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**BUILD A TIMEX/SINCLAIR EXPANSION
TO ENHANCE THE ZX81
OPERATING SYSTEM**

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DGS

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COMPUTERS - VIDEO - STEREO - TECHNOLOGY - SERVICE

What's coming in
NAVIGATION SYSTEMS
for your car

Build a
TALKING ALARM CLOCK
and listen to the time

How to use
LOW-N-C SIGNALS
for frequency calibration

Build a
DASHBOARD DMM
for your car

All about
TRANSCONDUCTANCE AMP IC's
and how to use them



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- ★ Videogames ★ Hobby Corner
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ON THE COVER

To most drivers, one of the most exasperating experiences is getting lost in completely unfamiliar territory. But an independent California inventor and a giant Japanese automobile manufacturer are hard at work trying to make that situation a thing of the past. If their efforts are successful, it won't be long until a common automotive accessory will be a navigational computer complete with a video display. This month, we'll preview the future and take a look at both systems. The story begins on page 43.



This upgrade for the Timex/Sinclair 1000 adds 8K of non-volatile RAM. The add-on can be used to increase the system/user memory, or more usefully, for the permanent storage of machine-language routines—thus, in effect, expanding the operating system. Find out more about it starting on page 47.

COMING NEXT MONTH

On Sale July 19

A special section devoted to electronics and photography. Among the things we'll look at are:

- The Sony Mavica system
 - Autofocus and autoexposure electronics
 - Electronics in the darkroom
- And lots more!**

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VIDEOGAMES

Future games

DANNY GOODMAN, CONTRIBUTING EDITOR

THE ARRIVAL OF SO-CALLED THIRD-generation home-videogame systems like the Atari 5200 and Colecovision, plus Coleco's announcement of a "fourth generation" tape-loading peripheral, leads me to speculate about what kind of home videogames we're likely to be playing in the late 1980's. I'm not talking about science-fiction gadgetry—stuff like holographic projections coming from your R2-D2 robot. I'm talking about the application of technologies that we have today, buried behind locked laboratory doors—technology that needs only a little refinement to be both practical and affordable.

Interactivity between game play and player will be the area where we will see the greatest changes in the years ahead. This interactivity will take many forms.

Late last year, the world was treated to a glimpse of the interactive future when Sega/Gremlin (555 Millrose, Los Angeles, CA 90038) demonstrated an arcade game that superimposed a shoot-'em-up space chase on a videodisc-scene backdrop that looked like outtakes from a low-budget *Star Wars* imitation. If a player successfully hit an alien ship, the disc would jump to a scene of an explosion in space. The game play and background are not particularly well integrated in this early commercial attempt, but the concept is a valid one.

Videodiscs, by themselves, are just now offering interactive adventures such as *Murder, Anyone?* from Vidmax (36 East 4th St., Cincinnati, OH 45202). In that game, the viewer's response to clues causes the story to jump from one character's account of the crime to another's. As a viewer enters a response into a remote control keypad, the microprocessor-controlled videodisc player accesses the proper segment of the disc.

But that's nothing compared to the possibilities of integrating more traditional videogame play-screens with the high-resolution effects of a videodisc scene. With game-console-generated graphics linked to the videodisc frame counter (there are 54,000 individually addressable frames on a disc), we might have the effect of walking down a corridor in an adventure maze-game. Suddenly a game-generated object—how about a treasure chest—appears on the floor in the distance. As we walk toward it, the chest, in



FIG. 1

proper perspective, gets larger. When we're standing directly in front of the chest, we have arms (from the disc) reach down and pick it up. Together, the chest and arms recede out of sight below the screen as though we actually had picked it up. Other game-generated objects could be picked up by the same disc-generated arms later in the game.

Another interactive trend we'll see involves increased use of our other senses. Right now, only our senses of sight and hearing are stimulated by a videogame. For now, we'll have to live with the graphics-resolution limitations of the home color-TV. Better-quality speech synthesis is about all we can expect from the current selection of systems. But stereo sound-effects will be the next step in attempted realism. For example, we'll be able to hear enemy ships approaching from off-screen to the left or right.

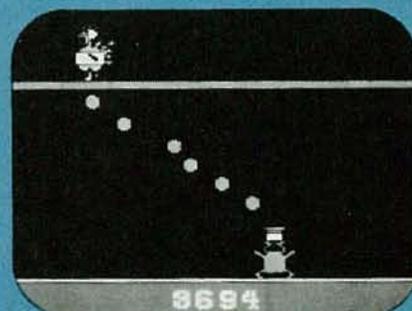
Beyond that, the sense of touch opens the way for game development into the late 1980's. Small solenoids will be built into a hand controller to give your palm a little "kick" when you catch a fly ball in a baseball game, or vibration when you're at the control of a race car.

We can even see special environmental videogame-chairs that partially enclose us in a sensory barrage of surround sound and that have motorized or vibrating seats to stimulate the sensations of flying a B-17 through flack or piloting the Millennium Falcon through hyperwarp. Most joystick-type controls would be in the armrests; a steering controller and two foot-pedals would swing in front of us from one side for games requiring that kind of control. The enclosure could adequately contain vapors from scented air

and release them in synchronization with changing screens. For example, as you walked through dark, musty caverns of an adventure maze-game, only your keen sense of smell would help you distinguish between several look-alike scenes.

Are these ideas far fetched? Hardly. Coleco has already demonstrated the kicking hand controller, but decided to hold off for a while. And a new company in the add-on business, Amiga, has shown a foot-operated floor controller (the *Joyboard*, shown in Fig. 1) that lets you stand up and recreate the motions of skiing down a mountain in conjunction with a skier's-eye-view of a slalom course. There's even a prototype environmental chamber that spins you around and gives you a real sense of motion as you pilot your craft. Those are but the simple first steps toward future homebound simulations of real-life and imagined adventures.

U.S. Games' Eggomania for Atari 2600



CIRCLE 101 ON FREE INFORMATION CARD

U.S. Games	Eggomania									
GRAPHICS	■	■	■	■	■	■	■	■	■	■
SOUND	■	■	■	■	■	■	■	■	■	■
EASE OF LEARNING	■	■	■	■	■	■	■	■	■	■
CHALLENGE	■	■	■	■	■	■	■	■	■	■
VALUE	■	■	■	■	■	■	■	■	■	■
	1	2	3	4	5	6	7	8	9	10
	Poor		Fair		Good		Excellent			

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