

**Users manual  
for the  
99/4 A**

**TI MOUSE**

**MECHATRONIC**

USERS MANUAL

T1-MOUSE

INCLUDING BUILT IN 99/4A INTERFACE  
AND DISKETTE SOFTWARE

MECHATRONIC

CONTENTS OF THIS PACKAGE

One TI-MOUSE.

with interface for the TI-MOUSE (built in the connector) and fix cabled AC adaptor.

One storage medium containing software (Either diskette or cassette). \*

One owners manual.

\* To see directory of diskette run the program TI-DOS.

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Required System Configuration

TI 99/4A console.

Memory expansion.

Disk controller with at least one disk drive.

(Hardware can be Peripheral Expansion Box or stand alone)

TI EXTENDED BASIC MODULE or  
MECHATRONIC EXTENDED BASIC II PLUS MODULE

all sold separately.

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## INTRODUCTION

The lightweight, compact TI-MOUSE adds greater freedom and versatility to games, graphics, and sound applications on the TEXAS INSTRUMENTS home computer. The unit allows you to control movement, sound, speech and colours without keyboard interaction. You can use the TI-MOUSE with certain Solid State Software Command Modules or with your own EXTENDED BASIC programs.

The TI-MOUSE enables you to control the cursor very fast and easy and you have the possibility to set it to each single pixel, you want. Especially for MECHATRONIC EXTENDED BASIC II PLUS it is a powerfull instrument to use its whole capabilities.

With some experience programs that were controlled up to now by joysticks or the keyboard can be changed for control by the mouse.

First this manual informs you how to attach your TI-MOUSE. In the main part you will become familiar with the MOUSE by explanation of its operating elements, demo-programs and the description of the concerning EXTENDED BASIC statements.

In this manual zero is represented by 0 to distinguish from the letter O.

## USING THE TI-MOUSE

### OPERATING ELEMENTS

For easy use the MOUSE consists of two operating elements.

- **MOUSE**  
The whole MOUSE itself is an operating element, since in the ground part of its case there is a ball which is a sensor element.  
It transforms the mechanical path of the MOUSE case (an analog quantity) in digital information.  
By the specific MOUSE software this digital information is transformed in single pixel cursor positions.
- **MOUSE key**  
This is the left key of the MOUSE.  
This key transfers an one bit information to the computer wether it was pressed or not.  
The MOUSE key can be compared with the function of the ENTER key since it can be used to confirm the 99/4A that the option specified by the position of the MOUSE is chosen.
- **HOME key**  
This is the right key of the MOUSE.  
Pressing this key resets the cursor to the home position row 0 , column 0 .  
Remember that this key will work only with the ALPHA LOCK key being released.

While the control is delegated to the MOUSE the keys of the keyboard will be inactive!

To operate with the MOUSE conveniently a working area of at least a sheet of paper (8,5 inch x 10,9 inch) should be available to move it all over the screen.

Since the source of the information for the MOUSE position is the friction of the ball against a rigid, plain, horizontal surface the Mouse will only work correctly if proper contact is achieved.

As shown on the picture on the last side, the correct handling position for the MOUSE is if the keys direct away from you. This is obvious because the cable comes out at the rear end, to avoid hindrance by the cable when operating the MOUSE. Generally however, the MOUSE can be situated everywhere one likes, limited only by the cable length.

In comparison with the joysticks the MOUSE allows much more exact controlling of the cursor position.

## ATTACHING THE TI-MOUSE

### Unpacking

Before attaching the TI-MOUSE check all contents of the package for shipping damage

### Removing the protective strip

Turn the MOUSE upside down. In the lower third of the ground part of the case you will see a ball. This ball is the sensor element of the MOUSE. To prevent this sensor element for damage by mechanical shock during shipment a protective plastic strip was put over it.

Remove this protective strip by pulling it out. Keep the strip for later transport.

### Connecting

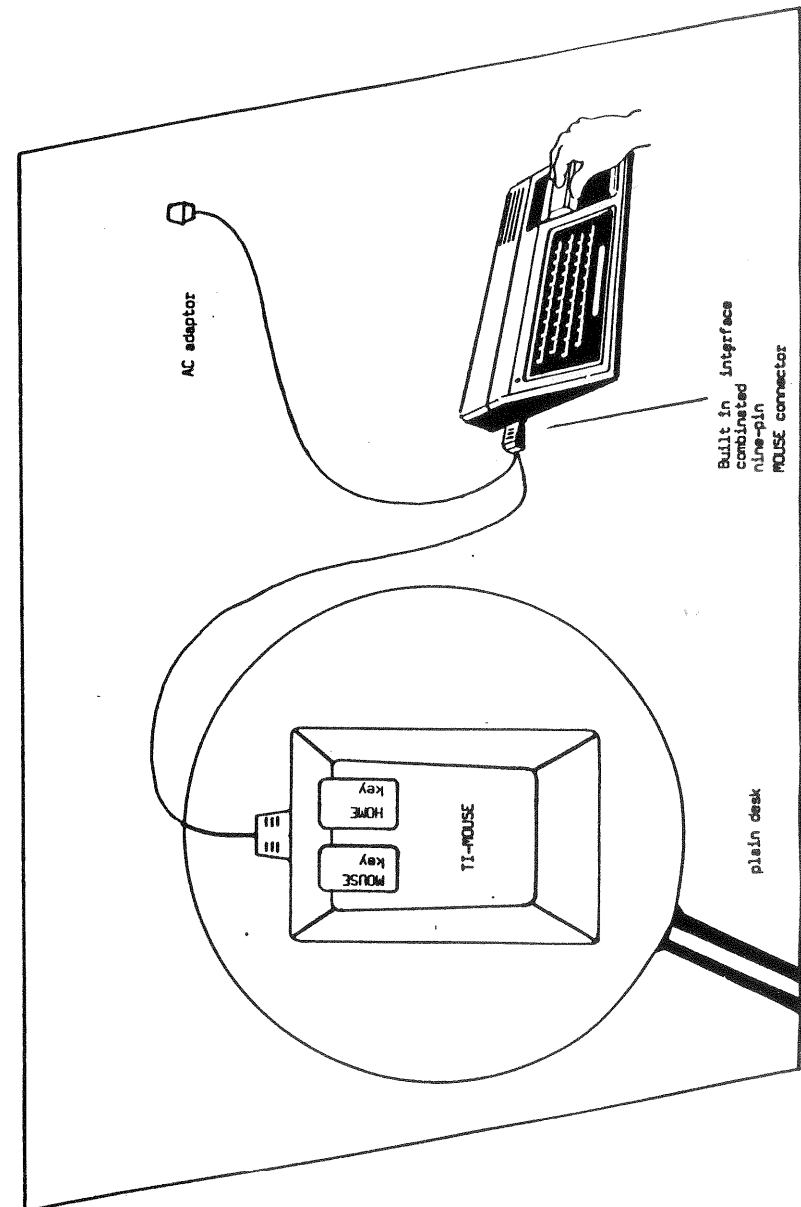
Two cables come out of the nine-pin MOUSE connector. The thicker, round cable for the MOUSE and the thin cable with only two lines for the AC adaptor which is contacted inside the connector.

- First plug the nine-pin MOUSE connector (which contains the MOUSE interface and is a female end) in the nine-pin outlet for the joystick port (which is a male end) on the left side of the console (not on the back!).
- Second connect the AC adaptor that comes with the MOUSE with a wall outlet.

### CAUTION

Do not use any other AC adaptor as the fix installed one, to avoid damage of MOUSE or the whole system.

The picture on the next side will show you how to connect the MOUSE correctly.



## GETTING STARTED

The normal way beginning the use of the MOUSE after having it attached is as follows:

- Push in an appropriate Solid State Software Command Module in the slot on the console.
- Insert the software diskette correctly in disk drive 1.
- Now the standard title screen should be displayed on the monitor.  
Press any key to get the main menu.
- Press 2 to select EXTENDED BASIC  
Disk drive 1 now becomes active and looks for an autostart routine on the software diskette (named LOAD).
- Now the menu TI-MOUSE DEMO is displayed.

```
TI-MOUSE DEMO
-----

1 BASIC

2 TI-DOS

3 CALCULATOR

4 BREAKOUT

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```

Due to the option chosen there are four possibilities:

1 selects BASIC  
The use of BASIC will be described later in this manual.

Further informations on the options 2, 3, and 4 will be given under "Demo-programs".

## TI-EXTENDED BASIC

### Description

Controlling the MOUSE with EXTENDED BASIC is possible without difficulty. With appropriate programming often the confusing menus can be avoided. Only by selecting the corresponding symbols by the MOUSE cursor and pressing the MOUSE key, subprograms and other Options can be chosen. This way of creating menus provides a great variety of interesting applications.

The controlling software for EXTENDED BASIC has only to be loaded once after having switched on the computer. It is stored in the MEMORY EXPANSION at addresses hex 2710 to hex 28C3. In BASIC programs the apply to the controlling software is made by a CALL LINK statement.

The MOUSE cursor is realized by sprite no. 1  
To make the MOUSE cursor visible this sprite must be defined in the corresponding program. This enables you to define the cursor individually for its image, size and colour.

The controlling software is divided into two calling orders. In the following the two options for calls are explained:

- MAUS0 With this option the execution of the main program is suspended up to pressing the MOUSE key.  
The call for the position is repeated continually and the cursor is set to the corresponding position while the program is suspended.
- MAUS1 This is an interrupt routine, what means that after this call the position is read up to 25 times in a second. While the execution of the main program is continued, an interrupt will be performed everytime the BASIC interpreter permits it.  
These continuous repetitions of the call, however, increase the processing time of the main program.
- MCLR This statement cancels the interrupt processing of the controlling software. By this the program will be processed with the normal speed again. In consequence this statement should be performed before parts of the program which do not use calls for the position of the MOUSE.

To enter or read data, certain addresses are reserved in the controlling software. The values in these addresses can be read by CALL PEEK and set by CALL LOAD .  
In the following the decimal addresses and the corresponding contents are listed:

ADDRESS	CONTENT
10000	Vertical position of the cursor.
10001	Horizontal position of the cursor.
10002	Status of MOUSE key. Contains 255 if pressed and 0 if not.
10003	Vertical homeposition of the cursor.
10004	Horizontal homeposition of the cursor. Into these addresses values between 0 and 255 can be written. These values correspond with the position of the cursor, if the HOME key is pressed (This key only works correct, if the ALPHA LOCK key is released).
10005	Left margin of the cursor. Default is 0 .
10006	Right margin of the cursor. Default is 255 .
10007	Upper margin of the cursor. Default is 0 .
10008	Lower margin of the cursor. Default is 192 .

By setting these positions, a window is defined, which the cursor can be moved inside.

#### Examples:

CALL PEEK (10000,X,Y,key)  
The actual position of the MOUSE can be read. If the MOUSE key has been pressed during the performance of this call the variable "key" is set to a value of 255 otherwise it is 0 (zero).

The examples listed in the following are a simple guide for the application of the MOUSE statements  
Both use a magnified exclamation mark as the MOUSE cursor to signalize the current position.

In the first example each time the MOUSE key is pressed a value of the actual position is displayed.  
Line 110 loads the controlling software.  
Line 130 defines the MOUSE cursor and line 140 magnifies it.  
Line 150 performs the call for the MOUSE position.  
Line 160 reads the actual position having it printed in line 170.  
The statements in lines 180 to 200 check if the program shall be leaved.  
To leave the program press any key (on the keyboard) and the MOUSE key at the same time.

## EXAMPLES

```

100 REM MOUSEEXAMPLE 1
110 CALL LOAD("DSK1.MOUSE")
120 CALL CLEAR
130 CALL SPRITE(#1,33,5,96,128)
140 CALL MAGNIFY(2)
150 CALL LINK("MOUSEO")
160 CALL PEEK(10000,Y,X)
170 PRINT Y;X
180 CALL KEY(0,KEY,ST)
190 IF ST=0 THEN 150
200 END

```

```

100 REM MOUSEEXAMPLE 2
110 CALL LOAD("DSK1.MOUSE")
120 INPUT "MOUSEROUTINE ":M
130 INPUT "VERTICAL HOME ":VH
140 INPUT "HORIZONTAL HOME ":HH
150 INPUT "LEFT LIMIT ":LEL
160 INPUT "RIGHT LIMIT ":RIL
170 INPUT "UPPER LIMIT ":ULI
180 INPUT "LOWER LIMIT ":LLI
190 CALL LOAD(10003,HH,VH,LEL,RIL,ULI,LLI)
200 M$=STR$(M)
210 MR$="MOUSE"&M$
220 CALL CLEAR
230 PRINT MR$
240 CALL SPRITE(#1,33,5,96,128)
250 CALL MAGNIFY(2)
260 REM BEGINNING THE LOOP
270 CALL LINK(MR$)
280 CALL PEEK(10000,Y,X,MKEY)
290 Z=(Y-X)*(Y+X)
300 IF Z=ZOLD THEN 280
310 PRINT Y;X,MKEY
320 ZOLD=Z
330 REM LEAVE PROGRAM
340 CALL KEY(0,KEY,ST)
350 IF ST=0 THEN 280
360 END

```

With this example also a usefull experiment can be tried. As explained under "Operating elements" the correct working position for the MOUSE is with the keys directing away from you. Turn now the MOUSE just opposite with the cable directing to you. Now you will see the cursor running over the screen in the opposite direction you move the MOUSE. With this simple trick you can try the correct working position.

In the second example the expanded programming capabilities of the MOUSE are shown.

Line 120 lets you enter the digit 0 or 1 to chose a MOUSE routine.

Lines 130 to 190 accept inputs where to draw a window for the cursor and and where to set the HOME position.

After the program preparation is completed the loop begins in line 260.

This program shows how to use the interrupt routine MOUSE1 in a program which displays only values if the MOUSE is moved. For this purpose line 290 contains a formula that ensures that also changes of the position in one direction are detected.

The program is left by pressing any key on the keyboard and moving the MOUSE at the same time.

#### OTHER MODULES

Except the EXTENDED BASIC module also other modules as the Editor/Assembler module can work with the MOUSE.

To involve the controlling software for your assembly program look at the sourcecode on the storage medium (called MOUSECODE).

For the use of the MOUSE with other modules refer to the appropriate manuals.

#### DEMO-PROGRAMS

##### Option 2 TI-DOS

TI-DOS is a routine that enables you to read diskette contents. With the software diskette in drive 1 the directory of this diskette is displayed on the screen.

At the left of each filename a symbol marks program- or data file.

At the right, another symbol indicates protection if any.

By moving the MOUSE around, an arrow cursor becomes visible with which options can be chosen.

Moving it to the triangle in the upper left corner, and pressing the MOUSE key, the remainder of the directory will be displayed, if available.

With the other triangle symbol you can proceed in the oposite direction.

If the cursor is moved to the symbol of the second disk drive and the MOUSE key is pressed, this symbol changes its colour and the directory of the diskette in drive 2 is displayed.

To get complete information over TI-DOS the cursor can be moved to the "?" symbol at the right margin and the MOUSE key needs to be pressed. Like the display of directorymove the arrow cursor to the triangle symbol and press the MOUSE key to see 15 pictures of explanation.

Please note:

This program is only a demo-version of the whole program TI-DOS. By this reason the other functions described in the DOSINFO will not work. The complete program is also offered by MECHATRONIC.

Caution

This program can only be left by switching of the console !

##### Option 3 CALCULATOR

The use of the MOUSE in BASIC programs is explained with the program "CALCULATOR". This program simulates a pocket calculator which keys are pressed by the MOUSE.

The MOUSE cursor appears as a red hand which is used to press the keys with the forefinger.

After having moved this cursor to a digit, press the MOUSE key to enter it. If a complete number is entered by this way simple arithmetic calculations are chosen in the same manner while the number disappears. Finally the result is displayed after entering the "=" symbol.

With "LO" the result is cleared and the "CALCULATOR" is ready for the next problem.

Erroneous entrys during calculating can be cancelled by "C" .

Illegal operations (like division by 0) cause an error. Due to the display of the message, the graphic of the CALCULATOR is shifted up on the screen. In this situation the CALCULATOR will perhaps not work correctly. To clear this error condition the console has to be switched of for a short moment.

With the "END" option the program can be left returning to BASIC.



#### Option 4 BREAKOUT

The goal of the game BREAKOUT is to shoot stones out of a wall with a ball. While the ball hits stones or is reflected at the upper or side limits it is in the game. If it has fallen to the ground line it is lost. To avoid this the player has a racket which is the MOUSE cursor to beat the ball back.

If all stones are removed a new round begins.

Due to the level points for each stone are scored and best results are highscored.

At the beginning of the game the player has six balls and can chose the level, moving the MOUSE cursor = racket under the chosen level and pressing the MOUSE key.

The game can be started if the ball is on the racket by pressing the MOUSE key.

If a player has made 10000 points he gets an additional ball. During the game the level increases, also exceeding the value of 10.

To leave the program press FCTN Quit.

This program is intended as an advanced example for involving the control-software for the MOUSE (named MOUSE) in assembly-programs.

#### IN CASE OF DIFFICULTY

If you have problems with the performance of your TI-MOUSE, check the following before having the unit serviced.

- Check if the plastic protective strip was removed (see attaching the TI-MOUSE)
- Be sure the unit is connected to the nine-pin outlet on the left side of the console (not on the back).
- Read the manual included with the module you are using to see if it is designed to work with the MOUSE. Remember, not all modules use the MOUSE.
- Be sure that the MOUSE has proper contact to the surface on which it is used. If the friction is too less or too high, or the surface is not rigid, plain and horizontal, difficulties can occur. Also grooves can cause malfunction.
- If a statement concerning the MOUSE causes the error message

```
SUBPROGRAM NOT FOUND
IN line
```

Check for correct spelling of the statement

If the message

```
I/O ERROR 02 IN line
```

is displayed, also spelling may be incorrect.

- If the MOUSE cursor does not appear, move the MOUSE around on the desk since it can be possible that the actual position returned from the MOUSE is outside the screen.

Also brand-new units should be moved around several times for breaking in them.

If no cursor appears after this, check your program for correct definition of the sprite of the MOUSE cursor.

- If a program will not work as expected check for correct application of the concerned statements.
- Errors in programs probably will be caused by neglecting to load the control software.

## FOR TECHNICAL ASSISTANCE

For technical questions such as programming, specific Home Computer applications etc. you should consult the retailer from whom you purchased your equipment.

Because of the number of suggestions which come to MECHATRONIC from many sources containing both new and old ideas, MECHATRONIC will consider such suggestions only if they are freely given to MECHATRONIC. We do not agree to receive any suggestions in confidence. Therefore, if you wish to share your suggestions with MECHATRONIC, or if you wish us to review any BASIC language program which you have developed, please include the following statement in you letter:

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## MAINTAINANCE AND SERVICE INFORMATION

### CARE OF THE MOUSE

Treat the TI-MOUSE with the same care you give other precision electronic products.

Protect it from mechanical shock, vibration wet surface and debris.

Observe the following precautions when the MOUSE is not in use.

First, take care to ensure that no pressure is exerted on the MOUSE key and the whole MOUSE case.

For transport put in the plastic protective strip to lock the ball.

Second, do not store the MOUSE near a heat source, such as a hot water heater, an oven or a furnace.

If the MOUSE becomes soiled, disconnect it from the computer, wipe it gently with a damp, soft cloth, and dry it with a soft towel before reattaching it to the computer. Do not spray the unit with any cleaning agents eg. thinners and so on.

Note: Before inserting the MOUSE connector into the outlet on the console, touch it to some metal object to ensure that it has not built up a static charge.

See the User's Reference Guide for further details.

PLEASE NOTE THAT THE HOME COMPUTER IS INTENDED FOR HOME USE AND NOT INTENSIVE USE IN A COMMERCIAL OR BUSINESS ENVIRONMENT.

## TECHNICAL DATA AND ASSISTANCE

### TECHNICAL DATA

QUANTITY	VALUE	UNIT SPECIFICATION
<u>Mechanical performance</u>		
Physical dimensions (L x B x H)	102 x 64 x 33	mm desk surface plain horizontal, rigid
Resolution	.26	mm/ count speed $15 \pm 5$ mm/sec
Hysteresis	$0 \pm 20$	count unit moves any direction and returns same path. distance 76.2 mm speed $15 \pm 5$ mm/sec
Operating force (any direction)	80	gf load <del>100</del> gf vertical force
Operating force (select switches)	$120 \pm 80$	gf
Weight	$170 \pm 20$	gf
<u>Maximum operating conditions</u>		
Temperature (operating)	0 to 40	C
Temperature (storage)	- 15 to 60	C
Humidity (operating)	85 or less	%RH
Humidity (storage)	85 or less	%RH
<u>Electrical characteristics</u>		
Resolution of encoder	30	pulses/ rotation both encoders
Supply voltage (typical)	$5.0 \pm .25$	V
Supply current (typical)	$25 \pm 15$	mA

## MECHATRONIC TI MOUSE

### THREE-MONTH LIMITED WARRANTY

MECHATRONIC EXTENDS THIS WARRANTY TO THE ORIGINAL CONSUMER PURCHASER OF THE TI-MOUSE.

#### WARRANTY DURATION

This hardware is warranted for a period of three (3) months from the date of original purchase by the consumer.

#### WARRANTY COVERAGE

This hardware is warranted against defective materials or workmanship. THIS WARRANTY IS VOID IF THE ACCESSORY HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLIGENCE, IMPROPER SERVICE OR OTHER CAUSES NOT ARISING OF DEFECTS IN MATERIALS OR WORKMANSHIP.

#### WARRANTY DISCLAIMERS

ANY IMPLIED WARRANTIES ARISING OUT OF THIS SALE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE THREE-MONTH PERIOD. MECHATRONIC SHALL NOT BE LIABLE FOR LOSS OF USE OF THE SYSTEM OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE CONSUMER OR ANY OTHER USER.

Some states do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusions may not apply to you.

#### LEGAL REMEDIES

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

#### WARRANTY PERFORMANCE

During the above three-month warranty period, your TI-MOUSE will be repaired or replaced with a new or reconditioned unit of the same or equivalent model (at option of MECHATRONIC) when the unit is returned by prepaid shipment to MECHATRONIC. The repaired or replacement unit will be warranted for three months from date of repair or replacement. Other than the postage requirement, no charge will be made for the repair or replacement of in-warranty units.

MECHATRONIC strongly recommends that you insure the unit for value, prior to shipment.

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