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Memotech's former excursions into the micro market have received critical acclaim, but it looks as though the RS128, a home computer with immense expansion potential, will be the machine that earns the company most praise. Tony Hetherington takes a look.



Memotech is no stranger to the home computer market. It began by supplying memory expansions for the ZX81 and has progressed to its own range of micros.

The MTX 500 and 512 started the range last year with limited success, but now the icing has been added to the cake with the launch of the RS128. It

retains all the features of the earlier models including the Basic, built-in assembler and a text display language called Noddy, and adds an impressive 128k of memory, two RS232 interfaces and a cable to connect it to the FDX disk system. All this is available for a starting price of £399, which can be expanded, via the disk system, to a full CP/M micro

for £1250.

Hardware

The RS128 is supplied in a box along with a power supply, leads, demonstration cassette and full documentation. Also supplied with the review machine was an FDX disk system, which converts the RS128 into a fully-fledged CP/M system, and a Pascal ROM board. The machine is housed in a beautifully-styled black brushed aluminium case with a sports car style stripe along the top.

The keyboard houses 79 keys divided into 57 keys which form the standard qwerty layout, a numeric keypad which doubles as cursor control and editing keys, and a group of eight function keys which, with the shift key, provide 16 programmable function keys. There are two additional unmarked keys at either side of the space bar which reset the computer when pressed simultaneously.

The keys are nicely spaced and have a good positive feel. It's obvious that some time has been spent on the board's design, for not only is it well laid out, but the F and J keys have deeper recessions for easy fingertip recognition during typing.

Aluminium is an unusual choice for a computer casing — it's normally plastic — but was presumably selected because of its ability to dissipate heat while shielding the electrical components from interference.

Along the back of the casing is an impressive array of outputs and interfaces, including two RS232 interfaces and a centronics printer port. Above the interfaces is a slot through which a ribbon cable connects the RS128 to the FDX disk system.

Both TV and composite monitor output are provided along with a hi-fi for channelling the sound through your amplifier. Power is fed into the computer via a din plug through an attractive power supply which has an on/off switch on one side. — it's surprising no one has thought of it before! Two standard joystick interfaces, a cassette microphone and ear sockets complete the back of the micro. There's also a cartridge slot in the left-hand panel of the unit.

Unscrewing the side panels allows you to lift the hinged lid of the computer giving access to the inside, two thirds of which is dominated by the main circuit board featuring the now familiar Z80A processor. As in the MSX machines, the graphics capabilities are provided by the remarkable TMS 9918A series video chip from Texas Instruments. This time, however, the sound is supplied by boards — the review machine *was* such a hybrid. The boards are easy to fit or remove as they are guided into the right place by two grooves running the length of the computer's innards.

The Pascal ROM board is one of two boards available, the other being a ROM-based word processor called NewWord. Unfortunately, there's only room inside the machine for two boards, so if you wish to use the Pascal board you should substitute it for the RS232 board, as it's unlikely that you'll require both at the same time. You should, of course, replace the RS232

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another Texas chip, the SN76489A.

The main board comprises 24k of ROM. This also contains MTX Basic and, among other delights, a built-in assembler. The video chip is accompanied by its usual 16k of video RAM, but the user RAM is made up to the required 128k by an expansion board which plugs into the right-hand end of the main PCB. Another plug-in RS232 communications board completes the inside of the machine.

It's these two boards that form the difference between the RS128 and its predecessor, the MTX512. Indeed, it's from these boards that the computer's name is derived — RS(232) 128(k) = RS128. An MTX512 can be upgraded to an RS128 by the inclusion of these two

board when you wish to use the FDX disk system.

The FDX is housed in a matching black brushed aluminium case and is large by any standards. Together with the RS128 and a monitor it forms a neat business system which would be equally at home in the office or on the dining room table. Set in the front of the FDX unit are two 500k 51/4in disk drives, an on/off switch and a fan. The FDX connects to the RS128 via a ribbon cable fitted into the bottom of the unit. A power lead runs from the back of the FDX to the RS128 which replaces the RS128's own supply. The video output is also via the FDX's 80-column board, and can deliver either monochrome or



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In addition to the disk drives, the review machine had a 256k silicon disk. This is basically an area of memory which the operating system treats as a disk drive. Consequently, applications software can be rapidly loaded and accessed at speeds that dramatically increase the package's performance. This can make the difference between a package that's useful but time consuming and an invaluable piece of software.

The review FDX system could be expanded by the addition of two further disk drives and up to three more silicon disks.

System software

When you switch on the RS128 you are

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faced with a dead screen — an all too common occurrence. The only movement is a flashing white cursor, below which appears the message 'Ready'. This is a shame since it hides the machine's best facilities: the RS128 user has access to MTX Basic or an interactive text language called Noddy, and a built-in assembler complete with display panel. According to Memotech, Noddy does for text what Logo does for graphics. I assume this means that the principles of programming are grasped through small, easyto-learn steps.

A Noddy program is a collection of pages that contain either data or programs. A data page is easy to create and once you've given it a title you're free to type any data you want, be it an address, recipe or menu.

A Noddy program is written on a program page and is constructed from only eleven commands. These are easy to understand and include DISPLAY to show a data page, ENTER to test for keyboard input, IF to test for a condition, and BRANCH and GOTO to jump to another part of the program. Noddy programs are run from Basic by the PLOD command (as in PC) and control is returned to Basic with the RETURN command. Each command is prefixed by an asterisk, so it's easy to distinguish a Noddy program from one written in Basic.

Noddy is a comparatively new language and is still in its infancy, conse-



The keyboard houses 79 keys, divided into three clearly-defined areas. They are nicely spaced and have a good positive feel



The machine's name is derived from the plug-in RS232 comms board and the (128k) RAM expansion board

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quently little is known about it. It has some interesting aspects, particularly the ease with which pages of data can be displayed onscreen. The majority of RS128 users will skip Noddy and go straight into Basic, which is a shame for it certainly has potential. It will not replace Logo as a teaching aid for children, but it may be suitable for adults learning programming since it provides more useful examples than a turtle moving round a screen. If nothing else, you should bear it in mind for screen display subroutines to be incorporated into Basic programs: for be created from moving sprites over the plane. If any pixels are left transparent the background colour of the backdrop plane will show through, thus completing the picture.

The sprite planes are larger than the screen area and the other planes. They are a massive 8196×8196 pixels, so you can move sprites around without them appearing on the screen: this is useful if you want to have something circling the screen which leaves one side of the screen and after a delay emerges at the other side.

The sprite planes are parallel to the

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example, a page of instructions or help screens.

The next built-in feature will appeal to users at the other end of the computing spectrum, as it's an assembler/disassembler package.

You enter the assembler from Basic by simply typing ASSEM. Once in you are free to enter insert and delete assembly programs; CLS then returns you to Basic and assembles the code. The assembler is accompanied by a monitor, or front panel, which allows the user to inspect, edit and move blocks of memory. With the monitor you can also follow the contents of the machine's registers while a program is running. This will have Z80 machine code freaks champing at the bit, but the rest of us will be content with MTX Basic.

The RS128 relies on the Texas Instruments TMS 9918 chip for its graphics facilities, so in order to appreciate the machine's Basic graphics capabilities it's necessary to understand the workings of the chip.

The picture displayed on the screen is created from a sandwich of 35 display planes, the first 32 of which are the sprite planes where a single sprite roams. These sprites are usually 8×8 pixels square, although they can be 16 \times 16 or even 32 \times 32. Positioned behind the sprite planes are the multicolour or pattern plane, the backdrop plane and the external video or border plane.

Any fixed pattern is drawn onto the pattern plane which in high resolution mode is split into 256×192 pixels, therefore quite complex graphics can

pattern and backdrop planes, which are exactly what you see on the screen. You, therefore, see the pattern and backdrop planes overlaid by whatever section of the sprite planes you've selected with the 'VIEW' command. If there's any overlap between the sprites on different planes, precedence is given to the upper ones.

Surprisingly, all this is controlled by a handful of Basic commands. The patterns or shapes of the sprites are defined using the GENPAT command which forms a pattern table. Any of these patterns can be used by each sprite by substituting the correct number into the SPRITE command, which also defines each sprite's initial speed, position and colour. Sprites are moved by the MVSPR which tells a single sprite to move one step in a given direction. be ordered to follow points or lines drawn on the pattern plane. These points or lines are drawn by the machine's remaining high resolution graphics commands. These include PLOT to draw a point, LINE to etch a line, and CIRCLE.

The Memotech's text screen has a resolution of 24 lines by 40 characters, but is split into eight virtual screens. MTX Basic uses five of these: the editor screen (four lines), the list screen (19 lines), the graphics screen, the whole screen (24 lines), and the one line message screen. These are numbered VS0, VS1, VS4, VS5 and VS7 respectively. These virtual screens can overlap each other and are selected by the VS command. MTX Basic only uses five, which leaves the other three for you to define as you wish through the CRVS command. Such virtual screens or windows can be set to any size and can be used for either text or graphics. You can redefine one of the screens used by Basic, but this will be taken from you whenever you return to Basic.

It's interesting to compare MTX Basic with MSX Basic since the RS128 has the same processor and video chip as found in MSX machines (for example, the Sony). Both Basics have excellent sprite facilities, but the RS128 forfeits powerful interrupt-driven commands in favour of screen windows. The sound differs as they use different chips.

The Memotech's sound is generated by the SOUND command and is specified in the command's seven parameters. These parameters include the channel number, the sound's frequency, volume and length. You can also specify the degree by which the volume and frequency will rise and fall. The

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The step size is set in the sprite command. The ADJSPR command is used to adjust a sprite's parameters while a program is running instead of repeating the SPRITE command.

The final sprite command is probably the most powerful and complicated, and can be used to set the size of sprites, their total number, the number of circling sprites and their speed, and to move sprites set distances. Sprites can machine loads this information into a special area of memory called the sound buffer, which allows the computer to perform other tasks while the sound is playing. As this uses memory the sound buffer can be accurately dimensioned by the SBUF command.

An MTX Basic derivative is packaged with the FDX system and is logically called FDX Basic. This replaces the MBasic found on earlier FDX systems



and is essentially MTX Basic with a few additional commands for disk access. These

commands support both sequential and random access files which are compatible with CP/M and are selfexplanatory.

Applications software

Also included with the FDX system are a word processor called NewWord, and SuperCalc which requires no introduction.

NewWord is available for the RS128 in two forms: as a disk supplied with the FDX system, and as a plug-in ROM board costing £75. The ROM version contains fewer features than the disk version and uses cassettes for storage of documents. it will, however, form a reasonable compromise between users who want a word processor but haven't the funds to buy the disk system. In essence, NewWord is Word-Star configured for use with the Memotech's keyboard. The transition has been successful as it forms a pleasant word processing unit.

Pascal and Logo are also available in ROM boards, although only the Pascal was available for evaluation. It was written for Memotech by Hisoft, and as you can see from the Pascal Benchmarks it's a good performer. Like the ROM-based NewWord it uses cassettes for storage, but must still be considered an essential buy for Memotech owners wishing to experiment with this powerful language.

Other software will be plentiful both in disk and cassette form if early indications are proven reliable. A catalogue enclosed with the machine shows a healthy list of about 50 titles including business, educational and games programs. The games include some titles that have been successful on other machines, such as the Level 9 adventures and titles from Ocean and Lothlorien.

As the RS128 becomes a fullyfledged CP/M machine with the addition of the FDX system, it will soon be supported by a glut of CP/M packages.

Documentation

Three manuals were provided with the

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review machine: the Basic tutor operator's guide, the FDX system manual, and the Hisoft Pascal user's guide. The Pascal manual is, and is meant to be, a pure reference guide to be used by existing Pascal users, and directs beginners to a number of books referenced at the back. The other two manuals aim to provide tuition as well as being reference works for experi-

enced users. The Basic tutor manual takes the user from initial setting up on to the intricacies of MTX Basic, Noddy and the built-in assembler. At each stage in the tutorial section there are enough examples to get users happily tapping away at the keyboard; at every stage you are urged to experiment with the commands you have just learnt. It's left to experimentation to discover some of the features of the machine. For example, as in Acorn computers, keywords can be abbreviated with a full stop, as the Basic takes this as a keyword and searches through its list until it finds one that starts with the letter(s) before the full stop. This is a useful feature which greatly speeds up programming, but no mention of this is made in the manual.

The back of the manual includes a variety of technical information which will keep techno buffs happy for weeks. This is fine, but there seemed to be an unbridged gulf between the tutorial section and the technical details. The same problem exists with the FDX manual which contains sections on setting up, using NewWord, SuperCalc and FDX Basic, and the technical section.

The manual is supplied in a ring binder which folds into a stand for easy use at the keyboard. A nice final touch is the disk holders, which are in the front of the manual and ensure that the disks don't stray too far from the machine.

Prices

The Memotech RS128 costs £399 and as such is a direct price competitor to the BBC B, Advance 86 and Sinclair QL. The FDX disk system which converts into a fully-fledged CP/M system retails for £870, setting the total cost of the CP/M system at £1269. The silicon disks cost

Technical	specifications
CPU:	Z80A processor running at 4MHz
ROM:	24k including MTX Basic, Z80 assembler/disassembler, Noddy interactive screen manipulator
RAM:	128k + 16k video RAM
Display:	Text 24 lines of 40 characters. High-res 192×256 pixels. 16 colours, 32 sprites
Sound:	Four channels via TV or hi-fi output
1/0:	2400 baud cassette port, two RS232 ports, centronics printer port, two standard joystick ports, TV and composite monitor output.
Dimensions:	70mm × 92mm × 110mm
Weight:	1kg

Benchmarks

Pascal	
Magnifier	0.3
Forloop	3.0
Whileloon	4.6
Repeatloop	4.1
Literalassign	3.7
Memory access	3.8
Realarithmetic	15.6
Realalgebra	16.1
Vector	8.7
Equalif	6.6
Unequalif	6.3
Non-parameters	3.1
Value	3.9
Reference	4.0
Maths	6.9
Basic	
BM1	1.9
BM2	5.3
BM3	11.7
BM4	11.4
BM5	13.3
BM6	22.6
BM7	40.8
BM8	43.7
All timings in seconds. For a full li	sting

£385 extra.

The Pascal ROM will cost around £50, but the ROM version of NewWord is more expensive at £75.

Conclusion

'Direct Access'.

The Memotech RS128 will be a very tempting prospect for anyone buying a home computer with a view to future expansion. The basic unit has a lot to offer with its 128k of memory, powerful graphics facilities, Noddy and the assembler. Add to this the FDX system and you have a powerful CP/M disk system complete with silicon disk for a competitive £1600. This also gives users access to the plentiful supply of CP/M packages.

This mirrors the facilities offered by the Advance, which provides users with IBM compatibility as opposed to CP/M. However, I feel that the RS128 has more appeal because of the quality of its construction and ease of use: for example, the keyboard is well suited for business use.

The RS128 may also convert some potential BBC and QL buyers by virtue of its specification (128k compares well against the BBC's meagre 32k), and the fact that its younger predecessors, the MTX 500 and 512, have operated bug free for several months.

The RS128 offers a total home computer package providing a wide range of games and educational programs, to a full CP/M system offering a formidable array of business packages.

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