 in the lower right hand corner of the socket). Lightly press down on the chip until it is firmly seated in the socket.

3.3.2 V1 to V2 UPGRADE

The Escort V1 board is factory upgradeable to a V2 board. The V2 offers all the features of the V1 but also allows the user to apportion memory as a high speed RAMdisk.

3.3.3 ESCORT MEMORY EXPANSION

Memory expansion modules are offered for each model of the of the Escort V/S multifunction board. The expansion modules snap into the two holes to the left hand side of the Escort and plug into the 20 pin connector on the Escort V/S multifunction board (see figure 3-2). Dip switch settings do not need to be adjusted. The additional memory will automatically become part of the system total.

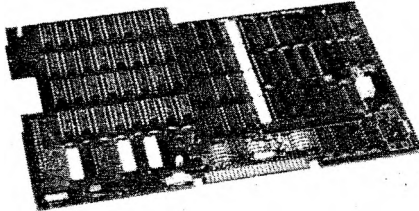


Figure 3-2 Mounting the Escort RAM pack to the Escort V/S

3.3.4 THE ESCORT RAMDISK

The Escort RAMdisk is arranged so that any 64K bank of memory on the Escort V/S board may be mapped into the address space D0000 (Hex). Any additional memory that is not directly memory mapped may be mapped, one bank at a time, into this space for use (refer to section 5.3 of this manual for more detailed RAMdisk information).

3.4 BOARD INSTALLATION

The Escort V/S board will fit into any of the Victor 9000/Sirius computer's expansion slots. If options (i.e. real time clock, memory expansion card) are added, however, the board will occupy two of the computer's expansion slots.

3.4.1 ESCORT V/S BOARD INSTALLATION

The Escort V/S board can be installed in any of the expansion slots in the Victor 9000/Sirius computers. The following steps describe how to install the board.

1. Follow the steps in section 3.2 of this manual to remove the system cover.
2. Follow the steps in section 3.3 of this manual to properly configure the memory on the Escort V/S board.
3. Determine which slot(s) will house the Escort V/S board with or without attachments.
4. Orient the Escort V/S so that the 20 pin connector marked "memory expansion" is toward the front of the Victor unit.
5. Apply enough pressure to ensure that the Escort board is properly seated in the connector. Make sure the board is firmly held by the card guides (see figure 3-3).

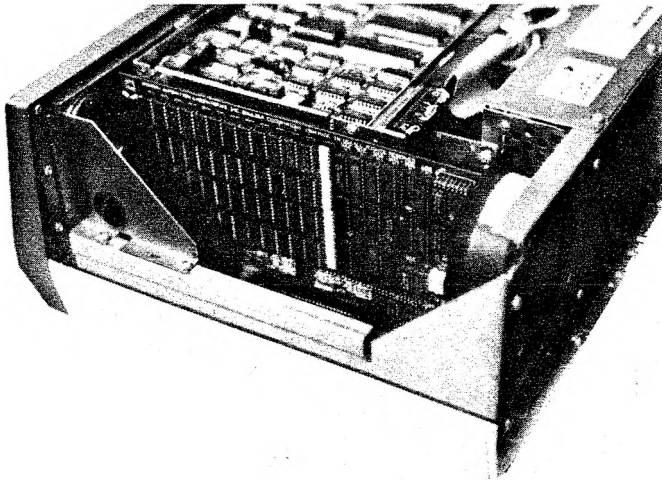


Figure 3-3 Escort board housed in the Victor computer

6. Install all cables as required.
7. Replace the back plate of your computer and tighten securely.
8. Replace the cover of the computer and screw firmly into place.
9. Your Escort system is now ready to use.

3.4.2 ESCORT MEMORY EXPANSION BOARD INSTALLATION

No changes or modifications are required to install the Escort memory expansion modules. Mount the expansion board to the Escort V/S as described in section 3.3.3 of this manual and then plug the two boards into the Victor computer.

Note: The two boards together will occupy two expansion slots in the Victor 9000/Sirius computer.

3.5 RAM PROBLEMS

If you suspect memory problems in your system, you must execute either the V1DIAG or the V2DIAG program (depending on which model Escort you have). To run either of these programs, you must first follow these steps:

Set the dip switches on the board to the positions shown in the table below.

<u>#1</u>	<u>#2</u>	<u>#3</u>	<u>#4</u>
on	on	off	off

Now reboot your computer and run the appropriate diagnostics program. The computer will display any bad bits and the banks in which they reside. If you purchased a fully populated Escort board, there is an extra memory chip to the left of the board's edge connector (marked "spare").

NOTE: When executing the RAM diagnostics, be sure not to include the last two 64K banks of RAM in the test. Executing the RAM test on these banks will crash your system.

3.6 TECHNICAL SUPPORT

If you have any problems with any components of your Escort system, contact our Technical Support department at:

Western Automation Labs.
Technical Support
P.O. Box 3438
Boulder, CO 80307
(303) 449-6408

4. INSTALLATION AND USE OF ESCORT PERIPHERALS

4.1 INSTALLING ESCORT DISK DRIVES

NOTE: In order to use the external floppy or hard disk drive, a device driver must first be installed. The appropriate drivers have been included with your Escort board (on the diagnostics diskette). These drivers must reside on your boot disk, and the CONFIG.SYS file on your boot disk must be modified to include these drivers. Under MS-DOS, new devices will be assigned the next available drive letters (e.g. If your Victor has two internal floppies--A: and B:-- then your first installed external device will be C:, your second D:, etc.). The proper format for the added device drivers is:

DEVICE=FDRIVER.DEV 5 for the Floppy drive
DEVICE=WDRIVER.DEV 1 for the first Winchester drive

Winchester drives after the first may be designated as Device 2, 3, or 4. The Escort Real Time Clock is Device 6, and the Streaming Tape Drive is Device 7.

Follow these steps to install and connect your Escort subsystem floppy or hard disk drive:

- 1) The Escort V/S board has a 16 pin connector (labeled SASI) used to attach external drives. Remove the system unit cover to gain access to your Escort V/S board (refer to Section 3.2).

- 2) Locate the dual cable connector (see figure 4-1) supplied with your external disk system. It is used for connecting the Escort board to the first external drive.

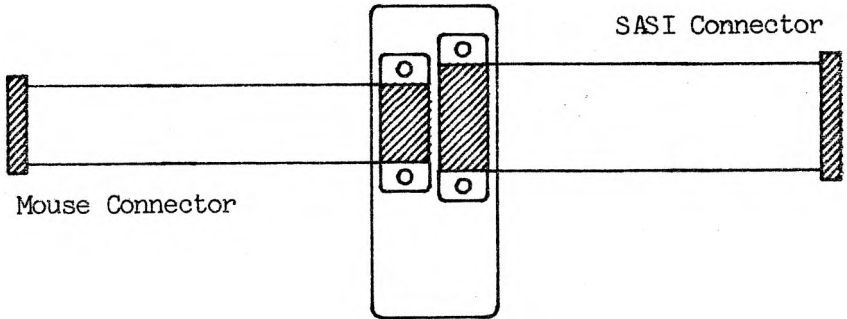


Figure 4-1 The Dual Connector Cable

- 3) Remove the small plate on the lower left hand corner of the rear panel of the Victor 9000/Sirius computer (see figure 4-2). Replace this plate with the dual cable connector supplied by Western Automation (the two cables should be inside the computer after doing this).

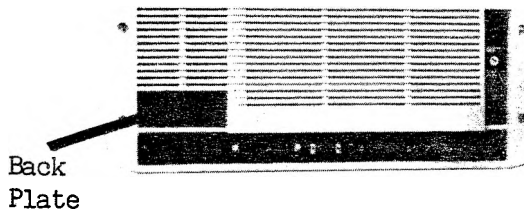


Figure4-2 Removable back plate on the Victor computer

- 4) Connect the sixteen pin connector (on Cable A) to the connector marked SASI on the Escort V/S board. The connect your external drive to the sixteen pin connector on the plate (supplied by Western Automation) that you installed in the rear panel of the computer. **NOTE:** The 8 pin connector on the plate is used for the attachment of a mouse--see Section 4.4 for mouse information.
- 5) After attaching all data cables to the external drive cabinet, plug in the AC power cables.
- 6) The external drive may be checked for proper operation by turning on the power for the drive. Leave the power off on your computer and turn on the drive using the red power switch located on the back of the external drive. If the switch lights up after depressing, the AC power is properly attached and the drive should work. Wait for approximately 30 to 60 seconds. If the LED located on the face plate of the drive cabinet is not on and is not blinking then the drive is operating properly. If the LED is blinking, then there is a problem with the external drive. If you have a problem with a Winchester drive, see section 4.5.2 on Winchester drive trouble shooting.

4.2 FORMATTING ESCORT DISK DRIVES

4.2.1 FORMATTING EXTERNAL WINCHESTER DRIVE

To format any Winchester drives on your system use the FMTHARD program provided with your Escort system. This program will allow you to format any standard Western Automation Winchester drive. The program will also allow you to connect non-standard Winchester drives to your system. If you are attempting to connect a drive not listed on the format menu, select option #9. If you require assistance in formatting a drive not offered by Western Automation, contact technical support staff. Western Automation will supply assistance at standard consulting rates. Call for more information.



4.2.2 FORMATTING THE FLOPPY DISK DRIVE

To format the Escort IBM PC-DOS compatible floppy disk drive, execute the FFORMAT program found on your Escort diskette. The computer will ask whether to format for single or double sided. Select the appropriate choice.

4.3 INSTALLING AND OPERATING THE ESCORT REAL TIME CLOCK

Your Escort real time clock/calendar is a valuable option. Mount the clock onto the Escort V/S multifunction board by following these steps:

1. Remove the chip from Integrated Circuit U32 on the Escort multifunction board.
2. Place the removed chip in socket U4 on the Escort clock board.
3. Attach the clock to the 50 pin connector on the Escort board. Insert the connector at the front of the front of the clock board into IC (Integrated Circuit) U32 on the Escort board. CAUTION: BE SURE NOT TO BEND CONNECTOR PINS WHEN ATTACHING CLOCK BOARD TO ESCORT BOARD.

Western Automation supplies software to allow you to set and adjust the real time clock from your keyboard. In order to set the time on your clock, you must first set the system time and date in MS-DOS. The DATE and TIME commands will allow you to do this. Record the date and time by executing the CLOCKSET program. This reads the time and date from the operating system and programs the information into the Escort real time clock.

If you then create an AUTOEXEC.BAT file (as outlined in the MS-DOS manual) on your boot disk with the TIMEREAD command, your system will automatically set the date and time by reading from the Escort real time clock.

4.4 ATTACHING A MOUSE TO THE ESCORT V/S BOARD

To attach a mouse to your Escort system follow these steps if you have an Escort dual cable cord (standard if you got an external disk drive with your unit). The dual cable cord is available from Western Automation for \$15.00.

- 1) Install the dual cable connector onto the rear plate of your Victor 9000/Sirius computer (refer to section 4.1 #'s 2 and 3 for information regarding the installation of the dual cable connector).
- 2) After installing the dual cable connector, attach the 8 pin connector on Cable B to the connector marked MOUSE on the Escort V/S board.
- 3) Connect your mouse to the 8 pin connector on the plate you installed in the rear panel of your Victor/Sirius computer.

If you do not have an Escort dual cable cord, follow these steps:

- 1) Remove the plate on the left hand side of the rearpanel of the Victor/Sirius computer.



- 2) Run your mouse connector through the gap left by the removal of the plate and attach it to the connector labeled MOUSE on the Escort V/S board.

4.5 TROUBLE SHOOTING THE ESCORT SYSTEM

When installing your Escort system you must follow the instructions given in section 3 of this manual. If your system does not boot after installation of your Escort V/S board, and you have followed all instructions, check the following:

- Make sure that the Escort V/S board is completely seated in the system motherboard.
- Check all cable connections for shorted wires, bent pins (connections to Escort board) and improper placement.

If your system boots but behaves improperly or erratically, utilize the V1DIAG or V2DIAG program included on your Escort diskette to test the memory (see section 3.5).

If you have taken all of the above steps and your system still fails to boot or perform properly, contact the technical support department at Western Automation (303) 449-6408.

4.5.1 TROUBLE SHOOTING EXTERNAL DISK SYSTEM

If your external disk system doesn't operate properly and you have completely followed the instructions pertaining to the installation of an external disk drive, check the following:

- Verify that the device driver installed in your CONFIG.SYS file matches the unit number of the drive in question (#5 if it is an Escort floppy disk drive).
- Make sure that pin-1 of the 16 pin connector on the Escort V/S board is properly oriented.

- Make sure that the 15 pin D connector on the back plate of the computer is completely installed and screwed into the cabinet.
- Make sure that the 15 pin D connector on the back of each external disk system is completely installed and screwed into the cabinet.
- Each external cabinet has a lighted power switch. Verify that this light is lit when power is applied to each external cabinet. If not lit, check the fuse and replace if necessary.
- If the external drive is a Winchester hard disk drive and the light on the front of the disk subsystem is blinking, there is a problem with the drive. Refer to section 4.5.2 on Winchester drive trouble shooting for suggestions.

4.5.2 WINCHESTER DRIVE TROUBLE SHOOTING

When power is applied to a Winchester disk drive, its internal microprocessor will do a diagnostic checkout of the drive. The processor will display error messages by flashing a Morse-Code type hexadecimal character via the activity LED. The flashing sequence is a combination of long and short periods of LED ON cycles. The timing for each period is as follows:

Zero = 0.1 seconds on
 One = 0.6 seconds on
 Between Bits = 0.6 seconds off
 Between Repeat Cycles = 2.0 seconds off

Below is listed the binary to hexadecimal conversion table:

0 = 0000	4 = 0100	8 = 1000	C = 1100
1 = 0001	5 = 0101	9 = 1001	D = 1101
2 = 0010	6 = 0110	A = 1010	E = 1110
3 = 0011	7 = 0111	B = 1011	F = 1111

Example: Code "E"

0.6 seconds on
0.6 seconds off
0.6 seconds on
0.6 seconds off
0.6 seconds on
0.6 seconds off
0.1 seconds on
2.0 seconds off

Message Definitions:

Code 0 - Microprocessor RAM error
Code 1 - EPROM checksum error
Code 2 - Miscellaneous hardware error
Code 3 - Write fault does not set
Code 4 - Write fault does not reset
Code 5 - Unable to detect motor spinning
Code 6 - Spin motor failed margin test
Code 7 - Unable to maintain spin speed
Code 8 - Unable to uncover Track 00 sensor
Code 9 - Unable to cover Track 00 sensor
Code A - Incorrect phase selected
Code B - Step counter error
Code C - Correct phasing is both pin pairs open
Code D - Correct phasing is 3/14 open and 4/13 shorted
Code E - Correct phasing is 3/14 shorted and 4/13 open
Code F - Correct phasing is both pin pairs shorted

If you receive an error code 5 from the Winchester drive, you probably have a problem with the +12V power supply.

5. SOFTWARE INFORMATION

Included with your Escort V/S board is a software package containing programs to assist you in using a mouse, the RAMdisk option, and the SASI port. Some users, however, may wish to control these ports under custom software schemes.

The I/O port assignments in table 5-1 are included to assist you in developing custom control over these ports.

Note: Direct programming of the SASI port is not advised unless the user is familiar with the associated protocol.

The port addresses listed below are encoded on a PAL chip and may be changed if necessary by purchasing a custom PAL chip from Western Automation.

Table 5.1 I/O Ports

The following table lists the I/O port assignments of the Escort V/S multifunction board.

Base Address--EE000 (HEX)

0--(R/W)	SASI data port
1--(R/W)	Read SASI status port Write to issue RST
2--(WO)	Arm SASI interrupt
3--(WO)	Issue SASI SEL
4--(RO)	Mouse Status Report
5--(WO)	RAMdisk bank select port

Note: Victor uses memory-mapped I/O. All ports should be treated as memory.

5.1 USING THE MOUSE

The mouse interface on the Escort V/S multifunction board is quadrature encoded, displaying a two-bit grey code for each axis of travel (this results in a resolution of 200 parts per inch for each axis). The mouse hardware polls the mouse at approximately 2kHz, allowing a maximum velocity (without origin loss) of about 10 inches per second. Any change in mouse status (position or button) generates an interrupt. The interrupt service routine then updates the position and/or button variables. Mainline code may then examine the button or position locations at any time and receive an accurate account of mouse status.

Mouse Status: bits 0,1--xa, xb (horizontal)
bits 2,3--ya, yb (vertical)
bits 4-6--buttons 1-3 (normally TTL high)
bit 7--not used

5.2 INTERRUPTS

The Victor 9000 computer utilizes an 8259 Priority Interrupt Controller (PIC). Interrupt vectors must be programmed with a series of control bytes written to the PIC. Consult your Victor hardware manual for details.

IR4--Mouse Interrupt. This interrupt level indicates that a condition on the mouse has changed. The handling code should read the port and determine current mouse status.

IR5--SASI Interrupt. This interrupt indicates an incoming REQ from the "controller." Handling code should rearm the interrupt.

5.3 RAMDISK INFORMATION

Western Automation's RAMDRIVE device driver allows the user to apportion up to 1536K of RAM (2560K if RAM pack is installed) on the Escort V2 as a high-speed RAMdisk. The Western Automation Device Driver also allows system memory to designated as RAMdisk memory.

You cannot install the RAMdisk option on an Escort V1 board. Factory upgrades to raise V1 boards to V2 status are available from Western Automation.

In order to use the RAMdisk on the Escort V2 board, a device driver must be installed in the system CONFIG.SYS file. See your MS-DOS manual for more information on the device command. The device driver for the Escort RAMdisk is named RAMDRIVE.DEV.

The RAMDRIVE.DEV device driver should be the first line in the CONFIG.SYS file for most efficient startup performance.

CONFIG.SYS command line Syntax:

```
device = RAMDRIVE.DEV [Number of Memory Banks before  
Escort] [Number of System Memory Banks desired] [Number of  
RAMdisk banks desired]
```

In order for the RAMdisk on the Escort to function properly, it must know where the first bank of memory on the Escort board lies (same as switch setting). The system must also know how much system memory you desire (in banks) and the number of RAMdisk banks to use. For example, if you have a Victor 9000 with a 128K motherboard, and you would like to apportion a fully populated Escort board to have 512K of System memory (832K maximum) plus an 1152K byte RAMdisk, then you would enter the following command in your CONFIG.SYS file:



```

DEVICE = RAMDRIVE.DEV 2 8 18
      | | |
      | | 18 x 64 = 1152K RAMdisk
      | |
      | |
      | |
      | 8 x 64 = 512K System RAM
      | (this number cannot exceed 13)
      |
      2 banks of RAM on motherboard

```

NOTE 1: A space must be inserted between .DEV and the number following. All other numbers must also be separated with a space.

NOTE 2: After installing the RAMDRIVE device driver, boot your computer under MS-DOS. After booting is completed, the computer will perform a "warm boot." Do not be alarmed when your computer goes through this process.

RAMdisk example #2

If you have a 512K board manufactured by someone other than Western Automation, a 128K Victor motherboard, and a fully populated Escort V2 that you would like to apportion as a 1536K RAMdisk along with 640K of system memory, then the device driver you would install in the CONFIG.SYS file would read:

```

device = RAMDRIVE.DEV 10 10 24
      | | |
      | | |
      | | 24 bank Escort RAMdisk
      | | (1536K)
      | |
      | |
      | 10 banks (640K system RAM)
      |
      2 banks on motherboard
      plus 8 banks on other
      memory board

```