



TEXAS INSTRUMENTS HOME COMPUTER

MICROSURGEON™

ARCADE ENTERTAINMENT

SOLID STATE SPEECH™ CARTRIDGE

This cartridge is designed to be used with the Texas Instruments TI-99/4A Home Computer only. Optional **Solid State Speech™ Synthesizer** must be attached to the computer to activate the speech capabilities of the cartridge.

Pilot the robot probe through arteries, veins, and the lymphatic system. Eliminate deadly bacteria, tumors, cholesterol, tapeworms, tar deposits, and other life threatening diseases as you go!



IMAGIC

Microsurgeon

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with staff members of Texas
Instruments Instructional
Communications.

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See important warranty information at
back of book.

Introduction

Do you ever dream of being an expert surgeon? Microsurgeon places you in an imaginary operating room where you work against time to save patients in critical need of treatment. In this fantasy setting, you perform experimental surgery to cure a variety of conditions. Each imaginary medical case presents a

new challenge to your surgical skills. You gain satisfaction from curing patients and accumulating funds for medical research. Use this manual as your guide to successful microsurgery.

In Microsurgeon, you

- Develop your skills in microsurgery by first performing experimental surgery at the student level on practice patient 0
- Treat a variety of different conditions and diseases as you select from 1000 patients
- Use an experimental Robot Probe as your surgical tool
- Diagnose the patient's condition and direct the Probe through the body toward threatening conditions
- Eliminate the conditions with medications from the Probe

With Microsurgeon, you

- Play alone or with a friend
- Use Wired Remote Controllers (joysticks) or keyboard control
- Enjoy multi-screen graphics
- Choose from three levels of difficulty—student, intern, or surgeon
- Have more fun with synthesized speech that simulates the action and excitement of microsurgery

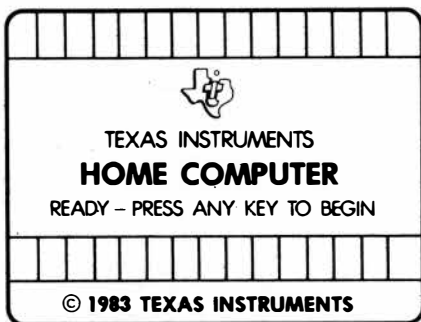
Note: Microsurgeon is designed to work with or without the Texas Instruments **Solid State Speech™** Synthesizer (sold separately). However, the Speech Synthesizer must be attached to activate the voice of the computer.

Using the Solid State Cartridge

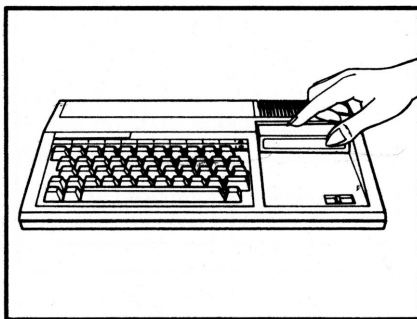
Inserting Solid State Cartridges is easy. If you have any problem inserting the cartridge, or if it is accidentally removed from the slot while in use, please see the "In Case of Difficulty" section in this booklet.

Inserting the Cartridge

1. If you have been programming in BASIC, save your data before inserting a cartridge. When you insert a cartridge into the console, the computer automatically erases all data or program material you have entered and returns to the master title screen to begin the new program.
2. Be sure the cartridge is free of static electricity before inserting it into the computer (see the "Maintenance and Service" section in this booklet).
3. Turn the computer ON, and wait for the master title screen to appear.



4. Slide the cartridge into the slot on the console.



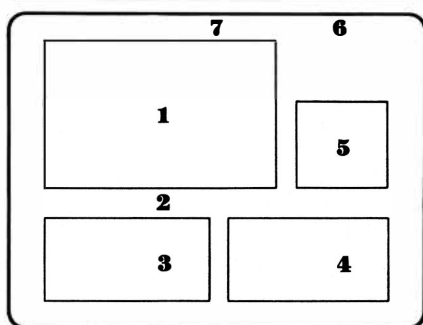
5. Press any key to make the master selection list appear. Then, press the appropriate number key for your selection.

Removing the Cartridge

1. To remove the cartridge at the end of play, press **QUIT** to return to the master title screen.
2. Remove the cartridge from the slot.

You see four small screens during microsurgery. They show the exact position of the Robot Probe in the body, monitor the condition of each organ and the overall status of the patient, and display activity in the patient's room. During microsurgery, the Robot Probe gains and loses power. The amount of

power, your accumulated research funds, and the name of the organ in which the Probe is located appear on screen. The number of your patient and level of expertise also appear.



1. Surgical Screen with Robot Probe

Shows the area of the body with the Robot Probe. The Probe is located within a white-bordered square. You see

- Red arteries
- Purple veins
- Orange lymphatic system

2. Patient Number and Level

Show the number of the patient and your selected level of surgical expertise. These appear below the Surgical Screen throughout the game.

3. Status Screen

Lists each organ and overall status of the patient. The length of the arrows indicates the condition of the individual organs and the patient's overall status.

Arrow Length	Status
No arrow	Good
Between 1st and 3rd dot	Fair
Between 4th and 6th dot	Serious
Between 7th and 10th dot	Critical
Red arrow	Terminal

If you successfully treat an organ, its arrow grows shorter and eventually disappears, signaling a cure. If you neglect to treat an organ, its arrow grows longer, eventually reaching the right side of the Status Screen.

When an organ becomes terminal, its name is framed in red. In general, when two or more organs become terminal, the overall status line is framed in red. Then, the patient's condition is terminal and the game ends.

4. Patient's Room

Shows a hospital room with the patient lying in bed. A doctor or visitor occasionally appears.

5. Close-Up Scanner

Shows a magnified view of the exact position of the Robot Probe. Use the Scanner to stay within veins, arteries, and lymphatic systems for safe and fast travel. The Scanner does not scan bacteria, viruses, and white blood cells.

6. Robot Probe Location and Power

Shows the name of the organ in which the Robot Probe is located. The organ's name appears when the Probe is centered in the organ. The name of an organ does not appear on the Surgical Screen when the Robot Probe is between organs.

Beneath the name you see the number of power units you have to operate the Robot Probe.

7. Research Funds

Shows the amount of your research funds. The amount is updated periodically.

When the Microsurgeon title screen appears, press any key to begin or press the FIRE button on your Wired Remote Controllers (joysticks). First, select your patient number. Second, select the level of play suited to your surgical expertise. Then, navigate the Probe through the

patient's body to areas that need treatment.

Developing Your Skills for Microsurgery

Microsurgery is complex, and your patient's health is in your hands. Follow these steps to develop your skills before advancing to more complicated medical cases.

- Study the manual before you begin.
- Press **AID** to see a preview of game play functions.
- Select patient number 0, a practice patient, as your first case.
- Select the student level of surgical expertise until your skills improve.
- If you do not yet have the skills to save a rapidly deteriorating organ, treat as many diseases as possible to stabilize the patient's overall condition.

Selecting Your Patient

Patients are numbered 0 to 999, giving you a variety of surgical challenges.

Type a number to select your patient and press **ENTER**. To change your selection, press **ERASE** before pressing **ENTER**.

Choosing Surgical Expertise Level

Select one of the following:

Press	Level
0	Student
1	Intern
2	Surgeon

Special Keys

Press	Function
4	To hear EKG sound in Intensive Care Unit room.
5	To hear heart sound.
6	To turn off sensors, producing quiet in the operating room.
P	To pause action during surgery. The word PAUSE appears in place of Robot Probe location. Press any key to resume action. Press key 4 or 5 to resume sound.
AID	To see a preview of game play functions.

You can move the Robot Probe through the body at two speeds. Stay within areas that allow you to travel swiftly and avoid white blood cell attacks. After treating the patient, leave the body carefully through an approved exit. You can play

Microsurgeon with one or two players using the joysticks or the keyboard.

Moving through the Body

Control the speed of the Probe by pressing the **7** key (Slow) or **8** key (Fast). Your quickest route is through the arteries, veins, and lymphatic system. Stay within these routes to avoid constant attack by white blood cells (phagocytes).

Stationary white blood cells (lymphocytes), located in the arteries, veins, and lymphatic system, cannot be destroyed. When moving through lymphocytes, the Robot Probe slows down and can be attacked by phagocytes.

To move from one part of the body to another, move the Probe in the desired direction. The Surgical Screen automatically shows the new section of the body as you proceed.

To leave the body, pilot the Robot Probe slowly through an approved exit to prevent damaging your Probe.

Identifying the Wired Remote Controllers

Each Wired Remote Controller (joystick) serves a different function in Microsurgeon. The primary joystick controls movement and issues medication. The secondary joystick only issues medication. Be sure to identify and use the primary joystick for one-player games.

In two-player games, the player moving the Robot Probe uses the left side of the keyboard or primary joystick. The player issuing medication uses the right side of the keyboard or the secondary joystick.

Using the Wired Remote Controller for Movement

To pilot the Probe, move the lever of the primary joystick in the desired direction.

Lever Position	Direction
Forward (toward the FIRE button)	Up
Backward (away from the FIRE button)	Down
Left	Left
Right	Right
Diagonal	Diagonal

Note: The **ALPHA LOCK** must be in the OFF (up) position when using the Wired Remote Controllers(joysticks).

Using the Keyboard for Movement

Movement of the Robot Probe is controlled by the following keys:

Key	Direction
(↑) E	Up
(↓) X	Down
(←) S	Left
(→) D	Right
(↖) W	Diagonally left, up
(↙) Z	Diagonally left, down
(↗) R	Diagonally right, up
(↘) C	Diagonally right, down

Treatments

There are three medications for the eight conditions that can attack the body. Each condition is treated by one medication. Three medications are contained in the Probe. You must select the right medication to treat each condition. Once a medication has been selected, you can use it repeatedly until you select another

medication. Because the Surgical Screen shows only a small portion of the body, a map is provided to assist you in maneuvering during surgery.

Selecting Medications

To select medications, use these keys:

Press	Medication
1	Ultrasonic Rays
2	Antibiotics
3	Aspirin

Select the appropriate medications to treat each condition.



Ultrasonic Ray



cholesterol buildup (gray, in arteries)



gallstones (dark green, in gall bladder)



kidney stones (light green, in kidneys)



tapeworms (red, in intestine)



tar deposits (black, in both lungs)



tumor (gray, in brain)

Note: Ultrasonic Rays also destroy attacking white blood cells (phagocytes).



Antibiotics



infection from bacteria (green, appears throughout body)



Aspirin



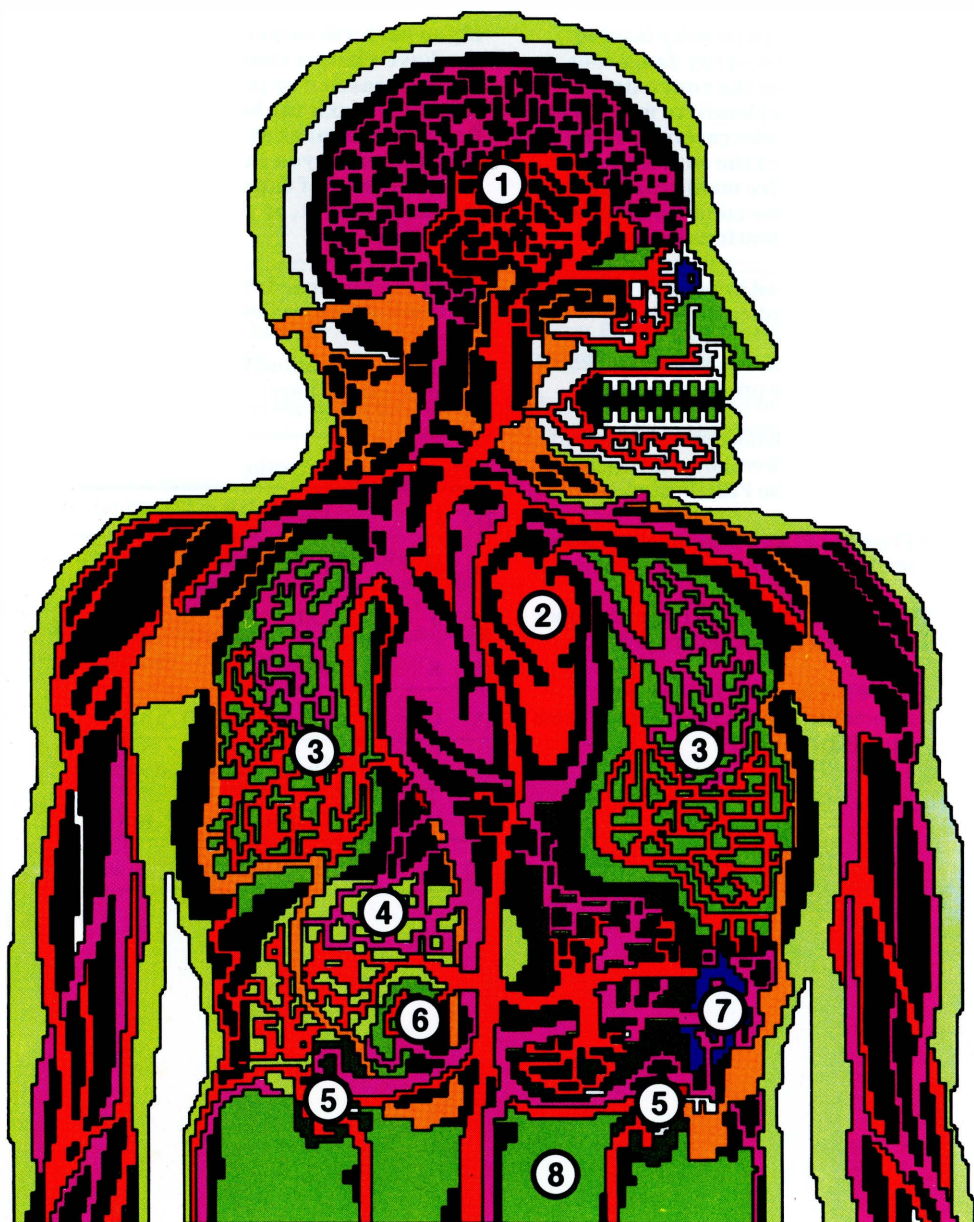
viruses (red, appear and disappear throughout body)

Note: Aspirin slows down viruses, but does not destroy them.

Body Map

The numbers shown below correspond to the body map on the next page.

- 1 Brain
- 2 Heart
- 3 Lung
- 4 Liver
- 5 Kidney
- 6 Gall Bladder
- 7 Spleen
- 8 Intestine



You help your patient by issuing medication to destroy dangerous conditions. Use the convenient joysticks or keyboard to maneuver your Robot Probe carefully into position. Select the correct medication. Fire medication at the condition. Some conditions require repeated medications for a cure.

If you perform surgery with a friend, you have a better chance of curing difficult cases. Try to save your patient and exit the body before the Robot Probe runs out of power. When the game ends, you can play again at the same level of expertise and with the same patient, or you can choose a new challenge.

Using the Wired Remote Controllers for Issuing Medication

To release medications from the Robot Probe using the primary joystick:

- Hold the **FIRE** button down, move the lever in the direction you wish to fire, and release the **FIRE** button.
- Press the **FIRE** button again to issue medication in the same direction.

To release medications from the Robot Probe using the secondary joystick:

- Move the lever in the desired direction. (It is not necessary to press the **FIRE** button.)

Using the Keyboard for Issuing Medication

To release medications from the Robot Probe, use these keys:

Key	Direction
(↑) I	Up
(↓) M	Down
(←) J	Left
(→) K	Right
(↖) U	Diagonally left, up
(↙) N	Diagonally left, down
(↗) O	Diagonally right, up
(↘) ,	Diagonally right, down

Ending the Game

The game ends when one of the following happens:

- Patient's general status becomes terminal
- Robot Probe exhausts power supply while still in patient
- Robot Probe exits the body properly through the ear, eye, nose, or mouth
- Robot Probe exits the body improper through any other point

Playing Again

- Press **REDO** to play using the same options.
- Press **BACK** to select new options before starting a new game.

As a microsurgeon, your primary goal is to save your patient. For your services, you are awarded funds to promote medical research. The total amount of research funds and power units appears on the screen. Research funds are recalculated periodically. Your level of expertise and your patient's initial and final

conditions influence the number of power units and research dollars you accumulate.

Robot Power Units

You receive power units to operate the Robot Probe. You gain and lose Robot Probe power units—and research funds—as you play the game. At the end of the game, your power units increase if you exit properly.

Action of Robot Probe	Result in Power Units
Operate at normal speed	Use 1 every 20 seconds
Operate at faster speed	Use 4 every 20 seconds
Issue medication	Lose 1
Hit virus	Gain 3
Touched by virus or phagocyte	Lose 1
Hit other condition	Gain 1
Exit improperly with the Robot Probe	Lose all

Note: The Robot Probe loses additional power units the longer it is touched by a virus or phagocyte (an attacking white blood cell).

Student Level

1. You receive \$1 for each power unit at the beginning of surgery.

2. You receive additional research funds based on the patient's initial status.

- Good \$ 0
- Fair 100
- Serious 200
- Critical 300

3. As you play, you:

- Gain or lose \$1 as you gain or lose power units
- Earn \$200 for each organ saved
- Earn \$200 for piloting the Robot Probe through an approved exit

4. At the end of the game, you earn points for having improved your patient's condition from the initial status.

- Good \$4,000
- Fair 3,000
- Serious 2,000
- Critical 0
- Terminal 0

Intern Level

1. You receive \$10 for each power unit at the beginning of surgery.

2. You receive additional research funds based on the patient's initial status.

- Good \$ 0
- Fair 1,000
- Serious 2,000
- Critical 3,000

3. As you play, you:

- Gain or lose \$10 as you gain or lose power units
- Earn \$2,000 for each organ saved
- Earn \$2,000 for piloting the Robot Probe through an approved exit

4. At the end of the game, you earn points for having improved your patient's condition from the initial status.

- Good \$40,000
- Fair 30,000
- Serious 20,000
- Critical 0
- Terminal 0

Surgeon Level

1. You receive \$100 for each power unit at the beginning of surgery.

2. You receive additional research funds based on the patient's initial status.

- Good \$ 0
- Fair 10,000
- Serious 20,000
- Critical 30,000

3. As you play, you:

- Gain or lose \$100 as you gain or lose power units
- Earn \$20,000 for each organ saved
- Earn \$20,000 for piloting the Robot Probe through an approved exit

4. At the end of the game, you earn points for having improved your patient's condition from the initial status.

- Good \$400,000
- Fair 300,000
- Serious 200,000
- Critical 0
- Terminal 0

As you play Microsurgeon, you discover strategies to help you become a stronger player. As you become more experienced, you may wish to play at more advanced levels that challenge your new skills. Watch your playing ability improve with each successful game.

The Skilled Surgeon

1. A skilled microsurgeon
 - Treats the most dangerous conditions first
 - Avoids phagocyte attacks by staying within red, purple, or orange areas
 - Uses the Close-up Scanner to navigate the avenues of the body safely
 - Watches the status lines to detect changing conditions of individual organs and of the patient
2. Some conditions on the Status Screen require special diagnosis and treatment. A skilled microsurgeon
 - Cures infection by destroying bacteria
 - Treats heart trouble by eliminating cholesterol buildup in arteries throughout the body
 - Destroys cholesterol buildup and tumors in the brain
 - Improves the status of the lungs by treating both of them

Challenges of the Game

Watch out for these special challenges for microsurgeons.

- The Robot Probe and Scanner are experimental surgical tools and are slow to find and display diseases. When the Status Screen indicates disease in an organ, wait in the organ until the disease appears, and then destroy it with proper treatment.
- Lymphocytes impede the movement of the Probe and allow phagocytes to attack.
- Lymphocytes increase as the patient's condition becomes more serious.
- The Robot Probe cannot destroy lymphocytes.
- Viruses are disabled, not destroyed, by aspirin.
- Tumors reappear more quickly than other conditions.
- Phagocytes violently attack the Probe if you stay outside the safe travel routes for too long.

Glossary

The following is a glossary of terms used in Microsurgeon. These may be helpful to you in playing the game. The definitions are only related to the game and are not necessarily standard medical terms.

Antibiotic

A chemical substance used to treat bacterial infections.

Artery

Blood vessels of the circulatory system that carry blood away from the heart to other parts of the body. The Robot Probe moves through arteries smoothly.

Aspirin

Temporary reliever of symptoms caused by viruses.

Bacteria

Microscopic organisms, some of which produce disease.

Bone

Hard tissue making up the skeleton of the body.

Brain

Center of human thought and part of the central nervous system protected by the skull.

Cholesterol

Substance gradually blocking arteries, leading to high blood pressure and other medical problems.

Ear

Delicate system of bones, fluid, and hair cells that allows hearing. The Robot Probe can safely exit through the ear.

Eye

Sensitive organ that allows sight by detecting light intensity and color. The Robot Probe can safely exit through the eye.

Gall Bladder

Part of the liver system that concentrates and stores bile.

Gallstones

Hard pellets forming in the gall bladder and causing extreme discomfort.

Heart

Keeps oxygenated blood circulating throughout the body by a series of rhythmic contractions.

Intestines

Absorb water and nutrients and eliminate waste material.

Kidneys

Filter wastes and excess water from the blood.

Kidney Stones

Hard pellets forming in the kidneys and causing extreme pain.

Liver

Filters toxic wastes from the blood and secretes bile.

Lungs

Allow blood to exchange carbon dioxide for oxygen.

Lymph

Plasma-like fluid containing white blood cells.

Lymphatic System

System of vessels that carries lymph to the bloodstream. The Robot Probe moves easily through the lymphatic system.

Lymphocytes

White blood cells found in the lymphatic and circulatory systems. They slow the movement of the Probe.

Mouth

Opening through which food and drink pass into the body. The Robot Probe can safely exit through the mouth.

Neck

Connects the head and trunk.

Nose

Allows inhalation and detects odors. The Robot Probe can safely exit through the nose.

Phagocytes

White blood cells that roam through the circulatory system, destroying foreign bodies or organisms.

Stomach

Begins the digestive process.

Tapeworms

Parasites that live in the intestines, robbing the body of nutrients.

Tar Deposits

Dark patches on the lungs resulting from the inhalation of smoke and interfering with the exchange of gases in the lungs.

Tumor

Abnormal masses of tissue.

Ultrasonic Rays

A Robot Probe treatment using sound waves to eliminate affected tissue.

Veins

Vessels carrying blood from all parts of the body back to the heart.

Virus

An ultramicroscopic organism causing disease.

Cartridges are durable devices, but they should be handled with the same care you would give any other piece of software media. Information concerning use and service can be found in your User's Reference Guide.

Caring for the Cartridge

Keep the cartridge clean and dry.

Caution: The contents of a cartridge can be damaged by static electricity discharges.

Static electricity buildups are more likely to occur when the humidity of the air is low (during winter and in areas with dry climates). To avoid damaging the cartridge, touch any metal object (a doorknob, a desk lamp, etc.) before handling it.

If static electricity is a problem where you live, you may want to buy a special carpet treatment that reduces static buildup. These preparations are usually available from hardware and office supply dealers.

In Case of Difficulty

If the cartridge programs do not appear to be operating properly, return to the master title screen by pressing **QUIT**. Withdraw the cartridge, align it with the cartridge opening, and carefully reinsert it. Then press any key to make the master selection screen appear. (**Note:** In some instances, it may be necessary to turn the computer off, wait several seconds, and then turn it on again.)

If the cartridge is removed from the slot while the cartridge contents are being used, the computer may behave erratically. To restore the computer to normal operation, turn the computer off and wait a few seconds. Then, reinsert the cartridge and turn the computer on again.

Three-Month Limited Warranty Home Computer Software Cartridge

Texas Instruments Incorporated extends this consumer warranty only to the original consumer purchaser.

Warranty Coverage

This warranty covers the electronic and case components of the software cartridge. These components include all semiconductor chips and devices, plastics, boards, wiring and all other hardware contained in this cartridge ("the Hardware"). This limited warranty does not extend to the programs contained in the software cartridge and in the accompanying book materials ("the Programs").

The Hardware is warranted against malfunction due to defective materials or construction. **This warranty is void if the Hardware has been damaged by accident, unreasonable use, neglect, improper service or other causes not arising out of defects in materials or workmanship.**

Warranty Duration

The Hardware is warranted for a period of three months from the date of the original purchase by the consumer.

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. Texas Instruments shall not

be liable for loss of use of the Hardware 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 in those states.

Legal Remedies

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

Performance by TI Under Warranty

During the above three-month warranty period, defective Hardware will be replaced when it is returned postage prepaid to a Texas Instruments Service Facility listed below. The replacement Hardware will be warranted for three months from date of replacement. Other than the postage requirement, no charge will be made for replacement.

TI strongly recommends that you insure the Hardware for value prior to mailing.

Texas Instruments Consumer Service Facilities

U.S. Residents:

Texas Instruments Service Facility
P.O. Box 2500
Lubbock, Texas 79408

Canadian Residents:

Texas Instruments Consumer Service
41 Shelley Road
Richmond Hill, Ontario, Canada
L4C5G4

Consumers in California and Oregon
may contact the following Texas
Instruments offices for additional
assistance or information.

Texas Instruments Consumer Service
831 South Douglas Street
El Segundo, California 90245
(213) 973-1803

Texas Instruments Consumer Service
6700 Southwest 105th
Kristin Square, Suite 110
Beaverton, Oregon 97005
(503) 643-6758

Important Notice of Disclaimer Regarding the Programs

The following should be read and
understood before purchasing and/or
using the software cartridge.

TI does not warrant that the Programs
will be free from error or will meet the

specific requirements of the consumer.
The consumer assumes complete
responsibility for any decision made or
actions taken based on information
obtained using the Programs. Any
statements made concerning the utility
of the Programs are not to be construed
as express or implied warranties.

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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 in those states.

Quick Reference Guide

TI-99/4A

(↑) E (↓) X Controls vertical movement of the Robot Probe.

(←) S (→) D Controls horizontal movement of the Robot Probe.

(↖) W (↗) R Controls diagonal movement of the Robot Probe.
(↙) Z (↘) C

(↑) I (↓) M Issues medication in a vertical direction.

(←) J (→) K Issues medication in a horizontal direction.

(↖) U (↗) O Issues medication in a diagonal direction.
(↙) N (↘) ,

P Stops the game temporarily.

1 Selects Ultrasonic Ray medication.

2 Selects Antibiotic medication.

3 Selects Aspirin medication.

4 Turns on EKG Sound Sensor.

5 Turns on Heart Sound Sensor.

6 Turns off Sound Sensor.

7 Moves the Robot Probe at slow speed.

8 Moves the Robot Probe at fast speed.

FCTN 3 (ERASE) Allows you to select another patient number before **ENTER** is pressed.

FCTN 7 (AID) Previews game play functions.

ENTER Proceeds to the next screen after **AID** is pressed. Press **ENTER** after selecting your patient number.

FCTN 8 (REDO) Begins a new game using the same options.

FCTN 9 (BACK) Returns to the Microsurgeon title screen.

FCTN = (QUIT) Returns to the master title screen.

Note: If the optional Wired Remote Controllers (joysticks) are used, eight directions are available to maneuver the Robot Probe; move the lever in the desired direction.

The **ALPHA LOCK** must be in the OFF (up) position when using the Wired Remote Controllers.