

AN ARGUS SPECIALIST PUBLICATION

A & B

OCTOBER 1986
£1.50

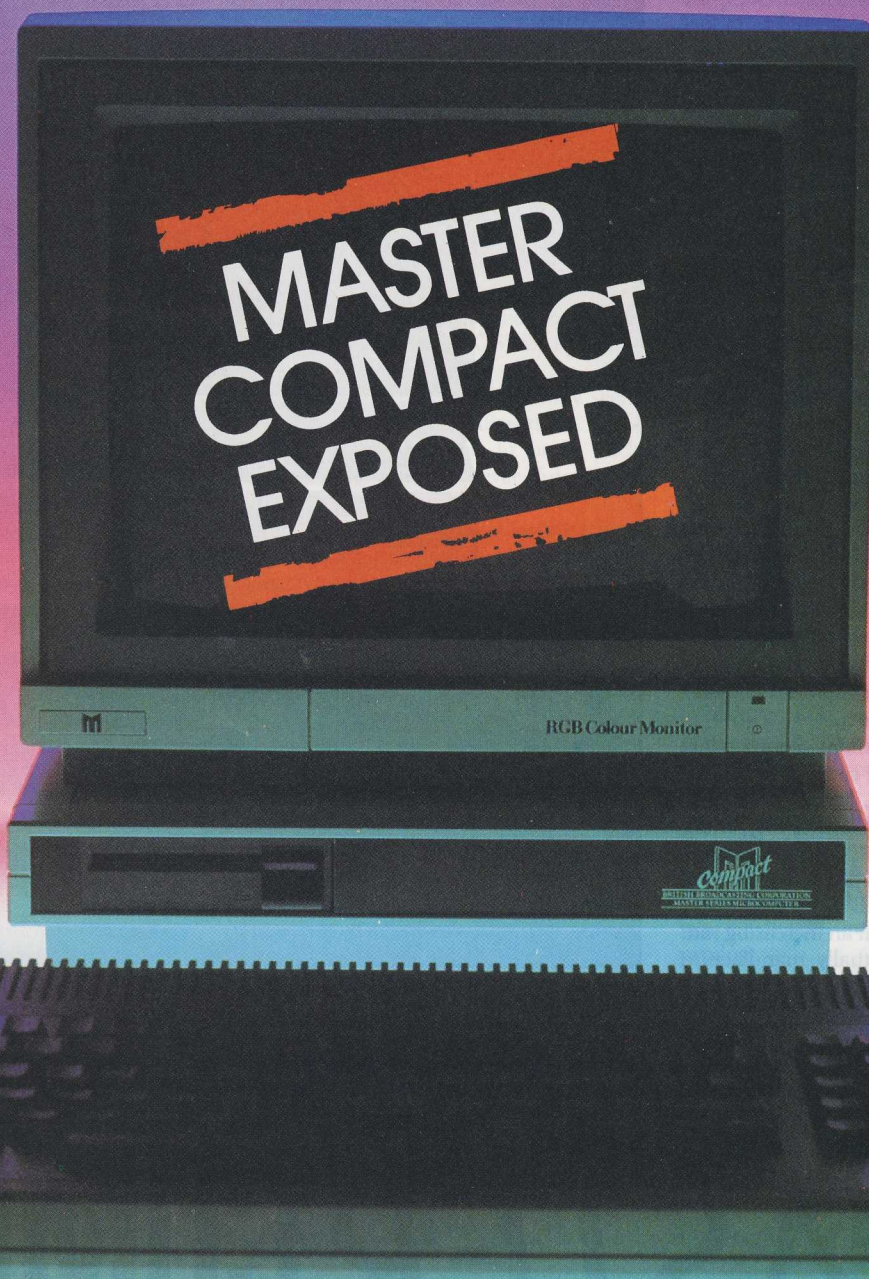
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ACORN'S NEW MACHINE

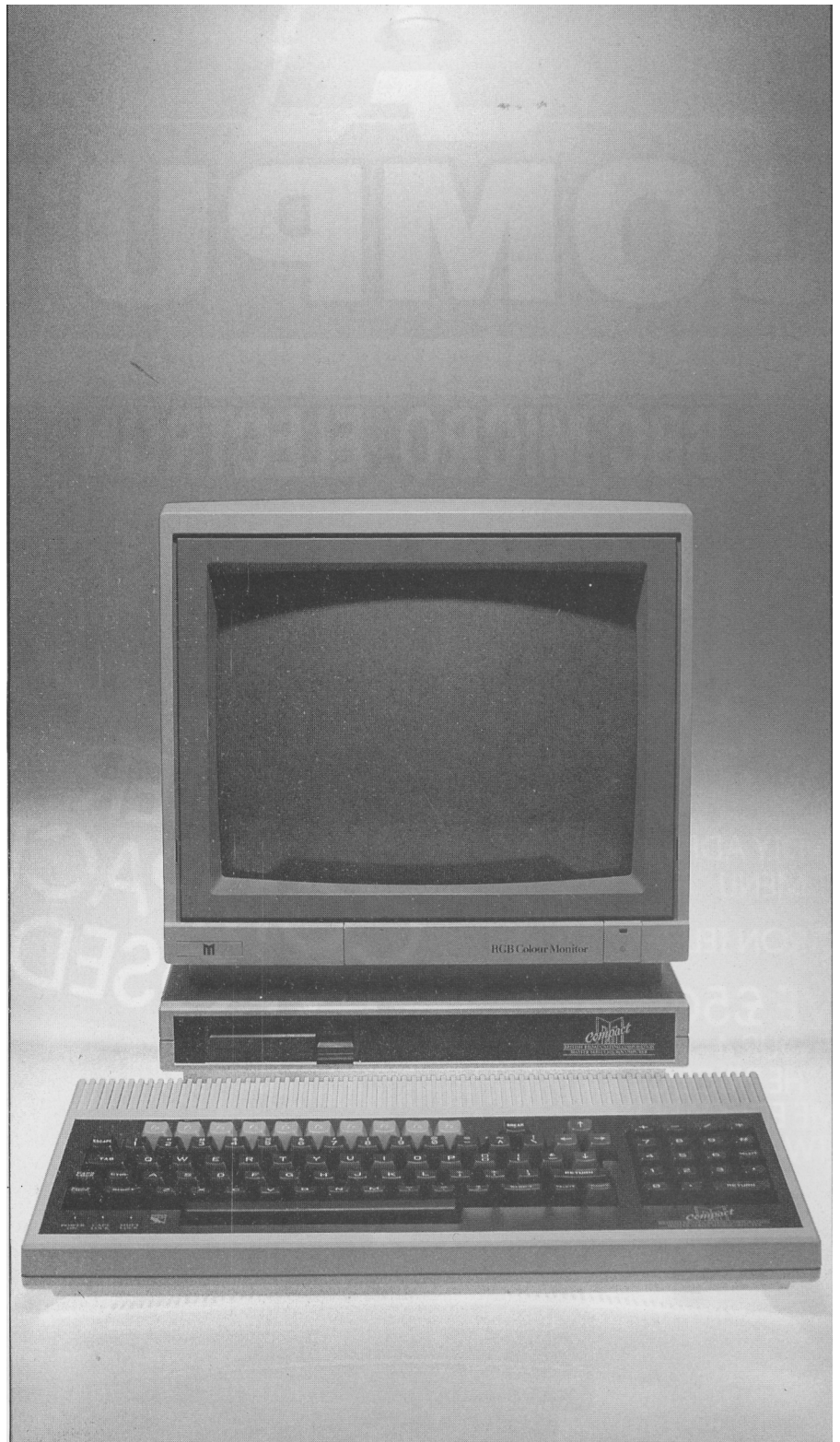
**A complete
Acorn system
for under
£500?**

**That is new!
Gordon Taylor
with the first,
in-depth review
of the Master
Compact**

The design of Acorn's new Master Compact was based partly on ideas gleaned from formal market research, and partly from informal talks with a great many people. As a result, Acorn have a clear idea of what people want, and who they expect to buy it. In concept, the Compact is a lower-priced version of the Master 128 — designed to do all that many users will ever ask of it. It is also intended to be a complete system — including software — usable "straight out of the box", even by the first-time user. Moreover, it will eventually be available with many different national keyboards, and even the UK version has a new prefix or "code" key to obtain characters from an extended set.

In overall size, the Master Compact is similar to the original Acorn Atom (1979) and the Electron (1983), though slightly wider due to the addition of a numeric pad. Like the Atom and the Electron, the keyboard unit of the Compact is small and light because it does not contain the power supply. This is in a separate unit, which contains one 3.5 inch drive as standard (with room for a second), and is designed to support the display. High quality monochrome and colour monitors are also offered as part of the system.

While incorporating many components from the Far East, the computer itself is manufactured in the UK. Initially, this is by Rank Xerox, of Welwyn Garden City, using very modern equipment, including automatic insertion of components into the printed circuit boards. AB Electronics, who are making Master 128s at an increasing rate in Abercynon, will eventually manufacture the Compact as well. Acorn expect to produce



MASTER COMPACT

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and sell several tens of thousands of Compacts by the end of the year, and at a rising rate thereafter. Even before the launch major interest has been expressed by Australia and Canada.

The Marketing Story

The Compact is the direct successor to the Electron, but just as the Master has learnt from the original Model B, so the Compact has learnt many harsh lessons from the Electron. Notable amongst these is that software compatibility must not be compromised — at least as far as the code itself is concerned, as opposed to the file format and disc size. This becomes ever more important as the software base continues to grow, and with the marketplace becoming increasingly competitive. Software compatibility is directly related to hardware. Whereas the cost of the Electron was lowered (compared with the Model-B) by reducing the number of keys, and compromising the screen display modes, these were found to be impediments to acceptance by both software houses and users.

Responding to these lessons, Acorn are offering the Compact as a complete high-quality system, with hardware and software especially suited to the school and the home. As a full member of the Master Series, endorsed again by the BBC, it should give continuing satisfaction to its users, both in the UK, and — increasingly — overseas.

The Keyboard Unit

The casing is based on that of the Acorn Communicator — a smart desktop computer-plus-telephone being developed by Chris Curry — one of Acorn's founders. However, the Master Compact differs completely in both its keyboard and contents.

The layout of the 93 keys is the same as that developed for their "top" series product — the Acorn Cambridge Workstation, and adopted for the Master 128. Moreover, the key area of the Compact is the same full size — there has been no subtle narrowing or crowding of keys to shave the cost. It features ten red function keys in a single horizontal row at the top — where they have always been on a BBC Micro. Unlike vertical columns or rectangular groups, horizontal rows can be labelled clearly — with keycards or on-screen — with multiple legends for shifted functions if necessary. There is a full numeric keypad to the right, with the cursor keys in a separate cruciform group between. Interestingly, IBM have just changed to a new keyboard for all their personal computers — with the function keys in a horizontal row, and cursor keys separate from the numeric pad!

The keyboard uses a different technology from that of the Master 128. Instead of metal springs and contacts, special rubber is formed into bubbles, which yet gives "full-travel", both light and positive, with some overcentre action. Since the contacts are between carbon-impregnated rubber and gold, they are highly resistant to corrosion — and should be very reliable.

The keyboard also differs in shape in side elevation. Rather than being in raked rows, as

on the Master 128, all the keys are in a single (though sloping) plane. However, they themselves are angled — each row differently — by an amount increasing with distance from the middle QWERTY row. Moreover, the key-tops are of conventional hard plastic (which gives some click), with sculptured tops and flared sides, and clear, permanent markings. The keys themselves feel much like those of the Model B in action, and somewhat different from those of the Master 128. I found the keyboard very acceptable, and understand that touch typists like its light action.

As on the Master 128, the Break key may be locked against use, by turning a recessed screw alongside. The keycard simply rests in the usual place above the function keys.

The Character Set

The markings on the keys are identical to the Master 128, save that the © character is now on <SHIFT-0>. The former key — now marked with two small squares — is known as the "Code" key. It is used to prefix other keys, to send ASCII characters 128 to 255 direct from the keyboard — and thus access an extended character set. (The Master 128 — and indeed the Model B — can already send them, but only by typing CHR\$(n) or VDU n). This is to enable the computer to be multi-lingual (not to say multi-national), with letters and marks additional to those usual on the English keyboard. Conceptually, this "Code" key is the same as the prefix! used to add 128 to the code of a character in GSREAD encoding.

The action of the "Code" key may seem odd at present — since it requires the <CTRLSHIFT-Code> combination to prefix each single character sent. However, future versions of the machine operating system (MOS)

— in a one- rather than a half-Megabit ROM — will allow the "Code" key alone to toggle between two alternative character sets. Moreover, these will not be simply 0 to 127 and 128 to 255, but a complex mapping, differing for each national keyboard. (Presumably the keytops themselves will be double marked.)

In the jargon, ASCII characters 128 to 255 "have the top bit set", since the normal characters 0 to 127 are defined with only seven bits. For such extended characters to be useful though, as well as being sent from the keyboard and displayed on the screen, they must be accepted by applications such as word processors and acted on by peripherals such as printers. Not all applications and peripherals can be upgraded, and this will take time. In any case, it concerns mainly non-English-speaking countries, but it does show how Acorn and Olivetti are planning an international future for their products. Meanwhile, you can use the Master Compact version of *View* for editing text containing even double-height Teletext characters — though you will need to use a screen dump to print them!

Data Ports

On the Model B and Master 128 machines, the relatively expensive Analogue Port is used

most often for connecting "proportional" joysticks. However, many games expect the less expensive (and much more widely used) switch-type joysticks, which requires an adaptor. Similarly, the digital User Port is most often used for connecting an (AMX-type) mouse or (Marconi-type) trackerball which are also "proportional". Hence for the Compact, Acorn has elected to support the switch-type joystick, along with the mouse and trackerball. This is done by providing an "industry-standard" joystick/mouse port, with a 9-pin D socket — as used by Atari and Commodore, amongst others. The operating system software allows the new port to accept either "switched" (joystick) or "proportional" (mouse) inputs. Furthermore, the cursor keys can be set to simulate a switch-type joystick, so that software which requires it can be run even without additional hardware.

I tried the popular "Quickshot" switch-type joystick (which costs £6.95) with the "Icon" pointer-controlled software on the Welcome disc. It should be anchored securely — which means that the suction pads need a metal, glass or plastic laminate surface. Even then, it gave a rather imprecise response — but perhaps I was expecting too much of such a device. As proportional digital devices, the mouse or trackerball should be much better suited to controlling a pointer. They operate using interrupts, generated from two shaft-encoders, whereas the joystick has to operate by regular polling of the four directional switches. Both proportional devices worked well with the GEM "Icon" software of the Master 512, but I lacked an adaptor to enable their User Port connectors to fit the new joystick/mouse port on the Compact.

The Compact has a full 8-bit parallel printer port as standard. (The Electron did not even have a printer port until you added a Plus 1 interface, costing £60). However, the connector is now a 24-way Delta socket, rather than the 26-way IDC plug used by the Model B and Master 128. The reason is that some countries have severe Radio Frequency Interference (RFI) requirements, and the new connectors can be shielded much better if necessary. This would be done by using metal-sheathed versions of the connectors, and screened ribbon cable. These are expensive measures, for marginal technical gain, but are the price of penetrating international markets such as the USA — as Acorn knows to its cost with the Model B. The main benefit to the user is that this provides the volumes which justify the investment in a high-quality product.

The disc drive data connector on the back of the keyboard unit is also different. The 34-way IDC plug of the Model B and Master 128 has been changed to a 25-way "D" socket, again because it can be shielded better against emitting Radio Frequency Interference.

Inside the Case

On opening the case, the preparations for other RFI measures are apparent, with plastic "teeth" which bridge the two halves of the

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case, to ensure electrical continuity when the interior is metallised.

The motherboard looks economical. Almost all the components are soldered in place, including the processor. The only exceptions are the sockets for ROMs and the EEPROM, and for the fitting of the RS232 and Econet hardware.

The processor is the 65C12 — exactly the same as the Master 128. There are also two 6522 chips — one of which controls the audio circuitry and reading the keyboard (as on the Master 128), while the other serves the printer and joystick ports.

The Master 128 has eight semi-custom chips, including two carried over from the Model B. The Master Compact uses five from the Master 128, and the RS232 upgrade uses one from the Model B. Where the 40-column Teletext Mode 7 display was only simulated on the Electron, the Compact has the same Mullard 5050 chip as the Model B and Master 128 — for total compatibility. Likewise, where the Electron had reduced sound capability, the Compact has the full (three "voices" plus noise) capability of the Model B and Master 128.

The floppy disc controller is a WD 1772, which is very similar to the 1770 used in the Master 128, but offers the choice of track-to-track times of 12, 6, 3 and 2ms, rather than 30 and 6ms.

Of the five physical sockets on the right, the MOS occupies the one nearest the front, and the sideways ROM/RAM system the remainder. Three of these are of 16K capacity, and one will accept 16 or 32K ROMs. This is a wise provision, as the cost of the larger ROMs is already low, and they allow room for even more capable applications and languages, several of which are already of 32K (eg Pascal), now and in the future. The 16/32K ROM socket is "mapped" onto the same ROM banks as the expansion connector, with selection being by an internal link (PL 11).

Since the Compact does not have the cartridge slots of the Master 128, none of the internal ROM sockets are "mapped" onto the four x 16K of sideways RAM. However, Acorn have ensured that sideways RAM occupies banks 4 to 7 in both machines for compatibility, even though they recommend using the "machine-independent" bank "letters" W, X, Y, and Z, which are also supported by the operating system.

In their search for cost-effectiveness, Acorn have provided a powerful non-volatile "configuration" capability at less cost, by using an EEPROM, rather than battery-powered CMOS RAM as the Master 128. It stores many settings of this flexible machine while it is switched off — in accordance with the user's preferences. Although each "bit" is guaranteed to retain its data for a year, even after at least 10,000 write operations, Acorn have socketted the EEPROM chip for ease of eventual replacement. However, the capacity — of 128 bytes — is more than the 50 bytes of the CMOS RAM, and will be used for future developments.

While the Compact does not have a real-time calendar and clock as in the Master 128,

the operating system returns a fixed date and time (the end of the century!), to reduce the risk of programs stopping with an error, unable to find any date and time at all.

Two small sockets in the centre, and two larger ones to the left, are for the RS232 upgrade, while two special in-line sockets to the right of centre, near the back, are for the Econet upgrade board.

The power supply (from the disc drive unit) uses a standard connector — the same as for the Electron. However the Compact requires only 5 volts DC (not the 18 volts AC of the Electron), and the socket is accordingly clearly marked. It may be tempting for some young users, familiar with the Sinclair Spectrum, to switch off by pulling out this connector. However, unlike the Spectrum, the Compact has a proper switch at the back of the disc drive unit, which should be used — to avoid excessive wear of the connector.

One of the consequences of the "value engineering" is that, unlike the Model B and Master 128, all the connectors now fit on the back face of the keyboard unit.

Disc Drive Unit

The disc drive unit can support even a heavy monitor at just the right height, and yet manages to look elegant. Those who have a crowded desktop will need to leave space on the right to reach the power switch — just as for an IBM-PC. However, the Compact takes up far less room. Also, if you route the monitor lead over from the left — with the power, disc, and printer leads — the keyboard unit can be moved out of the way when required, without needing to disconnect anything.

The unit contains the power supply and a single 3.5 inch disc drive, with a formatted capacity of 640K. A second identical disc drive is available as a dealer-fitted option, giving a total capacity of 1280K — all accessible at once. The number of drives is limited by the hardware to two, even though the ADFS appears to allow four.

Cassette tape filing is not supported, and no socket or interface is fitted, or even available as an option. The price of a bare disc drive is now less than £100, compared with £30 or £50 for a much less capable cassette recorder. Now that a disc drive is included as standard, the cassette port has been deleted as a cost saving.

Of course, the Electron disc system also used 3½ inch disc drives. However, since then they have received the "ultimate accolade" of being adopted by IBM for their latest machine — the new Portable. Acorn will be supplying only 3½ inch disc drives for the Compact — though third parties may well offer add-on 5 inch drives. However, Acorn hope that software houses will accept that most users will have only the ADFS and 3½ inch drives, and will distribute in this format and on this media. Certainly they have been given plenty of notice.

Acorn see this as primarily a disc-based — rather than a ROM-based — machine. There is less need for external cartridges and internal ROMs if a fast, high-capacity disc filing sys-

tem is standard — especially if the machine has sideways RAM. This is the first high-volume Acorn machine of which this could be said (the Master 128 having been in transition, not having a disc drive included as standard). Certainly, disc-based software is less expensive in hardware terms. RAM comes in packages of ever-larger capacity, and can be soldered in, whereas ROM must be in modules of 16 or 32K, and must be socketted.

While 3½ inch discs are more expensive than 5¼ inch discs (by a factor of perhaps two), their capacity is between 1.4 and 6.4 times as great. Also, the ADFS allows much better use to be made of the disc capacity, thanks to the hierarchical directory structure that may be used, which increases the number of files (from 31 per side under the DFS), essentially without limit.

The 3½ inch disc has other functional advantages. It is easier to handle, and the magnetic medium is far better protected (by the plastic shell and sliding shutter), which should lead to higher reliability in practice. To write-protect a 3½ inch disc, you slide a captive plastic tab so that you can see through the notch. While this logic is opposite to a 5¼ inch disc, it is the same as an 8 inch — the original floppy disc.

Another benefit is that the 3½ inch drives are both less expensive and yet (in general) higher in performance. For example, as more recent products, they are designed to work with track-to-track times of as little as 3ms, as compared with from 6 to 30ms for the older 5¼ inch drives. (The later and better 5¼ inch drives — typically half-height — however, can also be run with a time of 3ms. My Teacs worked perfectly with it.) Hence a suitable Floppy Disc Controller (the 1772) can be chosen in place of the 1770 of the Master 128 (and Model B upgrade). The skew factor of 4 in the disc format has also been optimised to the new drives. This all adds up to a disc system of even higher performance than in previous models.

The disc drive unit also has a power-out socket for the monitor, so that both computer and monitor can be powered via a single mains lead. This socket is not subject to the computer power switch.

Displays

The systems are offered with the choice of a monochrome or colour monitor — both of high quality. It will also be possible to buy a system without a display — in the event that the purchaser already has a suitable monitor, or proposes to use a television. Although this is not recommended for more than brief periods or 40-column screen modes, a lead with an in-line modulator will be available — since there is none inside the casing.

The monochrome monitor has a green screen and is made by Philips. This would probably be preferred for business use. To reduce cost, the composite video connector (normally used for monochrome monitors) has been changed from the BNC connector used on the Model B and Master 128, to one like the UHF socket on these machines. However, no damage should result from plugging

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in a television directly — it simply would not work.

The colour monitor supplied by Acorn is a Philips with a dot pitch of 0.42 mm — the same as the medium resolution Microvitec 653. The display tube has a black shadow mask, for higher contrast, but lacks an anti-glare finish — which was judged too expensive. Even so, this gives very legible 80-column text and fine colour graphics — far better than a colour television tube. The RGB connection for the colour monitors is identical to that used on the Model B and Master 128, as are the signals provided by the computer. However, the monitor has a SCART connector, which ensures maximum flexibility for future applications, such as displaying more than 16 colours, and overlaying video pictures.

Other Peripherals and Expansion

Acorn do not intend to include printers in these systems, since they believe that the purchaser should be free to choose — depending on their requirements. Dealers will also offer advice. The Compact (like the Model B and Master 128) provides an industry-standard parallel interface, and the option of an industry-standard serial interface, which makes the choice of printer almost unlimited.

In addition to the second disc drive, Acorn offers two upgrades for the computer itself — an RS232 kit, and an Econet kit — the sockets for which are already in place. They may both be fitted by dealers. The RS232 is essentially equivalent to the RS423 fitted on the Model B and Master 128, but is significantly less expensive to implement. It is by far the most widely used standard for serial interfaces, and enables the Compact to be connected to modems, serial printers, and as a terminal, direct to larger, mainframe computers. Econet is of course Acorn's own Local Area Network, of which there are now more than 6000 installations. The Econet board is the one which may also be fitted in the Master 128 — another useful rationalisation.

The new machine has no "Tube" hardware or connector, for second or co-processors, since these are provided for in the Master 128. Although this may seem a significant loss, Acorn (and others) have done much to reduce the "need" — at least for 6502-type second processors. This has been done by the provision of shadow RAM (since the B+), private RAM — enabling PAGE to remain at &0E00 with any filing system — (since the Master 128), and progressively faster versions of BASIC. The latest version of BASIC 4 running in the Compact is faster than BASIC 2 running in the original 6502 Second Processor.

There is however an expansion connector on the right-hand side, fitted with a push-on plastic protector. There is also provision for mechanical mounting — with holes for attachment screws either side of the connector. It has all the 24 address lines available, so doubtless various devices will be offered to use

it. One obvious candidate is an adaptor/socket for Electron and Master ROM cartridges. None is yet available, but they are likely to be offered soon by Acorn and/or third parties. The latter may well also offer a second processor ("The Compact Turbo"?) with more RAM and a higher processing speed — as PMS have done for the Electron, which likewise has no Tube.

A 1 MHz bus is not provided as such, but again the signals are available on the 50-way expansion connector. So, eg, a Winchester hard disc drive could be connected quite easily. However, the version of ADFS used in the Compact lacks the special code needed to control a Winchester — though it could be

respect of graphics, compared with the Model B (though the Model B can enjoy the same facilities by plugging in the GXR ROM). Moreover, thanks to the provision of private RAM in the Master Series, using the GXR routines does not raise PAGE, and so reduce the space available for user programs.

To increase compatibility with the Master 128, even where certain hardware (such as the cassette interface) is not fitted, the operating system continues to recognise eg TAPE and MOTOR, so as to minimise the risk of an error. Even GOIO is recognised, which could be good news for anyone fitting a second processor.

*HELP ADFS returns the commands seen in the Master 128 version, with the addition of DRIVE (as well as DIR :n), FORMAT, VERIFY and BACKUP. This on-board formatter is a significant improvement on a disc-based utility, since it is all too easy to find that you have a masterpiece in memory, but no formatted disc to take it.

Bundled Software

Much of the bundled software comes on a Welcome disc, which may simply be "booted up", by pressing <SHIFT-BREAK>. You are presented with an icon-based graphic environment, in which a pointer is used to select from menus. This follows the fashionable idiom pioneered by Xerox, and popularised by the Apple Macintosh and Digital Research GEM. The pointer can be controlled by a switched joystick, a handheld "mouse", or a trackerball, connected to a socket at the back, or by the cursor keys — since none of these devices is supplied as standard. After positioning the pointer, you press the "Fire" or "Execute" button, or the <RETURN> key, as appropriate.

The contents and structure of the menus and sub-menus is shown in Figure 1. For example, to use the Calculator, you select "Applications", then "Desk Top", then "Calculator". These Desk Top applications are both entertaining and useful, and yet, like all this "Icon" software, they have been written in BBC BASIC! This makes them accessible to users, who are encouraged to make use of them in their own programs. However, the "Icon" software minimises the demands on a modest, 8-bit processor, since only a patch of the screen has to be redrawn for every pixel of movement by the pointer. It thus represents a "tour de force" in BASIC programming, and a credit to both writers and machine.

The Welcome disc demonstrates how the Compact may be regarded as much as a disc-and-RAM machine as a ROM machine. Thus, after booting it up, sideways RAM Bank 4 contains the Sprite ROM which complements the Graphics Extension ROM (GXR) routines built into the Master Series Operating System, and Bank 5 contains the Pointer and Mouse Filing System (PMFS), which handles pointer and other data for the icon software. Furthermore, on selecting

Fig. 1		WELCOME	DISC
Graphics	Castle		
	Clown		
Tutorials	Cloud		
	Patterns		
Applications	Shapes		
	ADFS		
	Keyboard		
	Screens		
	Text		
	Desk Top		Card Index
			Calculator
			Note Pad
			Catalogue
			Clock
	TimPaint		
	Logo		
Games	View		
	ABC		
Utilities	Adventure		
	Arcade		
	Characters		
	Envelope		
	Control Panel		
	Pattern Editor		
	Disc Utilities		CatAll
			ExAll
Device/Colour			DirCopy
			CopyFiles
	Text Colour		
	Background		
	Mouse		
	Joystick/Keys		

provided separately. Instead, the code space so released has been used to provide FORMAT, VERIFY and BACKUP, while staying within a limit of 16K.

System Software

The machine comes with a revised Machine Operating System (MOS), a modified ADFS, and an improved version of BASIC 4 — all in 64K of ROM. *H.. may be used to call up a full report on the ROMs (and ROM images) installed, complete with all the on-screen help that they provide. However, very sensibly, it is automatically presented in "paged" mode - to avoid it scrolling rapidly out of sight—! *HELP by itself returns MOS 5.00, UTILS 1.00, Advanced DFS 2.00 — the system software. *HELP MOS returns a full list of commands — a short form of on-screen help. Among these, *SRLOAD has been enhanced. The syntax is now *SRLOAD filename 8000 W Q I — where W denotes the RAM bank or slot letter, Q is for quick, and I is for initialise — both optional. This last avoids the need for <CTRL-BREAK>.

It is worth recalling that the Master Series has been enhanced very appreciably in

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ACORN'S NEW MACHINE

(among Applications), either Logo or View, the corresponding ROM image will be loaded into Bank 7. View (version B3.02) is the "senior" word processor from Acornsoft, enhanced to handle extended 8-bit characters. Logo is the best-selling version of the programming language from Acorn/Logotron. It takes full advantage of both GXR and Sprite graphics.

Many other demonstration, application and utility programs are supplied on disc for running in main RAM memory. There are tutorials for the keyboard, screen modes, text options, and ADFS, while the graphics demos use GXR routines, and may be listed for inspiration. The applications comprise the "junior" word processor "ABC", Card Index, and TimPaint. The disc utilities are CatAll, ExAll, CopyFiles, and DirCopy. The first two allow you to examine all the files on a high-capacity 640K disc, and the last two can help you to reorganise them.

Everyone expects a computer to come with BASIC — and the Compact is no exception. However, both it and the 128 come with two versions — BASIC 4 for running shorter programs very fast (the fastest in the class), and BAS128 for running longer programs (the longest in the class) somewhat slower — but still much faster than most rivals. At the same time, it allows well-structured programming, and full access to the excellent graphics and sound facilities.

Other Applications

The machine carries the BBC name — as part of the Computer Literacy Project — and is one of the Master Series. This means that it has a very high degree of compatibility for all Model B and Master 128 software.

ROM software that does not require a utility disc (such as View, ViewSheet, Inter-Word, Inter-Sheet and Inter-Chart, and doubtless many others among the 140-odd which are available) will be immediately usable in their present form. I can confirm that, in addition to the ROM versions of View and ViewSheet, Wordwise Plus, Inter-Word and Inter-Sheet all work — as does the new Master- and ADFS-compatible version of Merte DataScribe.

Along with View, which is bundled with the machine on disc, the rest of the View family can all be expected to be available very early, and to work perfectly. I received ViewSheet and ViewIndex in time for this review, and the remainder — ViewStore, ViewPlot, ViewSpell and the View Printer Driver Generator — were in the final stages of testing. As well as using ROM images on 3) inch discs in place of ROMs, they are being enhanced to handle the extended 8-bit character set.

While the Compact has immediate access to a large number of applications both from Acorn and third parties, it is largely thanks to Acornsoft that it also has a very wide range of powerful programming languages available. As well as BBC BASIC (now even faster and more accurate — see below), and Logo, these include Comal, Pascal, Lisp and Prolog. These undoubtedly contribute to the attractions of the BBC Microcomputers abroad as well as in the UK.

Fig. 2	BYTE	WORD	PROCESSOR	BENCHMARKS	
	Times	for	4000-word	document	- seconds
Computer+WP	MC+View	MC+Inter-Word	MC+Scribe	PCW+Locoscript	IBM-PC+WS
Load	3.4	3.7	3.8	11	10
Save	3.5	3.5	4.0	143	25
Search	3.3	3.0	11.4	292	11
Scroll	44.6	13.2	(53.3)	65	41
Times for PCW+Locoscript and IBM-PC+WS taken from Byte 86/3					

Of course Electrons with disc systems used 3) inch discs and the ADFS. Although they never achieved a high market share, owners of such systems will gain from the fact that they are media- and file- format-compatible with the Compact. Compatibility of applications, user programs and data in both directions remains to be seen, but (even if not complete) should still be good news for both parties.

Acorn have sought to ensure that over 100 titles will be available for the Compact at launch — using the 3) inch discs. A list of the compatible titles will be included with each machine. Beyond this, Acorn have produced four (of seven planned) catalogues, which list BBC Micro software in the General Interest, Educational, Scientific and Industrial, and Medical fields. Much of this vast resource of over 1700 titles should run on the Master Compact — especially if you or your dealer can transfer it to 3) inch discs.

Transferring between Filing Systems

If you want to use software or data on cassettes, it will have to be transferred first to a 5) inch disc using a Model B (or preferably a Master 128, for which PAGE = &0E00), and then to inch disc using a Model B, Master 128 or Compact — suitably equipped with 1770 or 1772 disc interfaces, ADFS, and appropriate data cables.

Small numbers of files smaller than the available memory may be transferred between 5) and 3) inch discs simply by loading them from the one, swapping the leads, and saving to the other. However, any significant volume of files, and any long ones — such as database files — requires that one 3) and one 5) inch drive be connected to the same system. (Use could also be made of two machines, connected via their serial ports — if the RS232 upgrade has been fitted in the Master Compact).

It is possible to connect 5) inch disc drives directly to the Compact — preferably 80-track, and double-sided. This of course gives media-compatibility with the Model B and Master 128. Furthermore, in addition to reading from and writing to such media under the ADFS (which is standard on the Compact), it is possible to install and use a version of Acorn's original DFS with 5) inch discs. Only those versions which run in a Master 128 are suitable, since the workspace for file channels is in a different place in the memory map. However, as the Master 128 ADFS is "em

bedded" in the Megabit ROM, it is necessary to load an "image" of it from disc into a side-ways RAM bank of the Compact. These will be available from dealers. After initialisation with <CTRL-BREAK>, it works just as well as one in ROM (although it is of course lost at switch-off). With these provisos however, a complete path for data transfer is available.

Indeed, one of the features of the DFS 2.2 used in the Master 128, is that *DRIVE n (40) may be issued, which causes the disc drive to double-step, and so enable reading from (and, if necessary, writing to), 40-track discs.

Apparently the best way of switching between filing systems in this case is not "permanently", with eg *DISC, *DIR :3, LOAD <filename> then *DIR :0, *ADFS, SAVE <filename>, but "temporarily", from the ADFS, with eg LOAD -DISC:3. <filename>, then SAVE :0.<filename>. Alternatively, both short and long files may be transferred using the *XFER command in the excellent *Advanced Disc Toolkit* from Advanced Computer Products.

Performance

Some useful measures of performance in business tasks are the word processor benchmarks established by the US magazine *Byte*. They use a standard document of 4000 words. Figure 2 shows the results for the Master Compact, using the word processor supplied with it (View), and two major alternatives (*Inter-Word* and *Scribe*). They are compared with the Amstrad PCW with *Locoscript*, and the IBM-PC with *WordStar 3.3*. This shows that, even on this modest document, the Compact with any of the three word processors is far quicker than the Amstrad with *Locoscript*. (*Scribe* is a page-based word processor, in which continuous scrolling is not possible, but the time shown is based on 320 lines being scrolled at a rate of six per second). The Compact with *View* or *Scribe* is even faster than the IBM-PC with *WordStar* loading and saving, and otherwise comparable, while the Compact with *Inter-Word* is far faster at all four tasks. This shows that the Acorn is a powerful business machine, with a choice of effective software.

For many computing tasks, the accepted measure is the average time for the PC WBASIC benchmarks, see Figure 3. For the Master Compact, this is 8.3 seconds — some 13% faster than even the Master 128. Apart from a slightly reduced MOS overhead (reflecting the lack of support for Tube or 1 MHz bus),

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this is due to further improvements in BBC BASIC — making what Acorn call version "This has new algorithms for the so-called "trigonometric functions" (logarithmic and trigonometric) — as revealed by the 30% greater speed for Benchmark 8. They are also more accurate. It thus runs user programs faster, without over-speeding games written in machine code — as would eg an increase in processor frequency.

This benchmark time makes the Compact with BASIC 4½ some 70% faster than BASIC 1 and 2 on the Model B, and faster even than on the original 6502 Second Processor. It also makes the Compact almost twice as fast at running BASIC than any 8-bit Amstrad or the 16-bit IBM-PC. Hence, although the Compact was planned specifically to offer greater cost-effectiveness, enhancements have clearly been implemented, where they have not compromised the main intent.

With their powerful operating systems, the Acorn machines have less room for BASIC programs than some others when running BASIC 2 and 4. However, when running BAS128, the Compact and 128 can handle programs and data of up to 64K. Moreover, the speed is little slower than the IBM-PC and many compatibles — for which BASIC programs are usually limited to only some 59K, however much RAM memory the machines may have.

Documentation

The manual is typeset, with both contents and an index, and is wire-bound to lay flat when open. It devotes some 19 pages to the Icon software, 67 to BASIC, 23 to *View*, 14 to

ABC, and 23 to Filing Systems. Notes on Getting Started, Expanding the System, and 11 valuable Appendices complete an introduction to the hardware and — especially — the software. The latter is very extensive (over 400K), but fortunately the games, tutorials, and utilities have on-screen help, and the graphics demos need none at all. A separate manual on Logo programming is included, while the excellent full manual for *View* costs only £10 for those who want to use the more advanced facilities. Doubtless additional manuals for advanced users of the machine will emerge in due course — as they have for the Master 128.

Discussion

It is very well understood that you pay more for quality in the fields of eg cars or hi-fi. The difference in the field of computers is that the measures of quality are less widely appreciated. However, they are increasingly seen to include processing speed and capacity, filing system speed and capacity, freedom of choice of peripherals, expandability, and — above all — the quality of the software. These things are directly linked however, since quality machines will give rise to quality software — written by people who take the time to understand and exploit the machine fully, quite often surprising the designers in the process!

Examples of these potentials being realised include Computer Concepts' *Inter-Word*. In addition to the ROM-link system for in-memory data transfer, this offers very high performance (see Figure 2) and other features in proportion, in a 32K ROM which "looks like" only 16K to the machine — thanks to

"internal paging" (see *A&B*, August 86, p56). Another example is the forthcoming *Inter-Spell* spelling checker, which — though a separate product — can be called from within *Inter-Word*. This too will use internal paging — of no less than 128K of ROM — to contain a dictionary of over 50,000 words. At the same time, it will be fast enough to check words as you enter them — so you can correct as you go. Yet because they are designed to work in any BBC Micro, including the Compact, such quality software can be sold at prices which reflect the prospective high sales.

The Compact is very important to Acorn as part of their plan to remain a volume producer of micro-computers and systems. While the machine itself has only limited scope for upgrade, these are well-chosen — a second disc drive, Econet for local area networks and RS232 for modems and "wide area networks". However, both users and software are also able to migrate to the compatible and very versatile Master 128 — with its greater capabilities for measurement and control, and potential for adding Winchester disc drives and co-processors. The latter include the 8-bit "6502-type" and Z80, the 16-bit 80186 and 32016, and the 32-bit Acorn Risc Machine. This gives remarkable scope for growth, while retaining much of your investment in hardware, peripherals and software.

Conclusions

The Master Compact may be compared with two Amstrad machines — the CPC 6128 and the PCW 8256 — as the only rivals with 80-column capability and reasonable speed for BASIC. As seen above, the Compact running *View* is much faster than the PCW 8256 running *Locoscri pt*. Moreover, it has ample disc capacity, and a standard printer interface. At the same time, it has better colour and graphics than the CPC 6128 — both for games and more serious purposes, such as simulations and business graphs. Hence the one Acorn machine beats their two more limited offerings. This is compounded by the quality of the hardware, and Acorn's excellent reputation for reliability — which is being further enhanced by the Master 128.

Furthermore, the Compact can be expanded, not just with a RS232 serial port for a modem etc, but with an Econet Local Area Network, to share powerful resources — such as Winchester disc file servers, and printer servers, which could even be laser or other "page" printers.

Finally, some of the best 8-bit business software, and most of the best educational software — at primary, secondary, and college and university level — is available on this BBC Micro — thanks to a base of over 600,000 compatible machines. This review was written (to a very tight schedule) using the Master Compact and *Inter-Word* — an impressive test of its compatibility and power. Certainly "Compact", it is still a "Master" in terms of performance and value.

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Fig. 3	BASIC	SIZE AND	SPEED
Computer	Basic	Size for Basic - K Average Time - s	
Master Turbo	BBC Basic 4	44 with disc	4.6
Master 128	BBC Basic 4	28.5 with disc	9.4
	BAS128 v 1.1	64 with disc	18.1
Master Compact	BBC Basic 4 1/2	28.5 with disc	8.3
	BAS128 v 1.1	64 with disc	18.2
Model B + 6502	BBC Basic 2	44 with disc	9.8
Model B	BBC Basic 2	25.7 with disc	14.3
		28.5 with tape	
Electron	BBC Basic 2	20.5 with disc	20.4
		21.5 with tape	
Amstrad PCW 8256	Mallard		14.9
Amstrad CPC 6128	Mallard	41.3 with disc	
Amstrad CPC 464	Mallard	45.5 with tape	14.6
Atari 130 XE	Atari	40 with tape	75.5
Commodore C128	Basic 7	37.5 with tape	40.1
Commodore C64	Commodore	37.5 with tape	34.0
Sinclair Spectrum	Sinclair	40 with tape	58.5
Sony (& other) MSX	MSX	26 with disc	44.3
		32 with tape	
IBM-PC	Basica	59 with disc	16.8
(Some results taken from Personal Computer World and Practical Computing)			

