

Sega SC-3000H

Peter Vernon assesses the latest home micro from the ace arcade manufacturer.



The Sega SC-3000H computer offers a lot for the price. Manufactured by the Japanese Sega company and distributed in this country by John Sands, one of Australia's largest publishers, the SC-3000H is loosely-based on the MSX standard. The system provides extensive colour graphics and sound effects capabilities, a powerful and easy-to-use

Basic interpreter and a wealth of expansion possibilities and software in a compact, attractively styled console.

Packaged with manuals and a separate power supply pack in a sturdy cardboard carry-case, the SC-3000H provides everything you need to get started immediately. The console is low and sleek, and has 64 colour-coded keys in a

standard typewriter configuration. The key action is light but positive, and the short range of movement of the keys makes typing very comfortable.

Cursor control keys for the SC-3000H are not clustered in the MSX style, but set on the left of the keyboard in a standard diamond layout, below the prominent red reset key. There are no

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programmable function keys, but on each side of the space bar are two extra keys including CODE and GRAPH and a key marked "dieresis", which sets the keyboard for operation in languages other than English (a dieresis is an accent mark over a vowel sound, as encountered in the French language).

A set of silver paper stick-on labels is provided for the keyboard, and are intended to be mounted on the front of the keys to indicate graphics characters and the 48 Basic keywords available by pressing keys in conjunction with the CODE key. I have my doubts about the effectiveness of this approach. It wouldn't take long for the labels to come adrift and the overall effect is not likely to

be attractive. Use of the labels is optional however, and by no means essential to the full enjoyment of the Sega computer.

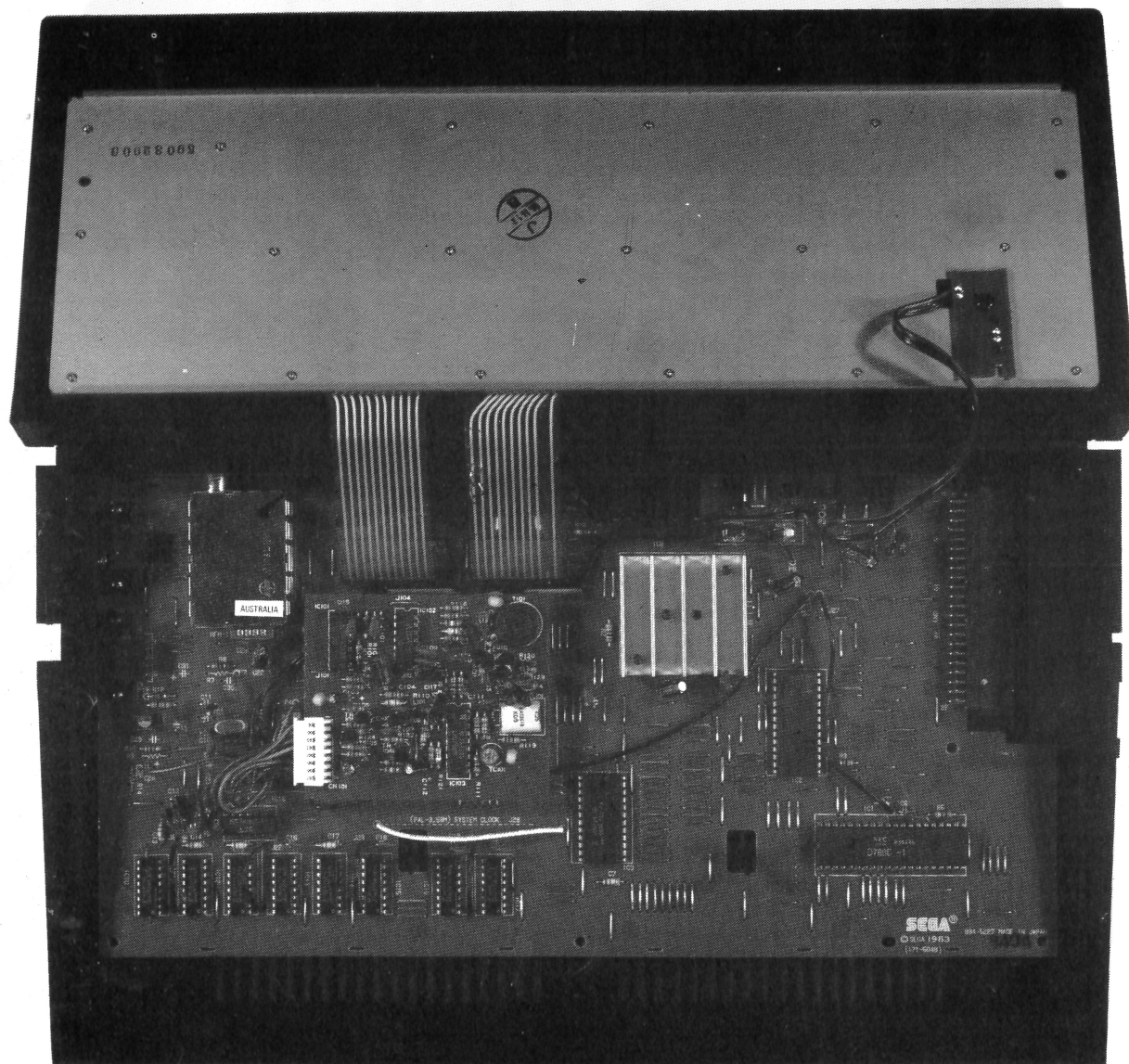
Along the rear of the console are the power switch, five pin DIN plug for connection of a video monitor, a cassette port connection and an output for connection to a standard television receiver. A slot for software cartridges is at the right side. Power for the system is provided by a specially designed external plug-pack adapter.

Operation and Basic tutorial manuals are included with the computer, together with a cassette containing six educational programs and a "hands-on" programming tutorial. The manuals are

comprehensive, but definitely take a "no frills" approach. I understand that John Sands is currently preparing a series of books on the SC-3000H which will be required reading for anyone wanting to make extensive use of the system.

On the other hand, it's good to see that the demonstration programs included with the system have been specially written for use in Australia. "General Knowledge" and "Geography Tutor" programs, for example, do not confront the user with questions on US or English subjects, and would be immediately useful in Australian schools. John Sands' long experience in the Australian market shows to good advantage here.

Also provided is a cartridge containing



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Sega's Level 3 Basic interpreter in ROM. This cartridge (or another program cartridge) must be installed before you can use the computer.

In use

Connecting up the Sega SC-3000H is easy. Any standard cassette recorder can be used, although Sega also manufactures its own version specially designed for use with the SC-3000. A cable is provided to connect the modulated video output to a television receiver with output on VHF channel 3 or 4, and the colour display is clear and steady, with a large black border at the top and bottom of the display area to allow for the peculiarities of different television sets. Of course, a direct entry colour video monitor can also be used, by-passing the modulated video output to produce a sharper picture.

One minor short-coming is that the cassette port does not provide for remote control of the motor of the cassette recorder. If you are using tapes which contain more than one program you must be quick to stop the cassette recorder after a program has been loaded to avoid running the tape past the start of the next program. The absence of remote control is not uncommon in computers of this class however.

The SC-3000H is based on the Z80A processor, running at a clock speed of 3.58MHz. The standard system provides 32k of RAM and 32k of ROM, with an additional 16k of video memory, entirely separate from the main user memory. When not in use by the graphics controller, this memory can also be used to store program data, accessed by special versions of the PEEK and POKE statements.

The video display

When first switched on, the SC-3000 takes about five seconds to initialise the graphics controller circuitry and display the Basic sign-on message. This time is required because all aspects of the Sega's video display are controlled by software. The character set and display parameters must be copied from ROM into the video RAM of the controller to prepare the system for use, and this does take a noticeable amount of time. The corresponding reward, however, is a flexibility and versatility unmatched by other computers in this class.

The standard display format is 40 characters by 24 lines, in black on a green background. A 256 x 192 bit-mapped graphics mode is also available, in 16 colours, together with 32 sprites (graphics objects which can be created

and moved independently of the remainder of the display). A 64 x 48 "chunky graphics" mode is also available with special programming, and of course, the character set is completely definable by software.

General Instruments AY-3-8910 specified by the MSX standard. Both chips generate sound by dividing a basic clock frequency by various amounts to produce the desired tone, but the TI chip uses a 10-bit divisor rather than the 12

Although primarily a home computer, as indicated by the emphasis on graphics, sound and games programs, the SC-3000H should also find use in schools and as a low-cost entry system for small business applications.

These display facilities are provided by a remarkable display controller, the Texas Instruments 9929 VDP (for Video Display Processor), which is specified as standard for MSX machines. With its own 16k of memory, the VDP can provide four types of display operations (although only text and high resolution graphics are supported by the standard Basic). As mentioned, the text mode allows all 256 displayable characters to be defined by data stored in RAM, with the colour of each group of eight characters programmed by separate memory locations. The bit-mapped graphics mode is actually an extension of the text mode, but uses 768 definable character blocks to completely fill the screen with bit-mapped patterns.

The VDP also handles sprite display. Each sprite is a block of 16 x 16 pixels, and can be displayed with one of two settings for size and magnification. The position of each sprite on the screen is set by X and Y coordinates stored in the video RAM, so animation and special effects are easily achieved. Each sprite also has a priority which automatically determines which object will be visible if two or more sprites occupy the same location. Sprite 0, for example, is always displayed "on top of" sprite 1, which is on top of sprite 2, and so on up to sprite number 31. The sixteen colours available for sprites include a "transparent" colour, which allows the background, or another sprite, to be visible "beneath" the first. One of TI's favourite demonstration programs for the VDP shows a car with windows moving along a road. As the car moves, the changing background scenery is clearly visible through the windows. Imagine the effort that would be involved in programming such a display by normal pixel plotting! With the VDP it's all automatic.

Sound effects

Sound effects for the SC-3000H are provided by another Texas Instruments chip, the SN76496, rather than the

bits of the AY-3-8910. Theoretically the General Instruments chip is thus more accurate, but the difference is imperceptible except to the most discriminating ear.

Both chips provide the same capabilities — three independently programmable tone sources, a noise generator, a programmable mixer and a programmable amplifier with 16 volume settings. By mixing various sound sources, or "voices", or modulating the noise source with the output of one of the tone generators, a wide variety of special effects can be created, quite apart from standard musical notes and accompaniment for games. An internal speaker reproduces the sound effects.

Sega Level 3 Basic

All the features of the SC-3000H are well supported by Sega's own version of MSX-standard Basic. With the Basic cartridge in place the Sega reports 26,620 bytes free, out of the original 32k. The Basic stack and work area are responsible for the difference in the two figures.

The graphics commands of Sega Basic will be familiar to users of Microsoft Level 5 Basic, with the familiar LINE, PAINT, and CIRCLE statements. Parameters added to these statements allow boxes and ellipses to be drawn and set the colour of drawings from the 16 available. One new statement is BCIRCLE, which erases a previously drawn circle. The same effect can be achieved by drawing the circle again using the background colour.

Sprites are defined using the statement PATTERN followed by a string of hexadecimal characters, and are positioned on the screen with the SPRITE statement, which takes coordinates, colour and size settings as parameters. There's no mucking about with PEEK and POKE statements.

Other Basic statements control sound effects. Both SOUND and PLAY are available, the first requiring numeric values

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for frequency and duration and the second taking actual notes as arguments. A range of five octaves is supported.

Sega Basic does have a few restrictions which are absent in Microsoft versions however. No more than eight nesting levels are permitted for GOSUB statements, and no more than 16 nested FOR . . . NEXT loops. In practice, these restrictions have no effect, as few programs would approach these limits, but the user should be aware of them in any case.

When first initialised Sega Basic sets aside just 300 bytes for the storage of character strings. Any program which requires more text handling capability must first clear additional memory for string storage space.

Software

A wide range of software is available for the SC-3000H on cassettes and in plug-in ROM cartridges. The largest part of this range is games, including the usual "shoot-em-up" space games and recreations such as baseball, tennis, soccer and boxing. A number of adventure-type games is also available, including graphics adventure programs. All the games which I have seen make full use of Sega's graphics and sound effects and rival many arcade games, which is only to be expected considering the Sega company's long experience in this field.

Other application programs include a spreadsheet with 256 columns by 10,000 rows (subject to memory limitations), a fully-fledged word processor and some exceptionally good music programs. The music cartridge, in particular, allows you to compose and play music note by note or in phrases, and comes with an extensive "Music Editor" handbook and a keyboard overlay.

Due for release shortly is a database program and a version of the Logo language. A Z80 assembler, Basic tutorial program and further educational programs will also be available soon. Whether you are interested in games, educational applications or small business programs, the SC-3000H is likely to have something for you.

Expansion

Expansion for the SC-3000H is provided by the "Super Control Station", a metal box which connects to the console through a ribbon cable and plug-in cartridge pack. A single 3-inch disk drive is included which provides 156k bytes of storage space per disk, together with

RS-232C serial and Centronics-type parallel interfaces and additional RAM to bring the total programmable memory up to 80k (including the 16k video RAM). The expansion unit comes with a disk version of Basic to add the extra commands required to save and load programs on disk, access data and keep disk directories in order.

Other accessories include the cassette recorder already mentioned, a joystick unit and a four colour printer/plotter which uses tiny pens to "draw" characters and graphics shapes on 10cm wide paper.

Conclusion

The SC-3000H is the latest version of the Sega computer, which was originally supplied with 16k of memory and a less extensive version of Basic. Considering the capabilities of the system, the range of available software and the marketing support facilities made available through John Sands, the new system is particularly good value. Although primarily a home computer, as indicated by the

emphasis on graphics, sound and games programs, the SC-3000H should also find use in schools and as a low-cost entry system for small business applications. In the under \$500 class, there are few computers which can match the capabilities of the SC-3000H.

Prices

The basic console described here is priced at \$349 including tax. The Sega cassette recorder is an additional \$99 and a joystick unit is \$19.95. Programs on cassette also cost \$19.95, and software cartridges are \$39.95. The price of the expansion unit is \$799, including disk Basic and the additional memory.

A number of retail outlets stock the SC-3000H and can supply further information. John Sands Electronics is at 6 Bay Street, Port Melbourne, Victoria 3207, or in New South Wales, at the corner of Allambie and Warringah Roads, Frenchs Forest. There are also offices in Brisbane, Perth and Adelaide.

Technical specifications

CPU:	Z80A processor running at 3.58 MHz
ROM:	32k
RAM:	32k plus 16k video RAM
Keyboard:	64-key typewriter standard
Display:	Text mode 40 x 24, graphics 256 x 192, 16 colours, 32 programmable sprites
Sound:	Three channels plus noise source, five octaves
Interfaces:	Direct video, RF modulated video, cassette port

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