

1979

sell-pay reports a significant jump in wagering. "This is one of the biggest advancements in our industry," exults Douglas Donn, president of Gulfstream Park Racing Assn. in Hollendale, Fla. "Not healthy." Track owners admit they need help. "Ours is not a healthy business," concedes an official of the Thoroughbred Racing Assns. Wagering growth is barely keeping pace with inflation, and attendance at thoroughbred and harness races from 1967 to 1977 grew by only 16% even though the number of races leaped by 48%.

At tracks using sell-pay, union resistance has been mild, partly because contracts have not been up for renegotiation. But the success of those tracks in cutting employment has aroused unions in New York and California. "There is no possibility for a labor agreement in California unless these machines are abandoned," says a Los Angeles parimutuel clerks spokesman.

Despite the tough talk, Chairman John A. DeVries of American Totalisator says sales are snowballing faster than expected. Within five years he expects to penetrate about 60% of the 240 horse and dog racing associations in North America. Says an official at Sportsman's Park in Cicero, Ill.: "There is no question this is here to stay." ■

ELECTRONICS

TI gets set to move into home computers

Texas Instruments Inc. is finally making a move to get into the personal computer business—a move anxiously awaited by the giant company's two-dozen competitors in this budding market—and is doing it in a way that is raising questions over the Federal Communications Commission's role in regulating this segment of the computer industry.

Some industry analysts expected that TI would dominate this business by the end of 1979, just as it came to dominate the markets for digital watches and calculators. But TI has been moving cautiously and only now is about to announce its computer. It will incorporate a computer with a keyboard in a typewriter-size console, probably will retail for \$300 to \$400, and will plug into any home TV for video display.

That TV link has been the problem for TI. The active connector between a home computer and the TV set, as well as the computer itself, must be tested by the FCC to ensure noninterference with radio or TV broadcasting. TI submitted its connector—known as an RF modulator—

with the computer late last year, and the unit failed the FCC laboratory's tests, not uncommon the first time around. Later, the company asked the FCC to examine the modulator alone, but laboratory officials said the rules forbid that.

FCC regulations. In February, TI asked the commission to adopt new rules allowing it to test all modulators, including those sold separately from comput-

A product announcement is expected soon. An FCC waiver is possible

ers, which would allow it to control the interference problem. Oddly enough, home computers sold on a purely stand-alone basis are not inspected by the FCC, although everyone involved knows that many buyers will connect them to their TV sets using modulators bought separately. These devices appear to violate the agency's rules.

Home computers sold with a video display as an integral part of the product are not examined by the FCC either. The other part of TI's proposed new rules for the agency attempts to tackle this problem by giving the FCC authority to examine the specifications for all home computers and video games to see if they are likely to cause interference.

The problem is that such changes in the rules can easily take a year or longer for the FCC to approve. Late last month, TI made it clear that it does not want to wait. It asked the FCC to waive its rules so that it can market its home computer while the commission considers the proposed new rules. The computer would meet the new specifications proposed by TI.

TI already has sent its modulator to the FCC, and shortly "will be submitting data that demonstrates we have taken reasonable measures to prevent any interference to TV or radio reception," says C. Morris Chang, TI group vice-president. Chang believes that the company has a good chance to get its waiver, and an FCC official acknowledges that "if there is a good reason, they are often granted."

Moving ahead. The electronics giant seems ready to move fast. "We are hopeful that the FCC will act rather expeditiously," Chang says. But if the FCC denies the petition, it would not stop TI from moving ahead. "We could market a home computer with a video monitor [a separate video display that would not require any FCC O. K.]," he says. But, he adds, "We do not think that the public would be best served by this approach, and it would mean a higher cost for initial buyers."

Using a monitor instead of the home TV would add \$200 to \$400 to the price of a home system, something that would limit the size of the market, at least

initially, TI believes. Nearly all of the home computers now on the market have a built-in or an optional monitor, partly to avoid the need to get FCC approval.

The home or personal computer could easily become the most important consumer electronics product in the 1980s. TI, for example, has set up an entire division for its personal computer and is developing a host of products for it, including a "floppy disk" memory to store such data as family records, and a device to permit it to "talk" by telephone to other computers.

While some observers describe TI as the company most likely to stimulate a booming market that could soar beyond \$3 billion annually by the early 1980s, the market is not waiting for TI. Last year more than 200,000 systems brought in over \$500 million in retail sales. TI executives, however, will not admit the market is taking off without them.

"I'm not surprised by the growth of the home computer market," Chang says. "It's going pretty much as I expected a year ago." With nearly all of the current models going to hobbyists, businessmen, and educators, he believes that the "real home computer market is not yet being served." Adds Chang: "The game is barely beginning." ■

THE ADMINISTRATION

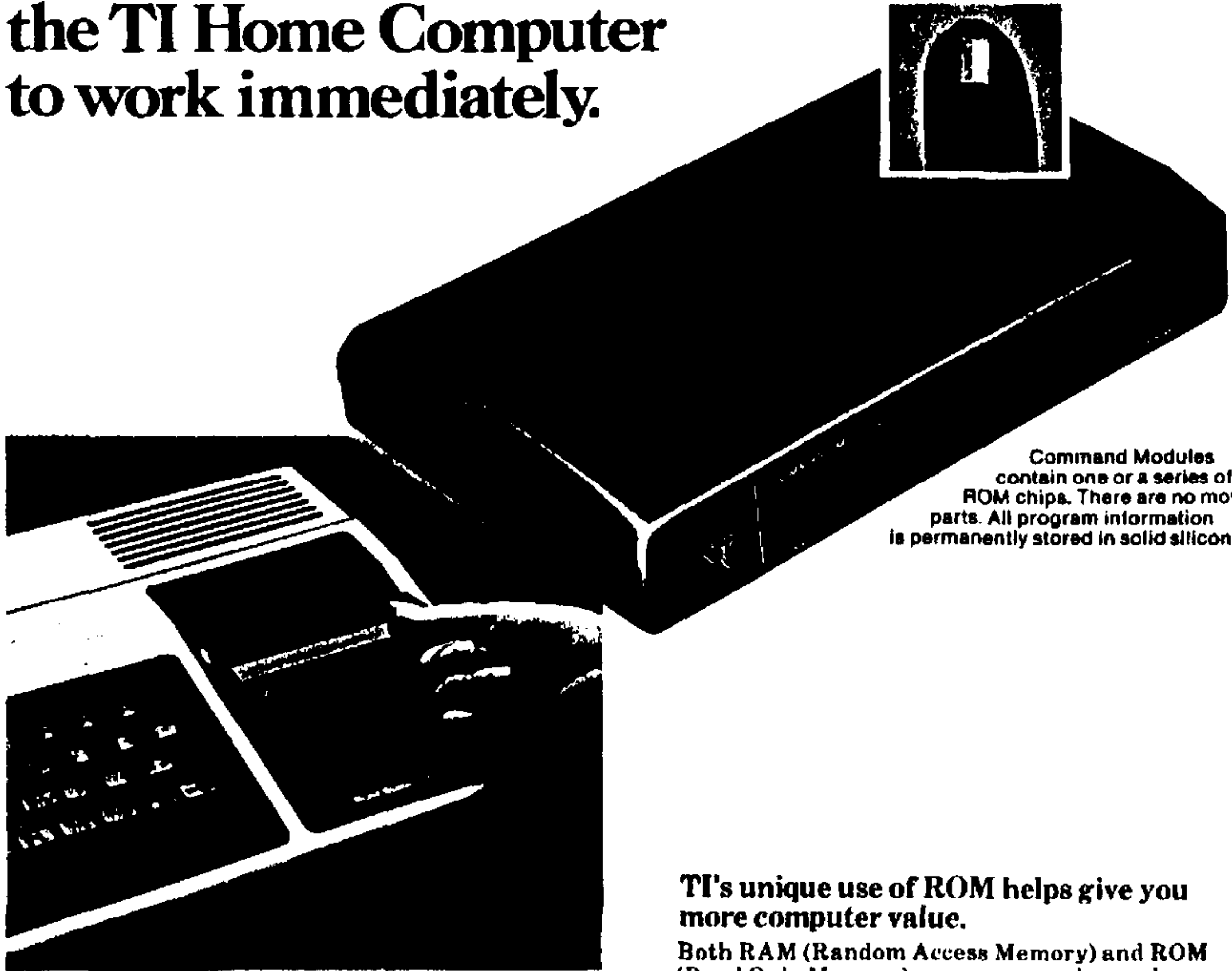
The political problems of a smaller deficit

The Office of Management & Budget will announce before the end of this month that a stronger-than-expected economy and soaring inflation will cause the budget deficit in the current fiscal year to be at least \$3 billion less than predicted only two months ago. Ironically, this reduction in red ink is creating political problems for the Carter Administration.

The new estimate is that the deficit will be about \$34 billion, down from the January estimate of \$37.5 billion. That makes Carter's goal of a \$29 billion deficit in fiscal 1980—part of his effort to bring the budget into balance—look less than impressive. And not only are Carter's efforts to balance the budget downplayed, Congress could be inspired to make more cuts of its own. At the same time, the Administration fears that moving too quickly could tip the economy into recession.

Tempting target. Plans to trim Carter's fiscal 1980 budget proposals already are flourishing on Capitol Hill. Senator Henry L. Bellmon (R-Okla.), ranking

Solid State Software™ Command Modules not only eliminate unnecessary programming, they make it possible for almost anyone to put the TI Home Computer to work immediately.



Command Modules contain one or a series of ROM chips. There are no moving parts. All program information is permanently stored in solid silicon.

No other memory system is so convenient or so simple to use.

Getting a computer up and running used to require a lot of programming knowledge and complex, time-consuming steps.

But TI's system is today's most advanced computer program system – whether you intend to program in BASIC (TI BASIC is accessible with only two keystrokes) or use one of TI's many ready-to-use Solid State Software programs.

Each plug-in Command Module automatically gives your TI Home Computer an entirely new capability. Each module is a complete, self-contained program with its own extra memory capacity.

Solid State Software is a proven concept – an innovation developed for TI's line of advanced programmable calculators.

TI's unique use of ROM helps give you more computer value.

Both RAM (Random Access Memory) and ROM (Read Only Memory) are necessary in any home computer. But the more memory you have, the higher the cost of the computer – particularly if it uses large amounts of expensive RAM.

With most other computers you normally must load ready-to-use programs into the computer's RAM system from an external source, like an audio cassette. This means your computer must contain enough RAM to house that external program. If you had to supply enough RAM to contain our "Video Chess" program, it would take more than 80K bytes. And the cost of a RAM memory that large could easily put the computer out of the reach of most people.

That's exactly why Texas Instruments uses solid state ROM integrated circuit chips inside each Command Module to hold pre-programmed instructions. While the TI Home Computer contains plenty of RAM (16K), it's used for your input *not* for pre-programmed instructions.

BYTE News...

ATARI'S NEW COMPUTERS. The recently announced Atari Model 400 and 800 personal computers are major entries into the market. The 8 K nonexpandable 400 (suggested retail \$500) sports a touch audio feedback keyboard and a single read only memory cartridge slot, plus cassette I/O. It also has 16 color graphics with eight luminance levels (!) The 48 K expandable 800 (suggested retail \$1000 with 8 K and cassette recorder) has additional color features, full keyboard, 8 K BASIC, high resolution graphics, two read only memory cartridge slots, and much more. Both units use a modified 6502. Availability: August 1979 (limited quantities); full availability: Fall 1979. More details next month.

TI'S NEW PERSONAL COMPUTER. Rumors are flying about Texas Instruments' impending entry into the personal computing market. The unit will reportedly use the TMS 9900 processor with 40 K of read only memory circuits, will generate 20 lines of 40 characters on a standard television, will have provisions for accommodating video disk players and video tape recorders, and will have sophisticated sound production. Sources predict a mid-1979 unveiling.

TI AND GTE DEVELOPING HOME DATA RETRIEVAL SYSTEMS. Since Labor Day, Texas Instruments has been testing a "Teletext" home information system which displays on a standard home television set via a decoder unit. The decoder can be internal or external to the television set. It is expected that the decoder should add about \$50 to the television's cost. The data is transmitted during the frame blanking time. The viewer can elect to view the data, the standard picture, or the data superimposed on the picture. Testing should continue throughout 1979. FCC approval is required.

Last October General Telephone & Electronics gave a presentation and demonstration to the FCC of their system, which uses a microprocessor. It would allow a user to retrieve data from a number of different data banks and have it appear on their television screen. The system is still in a very early stage of development.

A television based data retrieval system, called Viewdata, is already in operation in Great Britain. It was developed by the British Post Office.

WORD PROCESSING PRINTERS USING DOT MATRIX ARE COMING. All present word processing printers use character impact printing mechanisms and are expensive (typically over \$2000). The most popular are the Selectric, Diablo and Qume printers. Dot matrix printers are faster and cheaper but produce crudely formed characters generally considered undesirable for word processing applications. However, several companies are working on dot matrix printers to improve their printing quality. By moving the dots closer together to 1000 dots per inch or closer, characters can be formed which are very close to those of the Selectric. Further, since the dot matrix is under direct processor control, changing a character font requires only a program change rather than a type element change. Imagine being able to change from standard to italic type faces using only software! Although the initial entries (from RC Sanders Technology Systems Inc) in this area will cost more than present impact units, costs should decrease substantially to well below present units.

8080/8085 MICROPROCESSOR PRICES DROP. The 8085, Intel's 1 chip version of the 8080 with added features is now selling for \$10 in OEM (original equipment manufacturer) quantities. The 8080 is now down in the \$4 to \$5 range. Actually the 8085 is in effect cheaper than the 8080 since it does not need extra support devices and works off only 5 VDC. Therefore, most of the new 8080 designs now use the 8085. It is expected that the 8085 will be down in the \$4 to \$5 range by year's end. The importance of this is that the microprocessor is now insignificant in cost compared to memory and peripheral circuits.

WILL 16 BIT PROCESSORS TAKE OVER? Not yet, at least. There is reason to question whether or not 16 bit processors have achieved the success in the personal computer marketplace achieved by the 8 bit machines. The fact is that there have been at least three 16 bit mainframes available in the personal computer marketplace for over a year now, namely the Technico 9900 computer, the Alpha-Micro computer, and the Heath H-11 computer. Although all three provide better performance than the 8 bit machines, their acceptance does not compare to the smaller machines. It will be interesting to see if any 16 bit mainframes using the Intel 8086 processor will be forthcoming in the near future.

16 BIT PROCESSORS TO BE SECOND-SOURCED. Intel has entered into an agreement with National Semiconductor for the latter to also manufacture the 8086, Intel's 16 bit processor. Zilog has also arranged for second sourcing of their new Z-8000 16 bit processor, but does not expect to be in production until the middle of the year. Intel has been in production on the 8086 since May of last year.

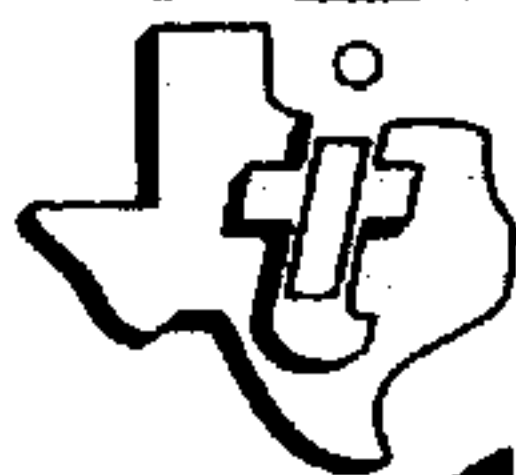


Gamevision™ CARTRIDGE

exclusively for the

TEXAS INSTRUMENTS INCORPORATED

Home Computer



Connect Four

Milton Bradley's CONNECT FOUR vertical checker game is a best seller game whose popularity grows each year. Now, with your Texas Instrument Home Computer you can play the original two-handed game and also the solo game where you can **challenge the computer**. In addition, there are two interesting and more advanced variations, DROP OUT and WILD SPOT for experienced players.

BASIC GAME—TWO PLAYER

Those who have not yet played CONNECT FOUR should play this version first to get familiar with it and its strategy. The "Demonstration Game" on the Cartridge illustrates this game and a typical sequence of play. Watch it while reading the directions.

OBJECT: Be the first to place four of your markers in a row — across, up and down, or diagonally.

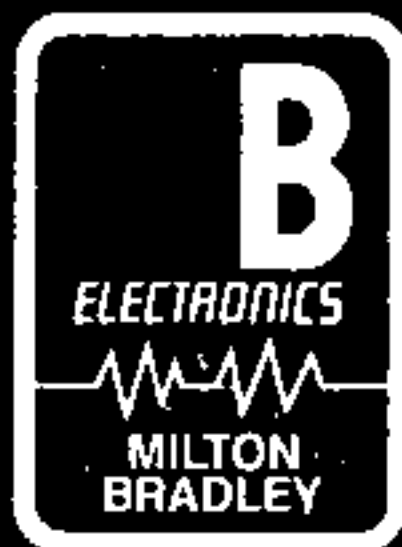
RULES

Player 1 uses RED markers and design. Player 2 uses BLUE markers and design.

1. Players alternate turns in dropping one marker. The starting player in one game should play second in the next. The computer alternates the starting player automatically.
2. Each player, in turn, "drops" a marker down ANY of the 7 slots. The marker will always go down the slot stopping at the bottom empty space of that slot.
3. Turns alternate until one player's markers form "four-in-a-row", horizontally, vertically or diagonally. The display will flash the winning markers and play a little tune.
4. The player who connected four in a row is the winner.
5. Occasionally, with well matched players, the entire board will be filled without a winner. This is a draw!

SOLO GAME One Player Game

1. This plays like the basic game except that the computer controls the BLUE player who alternates the turns with you, the RED player.
2. You also will have a chance to pick the one of four levels of computer ability, from "Novice", the lowest computer skill, to "Master", where the computer play is very smart indeed.



Gamevision



For programmable fun on the TEXAS INSTRUMENTS home computer.

Milton Bradley Company, the leader in the game industry since 1860, now presents classic, ever-popular games in a new, exciting computer format. Gamevision computer software is simple, reliable and easy to use. The practical game cartridges snap right into the T.I. Home Computer, and each have unique programming features.



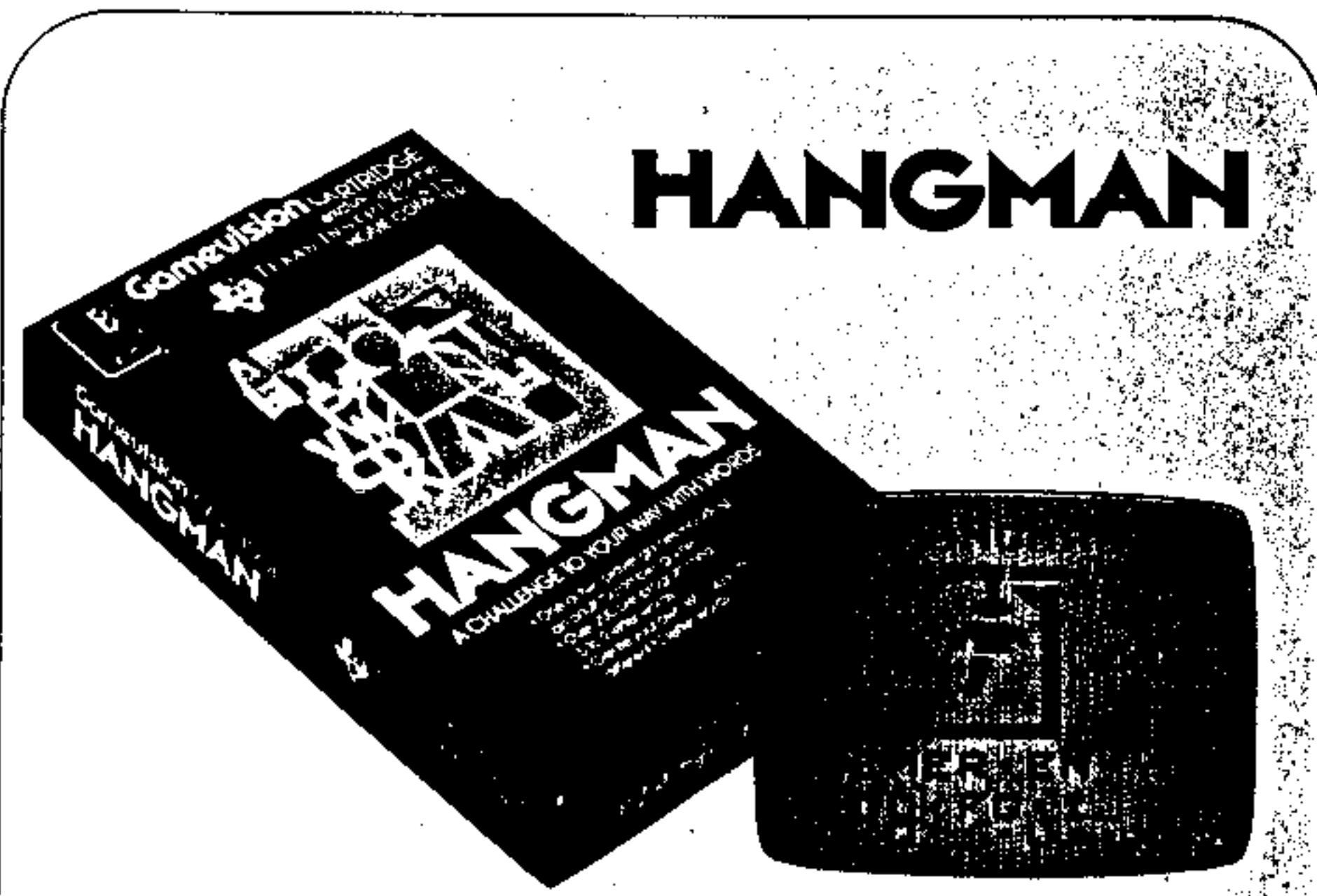
Exciting dice game that combines strategy and chance. Build points by rolling certain number combinations.

- * For 1 or 2 players
- * Choice of Yahtzee or Challenge Yahtzee
- * Dice roll set at random by computer
- * Indication of dice roll number. Keep roll, part of roll, or roll again
- * Large scoreboard lists all possible scoring combinations
- * Player's choice of scoring categories
- * Constant display of each player's running total
- * Musical underscoring



Challenging vertical strategy game. Get four markers in a row, down, across, or diagonally, to win.

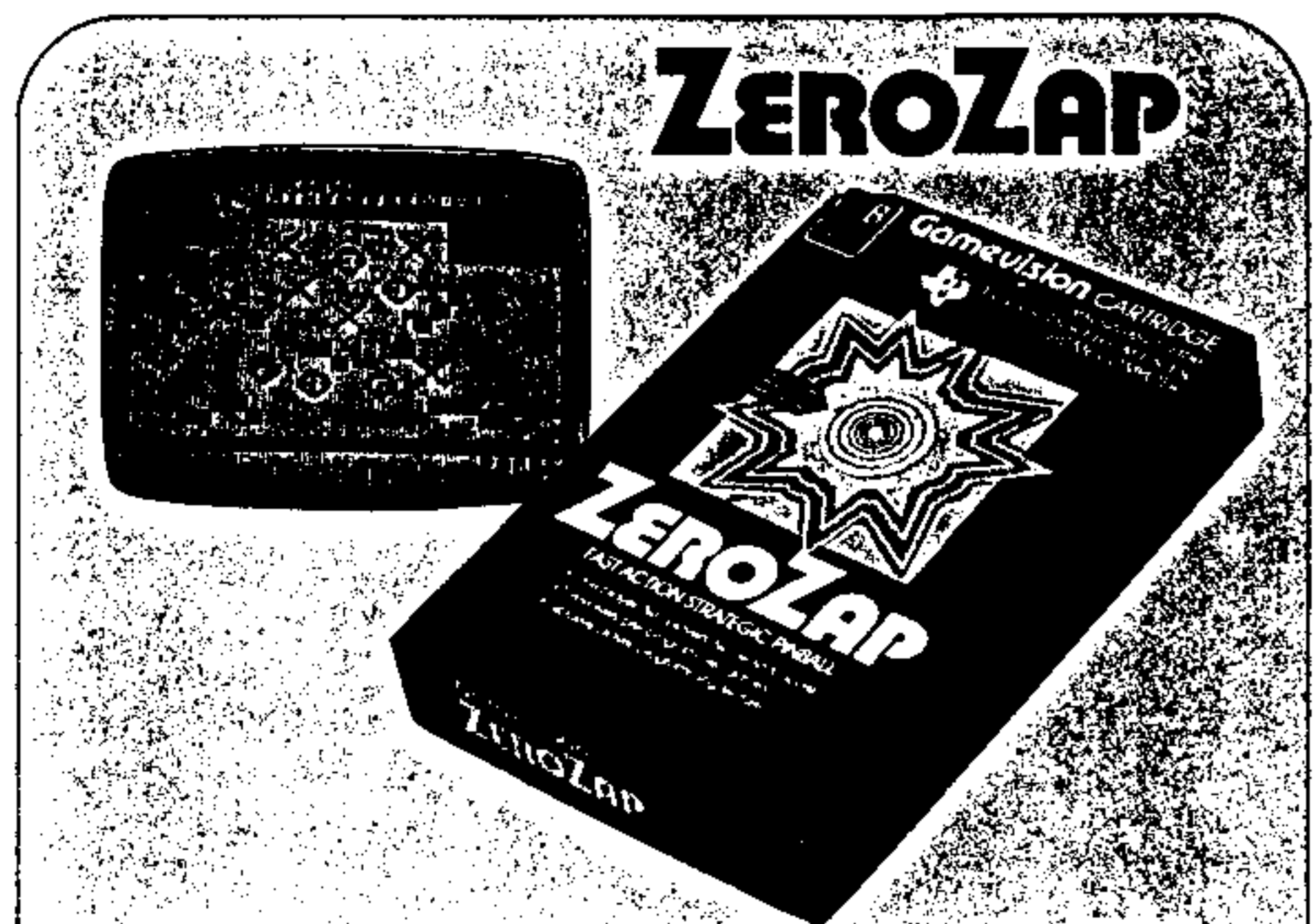
- * For 1 or 2 Players
- * Choice of regular, Wild Spot or Drop Out Game
- * One-player games at 4 skill levels
- * Wild Spot: bingo-type bonus spot
- * Drop Out: drop out a marker to change game picture
- * Player directs marker placement
- * Seven different ways to play in all



HANGMAN

Try to figure out the letters of the mystery word. Every wrong guess brings you closer to the gallows.

- * For 1 or 2 players
- * 200 pre-programmed words
- * Create your own word list of up to 60 12-letter words
- * Correct sequence or scrambled letter indication
- * Special buy-a-letter option
- * Instant correctability of misspelled custom list words
- * Control alphabet indication of remaining letters
- * Musical underscoring
- * Store custom games with a cassette tape recorder

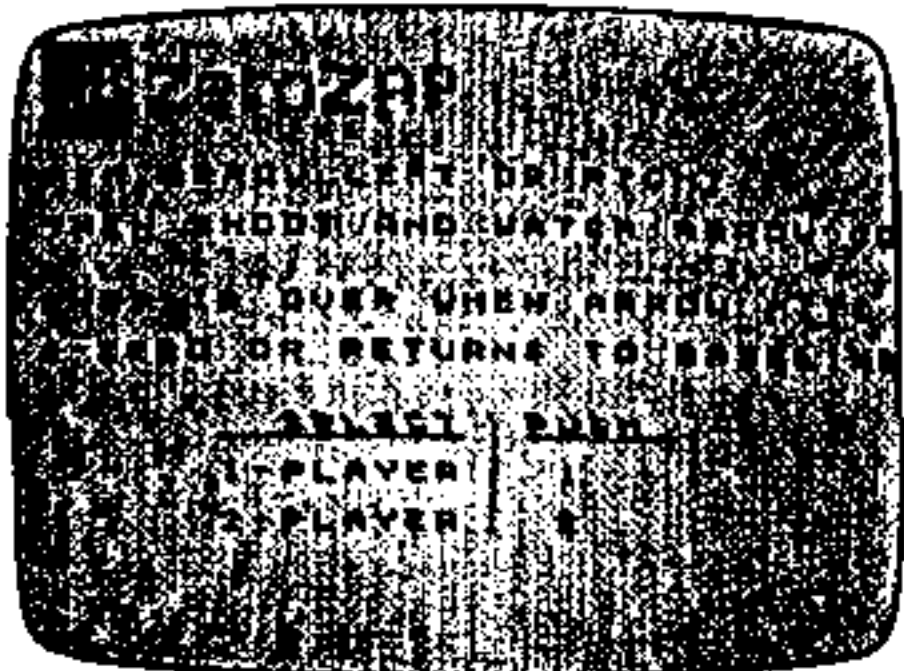


ZEROZAP

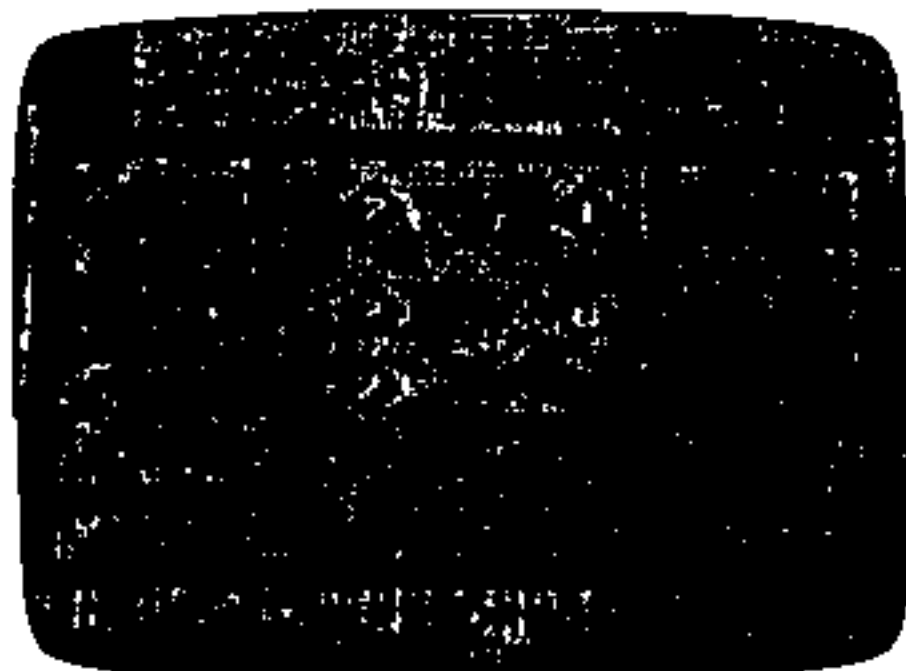
Fast-action pinball with live light and sound effects. Bounce your arrow off point markers for the highest score.

- * For 1 or 2 players
- * 3 fixed playing fields, build-your-own custom field
- * Scoring arrow with variable launching points
- * Large scoreboard
- * Choice of winning score from 100 to 999
- * Constant readout of shots remaining
- * Booby-trapped "0" point markers
- * Electronic light and sound effects
- * Store special games with a cassette tape recorder

Here's how to play . . . Zero Zap !



1. Snap in game cartridge. Choose game variation to be played. Terminal read-out indicates instructions and rules to be followed.



2. Build your own playing field with the cursor. Add or drop features, turn reflectors into point bumpers, even move walls.



3. Program in the desired winning score and number of shots you wish to make each game. Position your arrow and shoot.



4. Watch arrow score points. Turn is over when arrow returns to baseline or hits a "0" point bumper. Scoreboard will flash winning score.

Gamevision: where playing games has come of age.

Gamevision marks a fascinating breakthrough into new dimensions of home entertainment. The superb combination of Texas Instruments' hardware and Milton Bradley's software has led to a computer game system that is unequalled in its field. Each Gamevision cartridge is programmable. Players can determine desired skill levels, game variations, and create their own word lists and playing fields. A programmed flowchart-type instruction system offers players all the game options as they go along. For easier learning, each cartridge features a special demonstration mode, which simulates actual game play. For pure fun and play value, Gamevision can't be beat!



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Springfield, MA 01101

T.I. 6-PACK DEC. '79

Put an IMAGE on your T.I.

This new line of IMAGE cassette programs will introduce you to the full range of color, sound, and computing power of your Texas Instruments system. All six of these cassettes require the dual cassette cable and a standard recorder.



Wildcatting, Wallstreet Challenge, and Mind Master are each 16K to match your system's full capability.

Strategy Pack I, Tournament Brick Bat, and Skill Builder I are special cassettes with multiple programs for extended play and value.

Time Response Monitoring* and interactive programming make these games easy for children to play and enjoy—and also create a continuing challenge that expands to match your experience, creativity, and skill.

*TRM and Time Response Monitoring are trademarks of The Image Producers, Inc.

Tournament Brick Bat 9401
This fast-action skill game may be played against the computer or with a friend. Choose competition mode and challenge another player. Or select the cooperative mode and work as a team while the computer acts as your opponent. Whether you select solo play, competition, or cooperation, the computer keeps score and increases the challenge as your skill improves. Joysticks are required.

Wall Street Challenge 9402
This computer simulation of the stock exchange is easy to play and always challenging. Invest in several corporations ranging from Municipal Power and Light, a blue chip stock that usually provides steady growth, to Offshore Industries Limited, a high-flying speculative stock that is certain to change often. Stock charts, and the Dow Jones show you the trends. Both 8K and 16K memory versions are included.

Wildcatting 9403
This computer program simulates a hidden oil deposit which you will try to find. Select a location on the map that looks promising. The geological survey will show the probability of striking oil below that spot and also estimate the cost per meter to drill. Just like the professional wildcatters, try to strike oil early for maximum profits. The computer creates a different oil deposit each game and shows the view as you drill.

Strategy Pack I 9404
Roman Checkers. This ancient game has been a favorite for hundreds of years. It couldn't be easier to play, yet playing the game well takes skill, cunning, and strategy as you try to out-think your opponent.

Frame Up. Try to out-manuver your opponent or play against the computer in this game of wits and calculated strategy. You will alternate selecting numbers and controlling your opponents choices. Joysticks are optional.

Mind Master 9405
This classic strategy game takes on a new dimension as the computer designs the hidden problems and reports the results of each guess. Multiple players may compete against the computer and each player may select the level of difficulty that matches their skill, ability, and patience. This program also contains a formula for solving logic problems. Create the answer and watch the computer use deductive logic to discover the secret code.

Skill Builder I 9406
Bingo Duel. This fast-action skill game for one or two players provides an exciting challenge, because young children and adults can compete equally. The computer adjusts to match your skill and problems are specifically selected to help you gain speed. **Number Hunt.** Matching numbers is easy enough for young children, yet this computer game quickly advances in difficulty to challenge the experts. Joysticks are required.

ALL THESE CASSETTE PROGRAMS REQUIRE A CASSETTE RECORDER AND CABLES
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TO ORDER BY MAIL SEE OTHER SIDE

BYTE News

NCC/NYC TO BE THE BIGGEST COMPUTER SHOW EVER. The National Computer Conference (NCC) will happen again June 6 thru 9. Last year 57,224 attendees turned out for the show, held in Anaheim CA. This year the NCC will be held in the New York City Coliseum. AFIPS, the sponsoring organization, expects attendance to top that of last year. Approximately 400 companies have reserved 1,700 booth spaces on four floors of the Coliseum, with overflow at the New York Hilton and Americana hotels. Last year 396 companies occupied 1,400 booths.

NCC will have a personal computing adjunct at the Americana Hotel, a few blocks away. It will probably be played down, as it was last year. By way of example, the personal computing exhibitors and speakers were not listed in the regular show program book handed out to each attendee; hence, many attendees last year were unaware of the personal computing part of the show.

S-100 BUS STANDARD TO BE ADOPTED SOON. An IEEE committee has been working on a standard for the S-100 bus for over a year, and adoption is expected very soon. Much of the credit for this standard goes to George Morrow of Thinker Toys.

This standard will do two things. One, it will resolve the conflicts between the use of many bus pins by different manufacturers and eliminate the lack of compatibility between many "S-100 compatible" plug-in boards. Two, and possibly more important, it provides use of the S-100 bus for 16 bit processors for extended addressing of up to 8 M bytes of memory and for master-slave multiprocessor systems. This will make the S-100 bus the most powerful bus around and will, no doubt, continue and increase its popularity.

TI AND HP PC SYSTEMS RUMORS. Texas Instruments and Hewlett-Packard continue to maintain tight lips on their rumored personal computer systems. As TI has said, "TI will not discuss products that have not yet been announced." However, information has leaked out on these units which are expected to have a tremendous impact on the personal computing market. Several rumors have been reported in previous BYTE NEWS columns. The latest is that TI will introduce their entry at either the NCC show in June or the Consumer Electronics Show in July. In either event, it is expected to be ready for the 1979 Christmas market.

The HP computer is also expected to be ready by Christmas, and is anticipated to be a stripped down version of their current table-top system. This means that it will use BASIC and be expandable.

Both HP and TI are expected to have \$500 list prices for the basic unit. Key retailers have already been approached by both TI and HP to set up a selective distribution. It is rumored that they will favor selected personal computing stores that can do justice to software requirements.

INTEL TO PRODUCE ANALOG MICROPROCESSOR AND SUPER 8 BIT MICROPROCESSORS. Real time processing of analog signals by microprocessors has been severely limited by the slow speed of most microprocessors. For example, an 8080 clocked at 2 M Hz can, at best, synthesize clean sine waves at about 1 to 2 k Hz, which is the low end of the audio spectrum. This fall, Intel will introduce an integrated circuit which combines an analog-to-digital converter, a digital-to-analog converter, microprocessor and read only memory on a single device. It will be capable of processing analog signals up to 13 k Hz. Called the 2920, the integrated circuit will have a 9 bit conversion register. It could be used in conjunction with an 8080 processor, where the 2920 does the signal processing while the 8080 does the data processing.

Intel has done another clever thing. They have taken an 8086 and limited its data I/O (input/output) to 8 bits and memory addressing to 16 bits. It is called the 8088 and will deliver five times the performance of the 8080 (2 M Hz). Actually, the 8088 is an 8086 split into two 8 bit microprocessors on one integrated circuit, one handling I/O and the other data processing. *It offers most of the features of the 8086 (eg: hardware multiply/divide).*

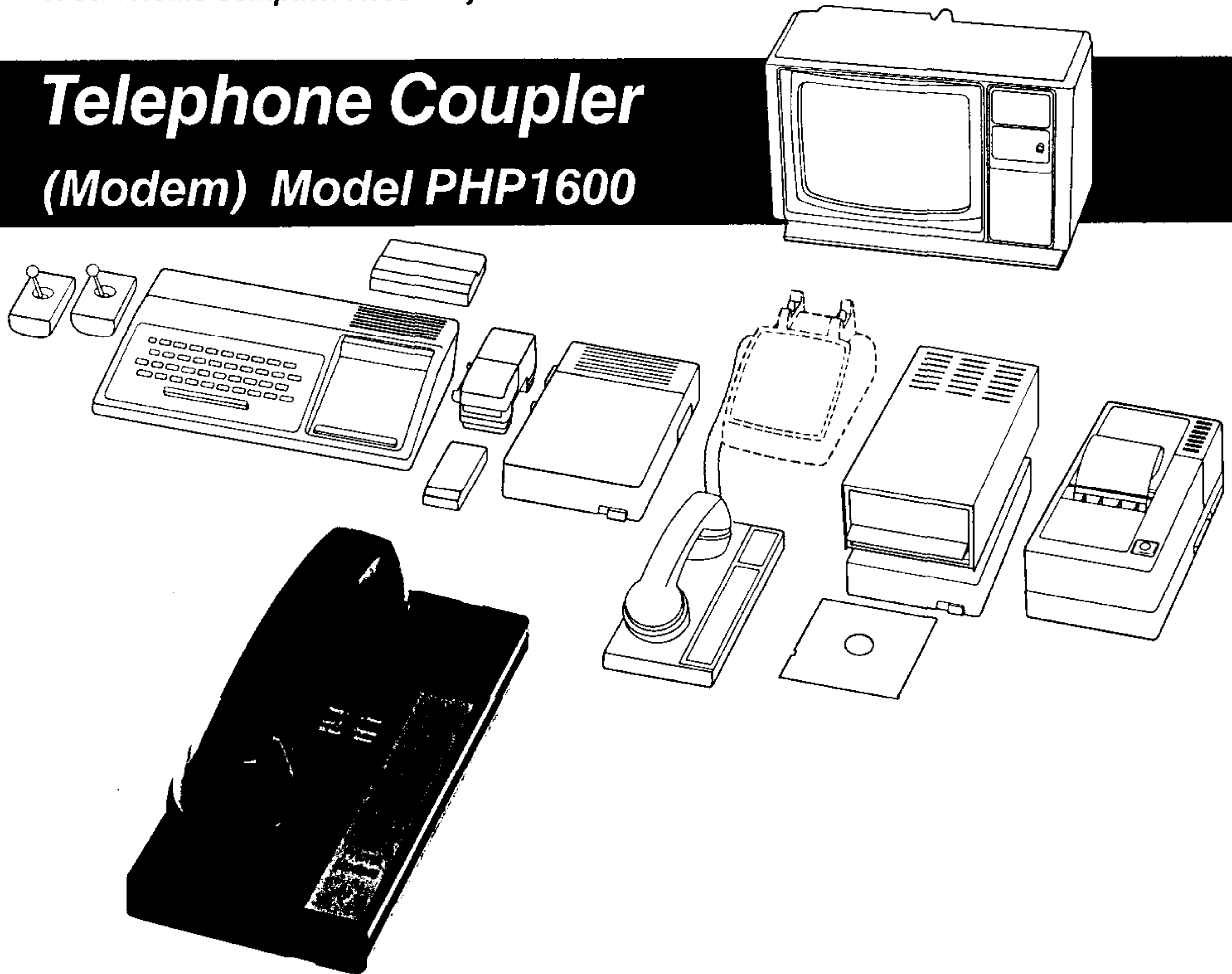
NATIONAL SEMICONDUCTOR TO INTRODUCE NEW MICROS. It is nearly three years since National introduced their last microprocessor. (Actually, we must give National credit for pioneering the 16 bit microprocessor with the PACE and IMP-16 microprocessors introduced in 1975.) Now National is bringing out a new CMOS 8 bit microprocessor that will be software compatible with the 8080, have added features and consume less power. Further, they will introduce a 16 bit microprocessor that is a "cut above" the Z-8000 and 68000. Production is expected by the end of the year.

MICROPROCESSORS FOR \$1 APIECE? Maybe not this year. . .but it is approaching fast. Synertek recently reduced the 100 lot price for the 6502 (used in the PET, Apple, OSI, etc) from \$10 to \$7. In high volume they have reduced the price from \$4 to \$2.50. I can still remember paying \$350 for an 8080, just four years ago!



Texas Instruments
TI-99/4 Home Computer Accessory

Telephone Coupler (Modem) Model PHP1600



The Texas Instruments Telephone Coupler (Modem) enables your TI-99/4 Home Computer to send and receive messages through a standard telephone. Use of the Telephone Coupler requires an RS232 interface unit, such as the Texas Instruments RS232 Interface Model PHP1700. (See RS232 Interface Data Sheet CL458 for additional information on this unit.)

With your Telephone Coupler and RS232 Interface, your Home Computer can communicate directly with other similarly equipped computers at distant locations via the telephone system. You can send and receive messages, transfer programs and data between computers, and much more.

The Telephone Coupler functions as a modulator to

convert the data you enter on the Home Computer console into signals that can be sent over telephone lines. It also functions as a demodulator to convert data received over telephone lines back to its original form. Using the Telephone Coupler is easy. It is powered by a UL-listed low voltage transformer (included). A handy, built-in cable connects the Telephone Coupler to the RS232 Interface. Your standard telephone handset simply inserts into the flexible acoustic couplers on the Telephone Coupler.

The Telephone Coupler may be used with many RS232 compatible terminals or computer systems for communication over standard telephone lines.

BYTE News

HOME BUS STANDARD BEING DEVELOPED: Stanford Research Institute, Menlo Park California, and the Home Bus Standard Association, Washington DC, are conducting a feasibility study to develop a home bus standard. It will allow home electronic appliances to interact with one another over regular home wiring.

TI MICROCOMPUTER PICTURE IN TRANSITION: Although Texas Instruments finally introduced its 99/4 personal computer system in June, it is expected to be an interim product. TI failed to get FCC approval for the original version and also ran into processor production difficulties which forced the introduction of a high-priced personal computer system (\$1150). TI is still pursuing a rule change request with the FCC and the development of its 9985 stripped down version of its 9940 16-bit processor. TI hopes to then introduce a personal computer system for under \$500 which connects to a standard color-television receiver.

TI has also expanded its small business computer (99/7) marketing efforts. The 99/7, which starts at \$5000, will be marketed by Moore Business Forms, through over 750 sales offices as well as through computer stores and TI's own retail outlets.

AT&T TESTING HOME INFORMATION SYSTEMS: American Telephone and Telegraph Co has undertaken customer acceptance tests of several home information systems similar to the Viewdata system. Among the systems AT&T will test are the Knight-Ridder system (reported in the August BYTE News), a system developed by McDonnell Douglas, and a Bell Labs developed system.

The Knight-Ridder system test will take two years and involve 150 to 200 families in Miami, Florida. The system will transmit news, sports results, weather, and public information. The McDonnell Douglas system will be tested in Kansas City, Michigan, and New York. It will allow users to call a special number, key a special code on a push button phone, and receive the requested information in audible form. No details are as yet available on the Bell system.

HEATH ACQUIRED BY ZENITH: Heath Co, a leader in the consumer electronic kit business, was sold by Schlumberger Ltd to Zenith Radio Corp for \$64.5 million. In 1977 Heath introduced two personal computer kit systems, the H-8 which is based on the 8080 processor, and the H-11 which is based on the Digital Equipment Corp (DEC) LSI-11. Heath entered into a three-year contract with DEC. Heath also entered the adult-education market. Heath sales for the last several years have declined at a 3 to 5% rate.

Zenith, a manufacturer of radio and television receivers, has been diversifying. They have been making video monitors for terminals and cable-television converters. Immediately after the acquisition was completed, Heath announced an aggressive marketing program to sell assembled computer systems through a network of distributors and original equipment manufacturers.

8-INCH WINCHESTER DISK MARKET STILL TRYING TO GET OFF THE GROUND: Despite the publicity and advertising, only one manufacturer is presently shipping production quantities of 8-inch hard-disk drives. The company is International Memories Inc (IMI), which is currently shipping limited quantities of their 11 M byte drive at \$1775. IMI will introduce a 20 M byte unit early next year, and expects to reduce the price on the 11 M byte unit 10 to 20% by midyear as production is increased.

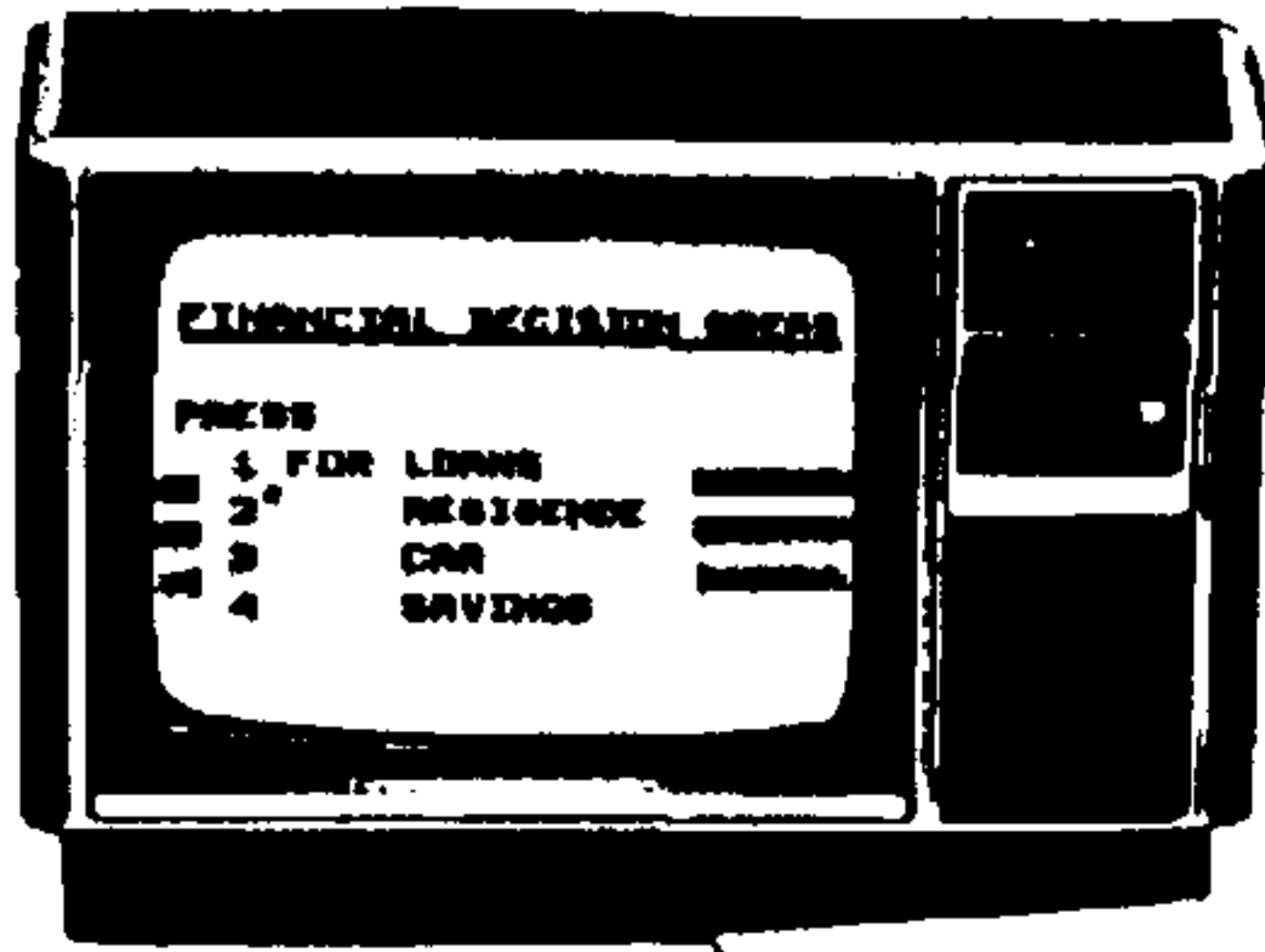
Micropolis expects to start shipping limited quantities of its 27 and 45 M byte drives soon. The introductory price for the 45 M byte drive is \$2688 and should drop to under \$2000 by midyear.

Shugart has not yet revealed its marketing plans for its 8-inch rigid drive.

COMPUTERIZED PORTABLE HOME ENTERTAINMENT CENTER SHOWN: Sharp Electronics recently showed a portable unit, about the size of a typical portable stereo system, which included the following: a television receiver with a 4.5 inch screen, an AM/FM radio, a stereo cassette, a digital clock, a calculator, and a personal computer. The computer's 48-key keyboard slides into the unit for storage, when it becomes necessary to transport the unit. The video screen is used for display, and the audio cassette recorder is for data and program storage. It uses BASIC, has graphics capabilities, and is expandable. No immediate marketing plans have as yet been announced.

NEECO

PROUDLY ANNOUNCES THE REVOLUTIONARY TI 99/4 PERSONAL/EDUCATIONAL COMPUTER!



13 INCH COLOR VIDEO MONITOR



SOLID STATE SOFTWARE COMMAND MODULE



99/4 COMPUTER MAIN CONSOLE UNIT



OPTIONAL SOLID STATE SPEECH SYNTHESIZER \$149.95

Superior color, music, sound and graphics—and TI's powerful extended BASIC—all built in. Plus a unique, revolutionary Solid State Speech Synthesizer and Texas Instrument's special Solid State Command Module Software.



Texas Instruments

TI-99/4

Home Computer

There's a computer in your future. And the future is now.

We've entered a new and exciting era—the age of the home computer. Maybe you've already quite knowledgably about computers and are looking for the most programming power and versatility for your money. Maybe you've just read about it, and want to learn more. Either way, you need to look closely at Texas Instruments TI 99/4 Home Computer.

The TI 99/4 was designed to be the best true home computer. Skilled computer users and beginners alike will be able to put it to effective use right away.

If you know computers, you'll quickly see the difference in the TI-99/4.

Texas Instruments has taken those features you've been wanting—plus some you may not have heard about yet—and included them in our reliable, affordable computer system. The TI 99/4 gives you an unmatched combination of features and capabilities, including:

- **Powerful TI-BASIC**—Built-in 13-digit floating point BASIC. Fully compatible with ANSI Minimal BASIC, but with special features and extensions for color, sound and graphics.
- **Up to 72K total memory capacity**—16K RAM (Random Access Memory), 24K ROM (Read Only Memory) plus up to 32K ROM in TI's Solid State Software Command Modules.
- **24K ROM**—Operating system, BASIC, floating point, sound and color graphics software are contained in ROM.
- **16-color graphics capability**—Easy-to-access, high-resolution graphics have special features that let you define your own characters, create animated displays, charts, graphs... and more.
- **Music and sound effects**—Provides outstanding audio capability. Build three note chords and adjust frequency, duration and volume quickly and simply. You can build notes with short, straightforward commands. Five voices from 150 Hz (Bass) to beyond 40,000 Hz.
- **Built-in equation calculator**—Unique convenience feature helps you find quick solutions to everyday math problems, as well as complex scientific calculations. Directly accessible from the keyboard.

If you're new to computers, the TI-99/4 is for you.

You can begin using the TI Home Computer literally minutes after you unpack it. Without any previous computer experience or programming knowledge. You simply step in one of TI's Solid State Software Command Modules and touch a few keys. Step by step instructions are displayed out on the screen. So you can just about anyone in your family can use the TI 99/4.

Two pioneering technological developments in particular set the TI-99/4 apart from the rest.

Solid State Speech™—This optional speech synthesizer module (the TI 99/4 actually speaks) to provide verbal prompts and special messages to the user. Actually reproduces the human voice (not usually). Hundreds of words are available, and plug-in word modules will add hundreds more. TI's exclusive technology lets you call up the words you want by simply typing them in. Outstanding voice clarity and fidelity. Solid State Speech is a process technology already on the market in TI's unique Speak & Spell™ electronic learning aid for children.

Solid State Software™ Command Modules—Available in a wide range of application areas, these optional ROM modules actually add additional program memory to your TI 99/4. They let you use the TI Home Computer immediately, with no programming. Service programmers will appreciate the time and effort saved by these pre-programmed modules. Plus, they'll let you introduce your family to the computer in the easiest possible way. Solid State Software was pioneered by TI for use with its powerful program made calculators.

A world of genuine, practical applications exist for the TI Home Computer right now.

In addition to the many personal finance, home management, educational and recreational uses for the TI 99/4, there are also a variety of home business and professional applications. The TI 99/4 is a powerful problem solving tool—an ideal solution when larger, more expensive computers would be impractical.

ACCESSORIES TO BE AVAILABLE:

- 32 Character Printer
- RS232 Peripheral Adaptor
- DISK STORAGE/MEMORY
- MANY COMMAND MODULES

CALL OR WRITE FOR FULL PRODUCT INFORMATION AND LITERATURE

99/4 Computer \$1150—
(includes Console, Video Monitor, and Demo Module)

SPEECH MODULE \$149.95
(263 Words, available OCT/NOV)

COMMAND MODULES ... \$20 to \$60

99/4 DEALER INQUIRIES INVITED—CONTACT NEECO FOR INFORMATION

NEECO IS PLEASED TO ANNOUNCE THAT WE HAVE BEEN SELECTED AS ONE OF THE TI 99/4 COMPUTER DISTRIBUTORS FOR THE NEW TEXAS INSTRUMENTS 99/4 HOME COMPUTER. OUR GOAL IS TO MAKE THE TI 99/4 COMPUTER, IN ADDITION TO OUR MANY OTHER PRODUCTS, AVAILABLE TO INDEPENDENT COMPUTER STORES NATIONWIDE. 99/4 PRODUCT AVAILABILITY IS SEPTEMBER/OCT BUT IS ALWAYS SUBJECT TO TEXAS INSTRUMENT'S 99/4 PRODUCT ALLOCATION.

NEECO

NEW ENGLAND ELECTRONICS CO., INC.
679 HIGHLAND AVE., NEEDHAM, MASS. 02194
MON. - FRI. 9:30 - 5:30, EST.

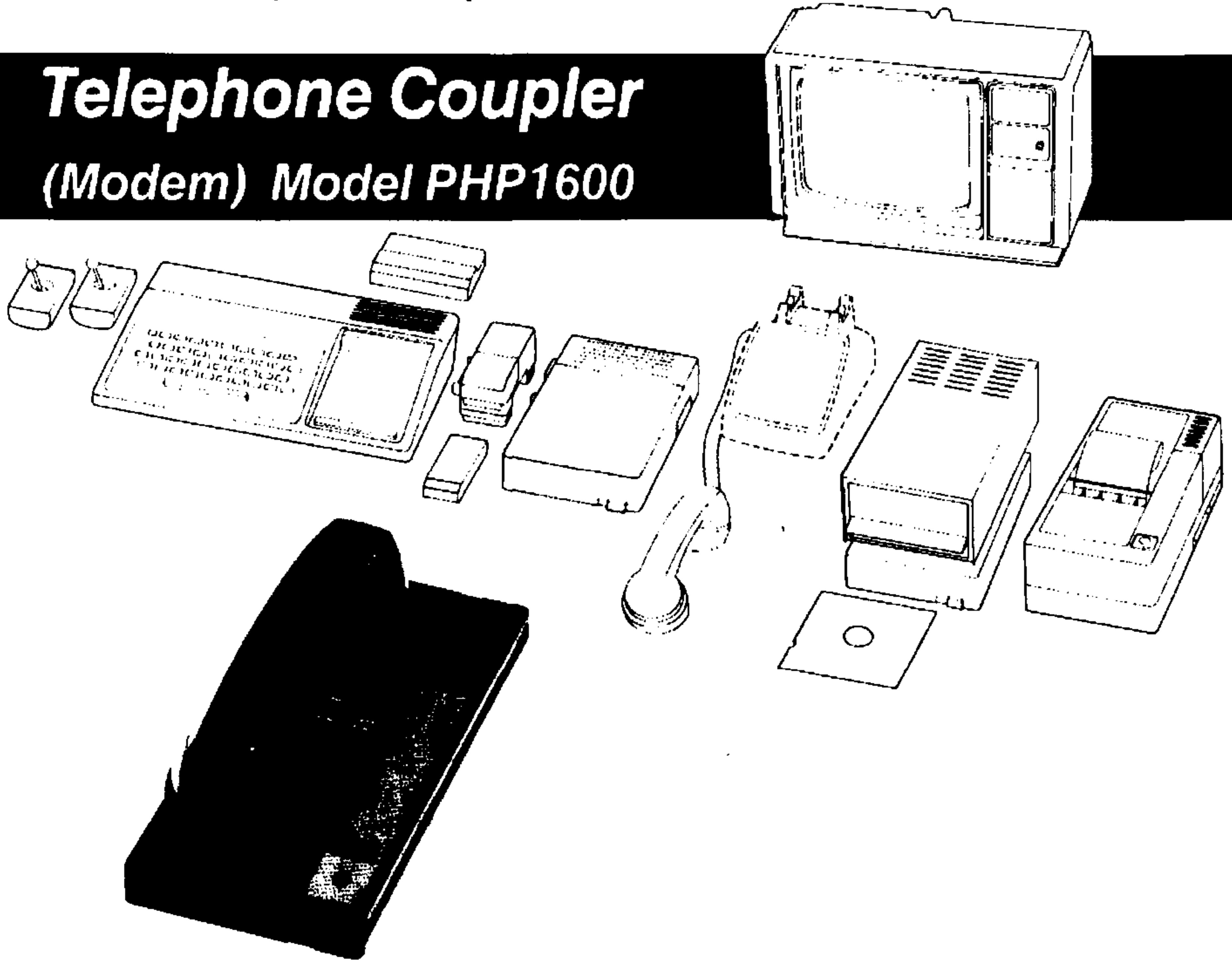
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MASTERCARD OR VISA ACCEPTED
TELEX NUMBER 951021, NEECO



Texas Instruments
TI-99/4 Home Computer Accessory

Telephone Coupler (Modem) Model PHP1600



The Texas Instruments Telephone Coupler (Modem) enables your TI-99/4 Home Computer to send and receive messages through a standard telephone. Use of the Telephone Coupler requires an RS232 interface unit, such as the Texas Instruments RS232 Interface Model PHP1700. (See RS232 Interface Data Sheet CL458 for additional information on this unit.)

With your Telephone Coupler and RS232 Interface, your Home Computer can communicate directly with other similarly equipped computers at distant locations via the telephone system. You can send and receive messages, transfer programs and data between computers, and much more.

The Telephone Coupler functions as a modulator to

convert the data you enter on the Home Computer console into signals that can be sent over telephone lines. It also functions as a demodulator to convert data received over telephone lines back to its original form. Using the Telephone Coupler is easy. It is powered by a UL-listed low voltage transformer (included). A handy, built-in cable connects the Telephone Coupler to the RS232 Interface. Your standard telephone handset simply inserts into the flexible acoustic couplers on the Telephone Coupler.

The Telephone Coupler may be used with many RS232 compatible terminals or computer systems for communication over standard telephone lines.

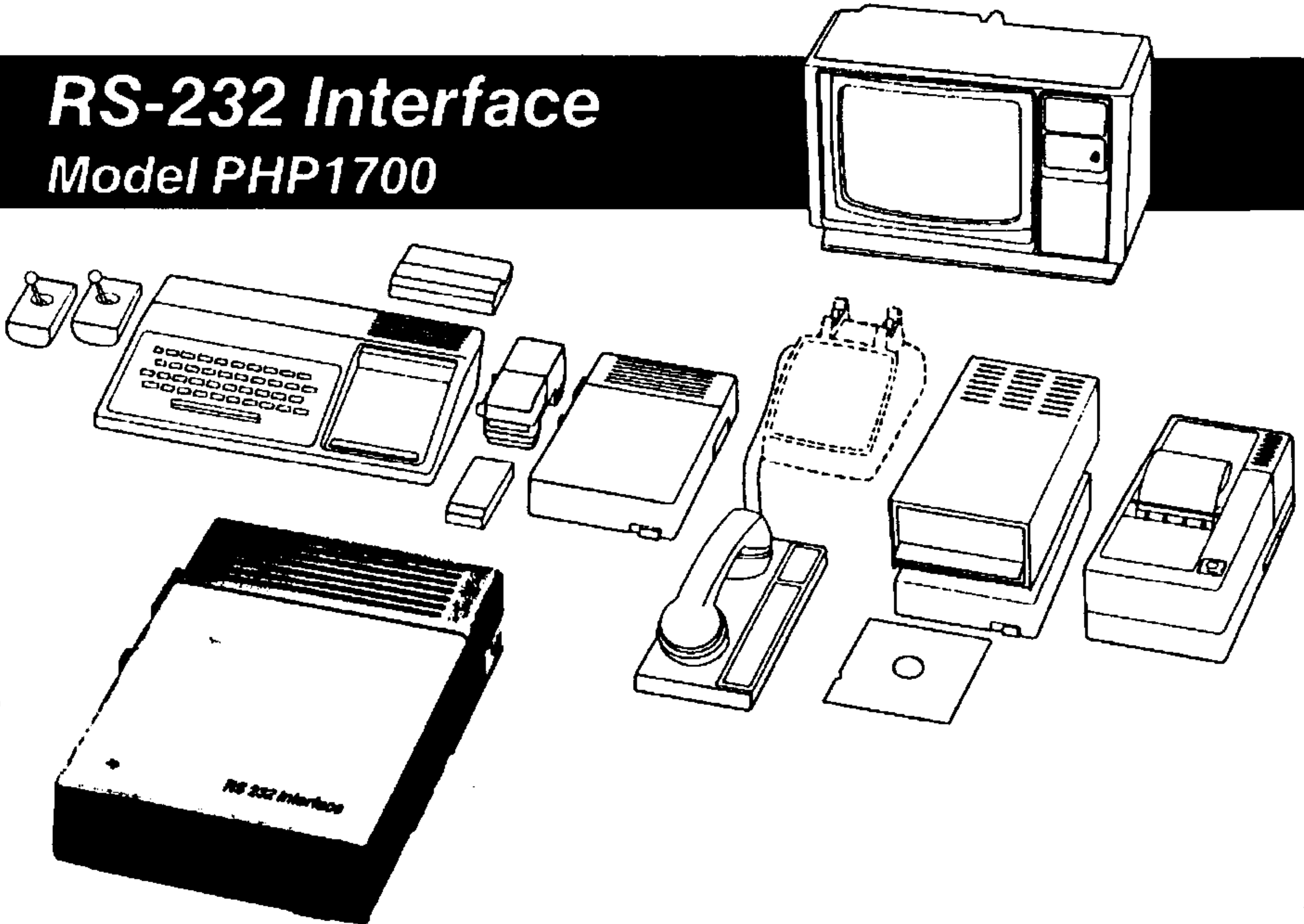
CL458A

Texas Instruments
TI-99/4 Home Computer Accessory



RS-232 Interface

Model PHP1700



The Texas Instruments RS232 Interface is a communications adapter that enables you to connect a wide range of serially formatted accessory devices, including those from other manufacturers, to your TI-99/4 Home Computer. It is not required for the use of TI-99/4 peripherals manufactured by Texas Instruments (with the exception of the Telephone Coupler [Modem], where it is required). With the RS232 Interface connected to your Home Computer you can list programs on a printer, send and receive data from a terminal, exchange TI BASIC programs directly between TI Home Computers, and much more.

With the addition of the Telephone Coupler (Modem), or other standard modem or acoustic coupler, and the RS232 Interface, a whole new world of computer versatility becomes available to you. Your Home Computer can now "talk" with other computers and

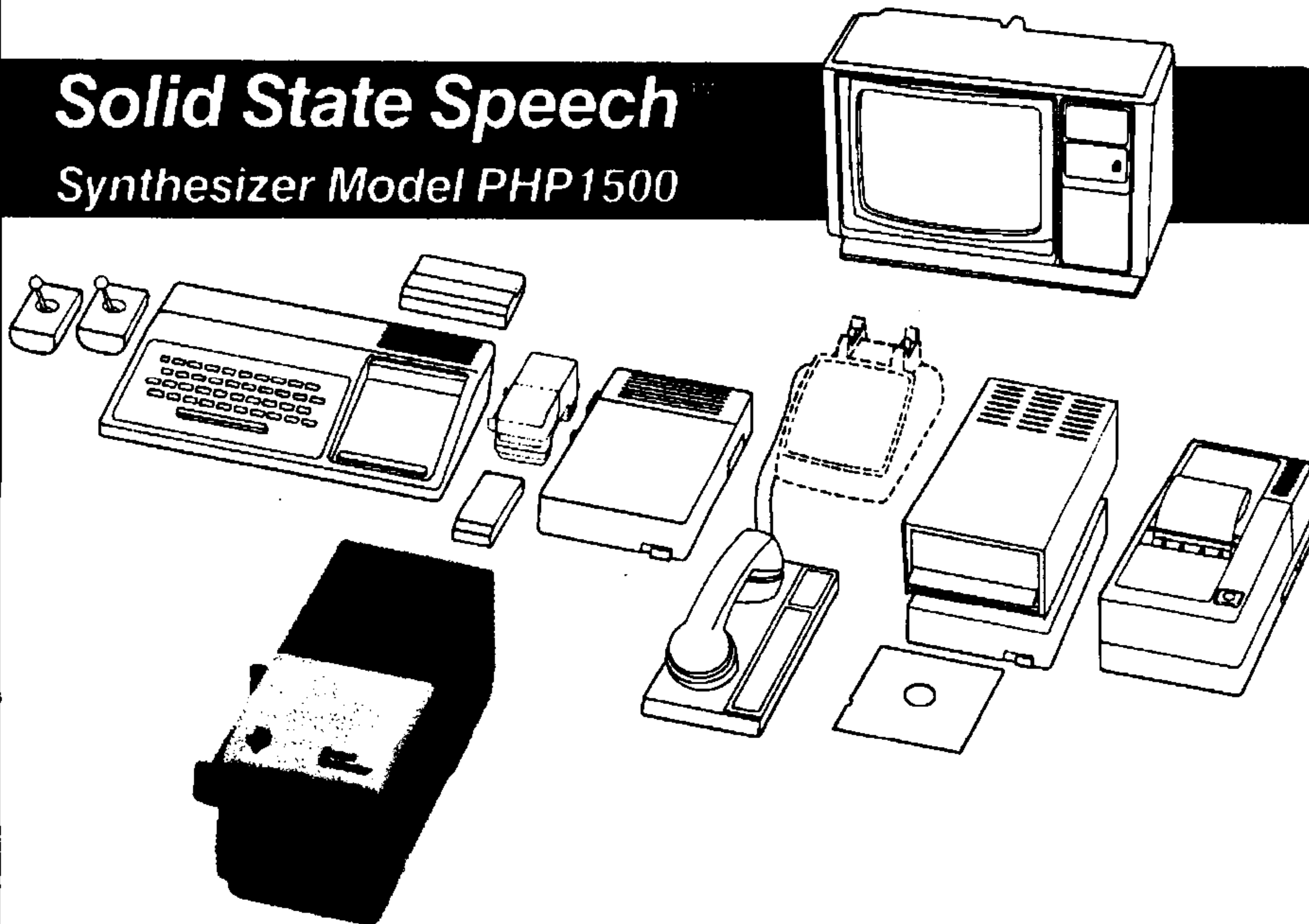
terminals over ordinary telephone lines. You can access your office computer or time sharing network from the comfort and convenience of your own home, using your TI Home Computer as a remote terminal to send and receive data*. This two-way communications permits interactive programming and distributed processing functions to be performed between two or more TI-99/4 Home Computers or by utilizing the TI-99/4 as a remote terminal for another computer system.

The RS232 Interface is programmable to let you exchange data with a variety of serially formatted devices. Using TI BASIC, you can select baud rate, the number of bits, parity, and the number of stop bits. This flexibility permits you to interface with both low and high-speed peripherals including printers, plotters, video display terminals, and other computers.

*Requires the Terminal Emulator Software Package for this function.



Solid State Speech Synthesizer Model PHP1500



The Texas Instruments Solid State Speech™ Synthesizer makes possible the exciting addition of speech to the TI-99/4 Home Computer. Utilization of the Speech Synthesizer requires an optional Command Module programmed for speech, such as the Speech Editor Command Module. These preprogrammed modules allow the Speech Synthesizer to be used without the need to do any programming. Speech can also be included as part of your own programs in TI BASIC.

The Speech Synthesizer is entirely electronic. There are no taped voice recordings or any other traditional recording medium. Instead, a vocabulary of words and phrases is permanently stored on chips contained within the Speech Synthesizer. Each word has been transformed into a pattern of bits. When processed, each pattern drives electronic circuitry that rebuilds the requested word and audibly reproduces it through a

loudspeaker. The Speech Synthesizer contains a resident vocabulary of over 300 words.

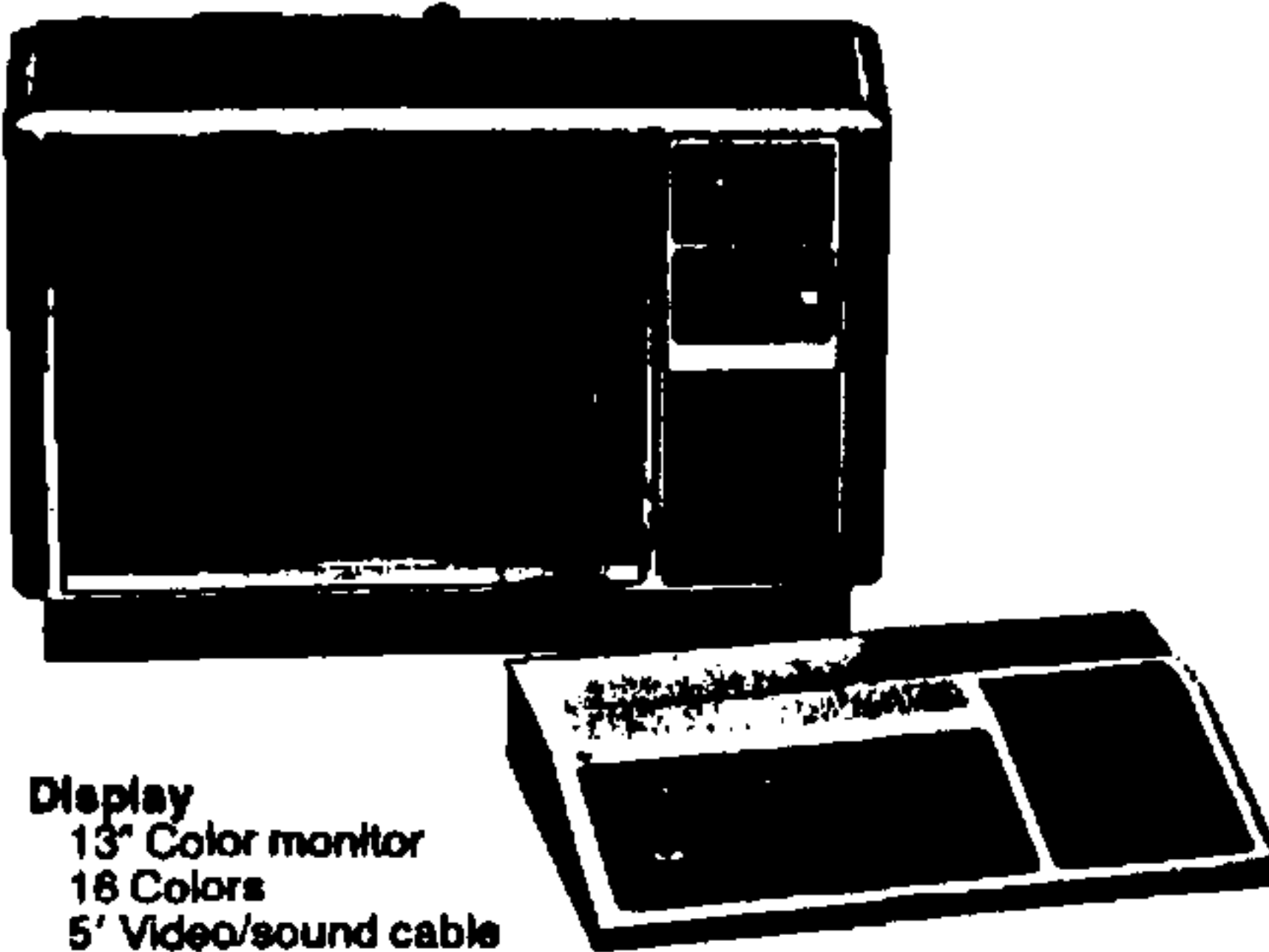
Using the Speech Synthesizer is easy. It simply docks directly into the Home Computer by means of built-in connectors. There are no dangling cables. Next, you insert one of the Command Modules designed to call up speech from the Speech Synthesizer and you are ready to go.

The Speech Synthesizer provides a voice for the Home Computer, creating many new applications and enhancing the effectiveness of existing ones. It can communicate with you without you being near the display. It can recite instructions to those unable to read, or where written instructions might interfere with the display. It can provide exciting comments and sound effects in games, and it can reinforce concepts in educational applications.



Texas Instruments
TI-99/4 Home Computer Products

Specifications



Display
 13" Color monitor
 16 Colors
 5' Video/sound cable

Console

CPU: 9900 Family, 16-bit microprocessor, plus 256-byte scratchpad RAM.

Memory: Total combined memory capacity: 72K bytes.

Internal ROM memory supplied: 26K bytes. External

ROM memory: (Solid State Software™ Command Modules) Up to 30K bytes each. RAM memory supplied: 16K bytes.

Keyboard: 40-key staggered Qwerty, full travel. Overlay for second functions.

Sound: 5 octaves, 3 simultaneous tones plus noise generator. From 110 Hz to beyond 40,000 Hz.

Power: 110 V, 60 Hz, 20 W. Wall mounted console transformer, UL listed 8' power cord.

I/O: Composite video and audio output for monitor. Interface for up to 2 audio cassettes. 44-pin peripheral connector—up to 3 peripherals attached to system. System memory and address signals available at peripheral connector. Remote control interface.

Built-in Software: 14K byte BASIC interpreter. Internal Graphics Language Interpreter, not user accessible. Equation calculator. Internal 4.4K byte monitor, not user accessible.

Size: 25.9 x 38.1 x 7.1 cm (10.2 x 15.0 x 2.5 in.)

Weight: Less than 2.3 kg. (5 lbs)

Three Month Limited Warranty: On TI console, monitor and Command Module hardware.

Console Technology (Detail Description)

CPU Chip (NMOS): TMS9900 16-bit microprocessor. Minicomputer instruction set including hardware multiply and divide. Architecture with 16 general registers. Can address up to 64K bytes of memory. 4 interrupt lines.

Video Display Processor Chip (NMOS): Controls display memory and generates composite video signal. 24 lines of 32 characters with 8x8 dot resolution.

Provides sixteen colors: white, gray, magenta, light yellow, yellow, light red, medium red, dark red, cyan, light blue, blue, light green, medium green, dark green, black, transparent. Provides 32 sets of 8 characters each with different foreground/background colors. Addresses up to 16K bytes of RAM for CPU or display.

Sound Controller Chip (I²L): 3 voices with 5 octave musical resolution. 15 bit programmable noise source. 100 mW audio drive with 30 db control in 2 db steps.

Solid State Software™ Command Modules. Up to 30K bytes PMOS ROM. Up to 8K bytes NMOS ROM. Simple plug-in module.

Peripherals

Remote Controls: 2 controllers. Cable: twin cable with single connector, 4' long. 8 direction control—up, down, left, right and diagonals. Fire button. Controls designed for use with either hand.

Solid State Speech™ Synthesizer. Uses Speak & Spell™ technology. Approx. 300 words in unit. Plug-in vocabulary expansion. Hundreds of words can be added. Interfaces via I/O port.

RS-232 Interface: Provides interface to RS-232 type computer peripherals, such as printers, plotters, digitizers, D/A converters, terminals, and data tablets. Dual port, two standard DB-25 connectors

Recorder Interface: 1 or 2 standard audio cassette units (not included) interface through a cassette interface. Cable: twin cable with single connector, 2' long. Each record recorded twice for 600 baud effective recording rate. Checksum added to end of each double recorded record. Operator interaction fully prompted. Provides mass non-volatile program/data memory storage. A number of standard cassette recorders can be used with the TI-99/4. For best operation, however, they should have such features as: tone control, microphone jack, remote jack, earphone or external speaker jack, digital tape counter. Check with your dealer and/or the "User's Reference Guide" for details.

TEXAS INSTRUMENTS
 INCORPORATED

Specifications for Texas Instruments TI-99/4 Home Computer

Console

CPU: 9900 Family, 16-bit microprocessor, plus 256-byte scratchpad RAM.

Memory: Total combined memory capacity: 72K bytes. Internal ROM memory supplied: 26K bytes. External ROM memory: (Solid State Software™ Command Modules) Up to 80K bytes each. RAM memory supplied: 16K bytes.

Keyboard: Staggered Qwerty, full travel style layout. Overlay for second functions.

Sound: 5 octaves, 3 simultaneous tones plus noise generator. From 110 Hz to beyond 40,000 Hz.

Colors: 16

Video resolution: 192 x 256

Power: 110V, 60 Hz, 20W. Wall mounted console transformer, UL listed 8' power cord.

I/O: Composite video and audio output for monitor. Interface for up to 2 audio cassettes. 44-pin peripheral connector – up to 3 peripherals attached to memory. System memory and address signals available at peripheral connector. Mini-earphone jack. Hand controller interface.

Built-in Software: 14K byte BASIC interpreter. Internal Graphics Language interpreter, not user accessible. Equation calculator. Internal 4.4K byte monitor (not user accessible).

Size: 25.9 x 38.1 x 7.1 cm (10.2 x 15.0 x 2.5 in.)

Weight: Less than 2.3 kg. (5 lbs)

Display

13" color monitor. 24 lines of 32 characters.

Optional accessories

Solid State Speech™ Synthesizer: Approx. 250 English words built in. Accessible from TI BASIC. Accommodates add-on word modules to broaden vocabulary. Size 7.6 x 13.4 x 7.1 cm (3.0 x 5.3 x 2.8 in.)

Wired remote controllers: Eight-position stick with side-mounted action button.

Solid State Software™ Command Modules: Variety of financial, educational and entertainment programs in rugged, reliable plug-in modules. Approx. 10.8 x 6.9 x 1.9 cm (4.25 x 2.75 x .75 in.) Modules contain up to 80K bytes of extra ROM.

Three Month Limited Warranty: On TI console, monitor and Command Module hardware.

Important Notice To Consumers

The warranty mentioned above covers only the hardware portion of the Command Module. See "User's Reference Guide" for complete warranty text. TI cannot and does not warrant that the TI Home Computer programs and book materials will be free from error or will meet

the specific requirements of the user. The user assumes complete responsibility for any decisions made or actions taken based on information obtained using these programs and book materials, which are made available solely on an "AS-IS" basis (see owner's manual).

Due to the difficulty of photographing video screens, some of the screens represented are simulated.

Texas Instruments reserves the right to make changes in materials and specifications without notice.

Texas Instruments technology – bringing affordable electronics to your fingertips.

TEXAS INSTRUMENTS
INCORPORATED

Your experience with personal computers is going to open an unlimited career at TI.

TI is into personal computers in a big way, and that means a ground floor opportunity is going to be open for you, the personal computing innovator. You'll be joining the undisputed world leader in creating new products and markets for consumer electronics with the company that invented the calculator on a chip. And it's all going to happen in TI's new Management and Technology Center for Consumer Products in Lubbock, Texas. Located in the high, dry, and cool plains of West Texas, Lubbock is about halfway between Dallas and Albuquerque. It is the home of Texas Tech University. You are just a few hours' drive from skiing in Taos, or touring and shopping in Juarez, Mexico.

Make your career opportunities in the following areas:

Personal Computer Product Marketing Manager

Responsible for establishing distribution channels for personal computer products, developing advertising and sales promotion programs, training, quoting and providing market requirements for new products and software. Requires BS in EE, math, physics or Computer Science. MBA preferred. Minimum of 5 years' experience in consumer sales or marketing related to desk programmable calculators, minicomputer

systems, microcomputer systems, or small business systems.

Systems Programmers

Outstanding opportunities—design, code, integrate and debug operating system modules, including device service routines, self-test diagnostics, and system utilities. Requires BSEE or Computer Science plus minimum of 3 years in assembly programming with some high level language experience.

Digital Design Engineers

Opportunity to design and develop digital subsystems for major new products. Projects will require design-to-cost discipline with internal and external component vendors, vendors of peripheral devices and making trade-offs of hardware and software. Requires BSEE with 2 years' experience. Prefer experience in design of bubble and/or flexible disk computer memory subsystems.

Product Design Engineer

Responsibility for mechanical design on major new personal computer products. Interface with electrical design engineers, software development personnel, marketing, purchasing, planning and all areas involved in taking a product from concept through initial production. Requires BSME with a minimum of

3 years' experience in design or closely related field. Knowledge of plastic tooling preferred.

Application Software Specialist

Total responsibility for development of complete application packages for specific business sectors and professionals. Specifications, design, coding, program check-out and documentation for personal computer systems. Requires BA or BS in math or Computer Science or BBA with data processing major with 2-3 years' experience. Program in high level language on mini, micro, or business computer systems.

Marketing Support Engineers

Project responsibility for future product service direction concerning existing as well as future products. Develop and maintain total service program for personal computer systems and field testing/check-out. Requires BSEE or equivalent with at least 3 years' experience with programmable desk calculators, minicomputer systems, microcomputer systems, small business systems, or product service management.



Send your resume in confidence to: Bill Toomey/
P. O. Box 10508, M.S. 5807,
Dept. B/Lubbock, TX 79408.

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