

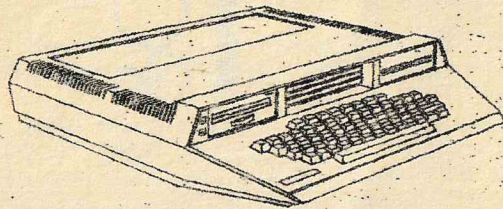
# EINSTEIN MAGAZINE

84

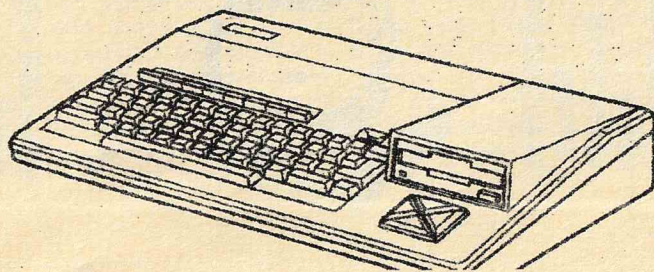
 TATUNG  
**Einstein** 

TC-01 AND TC-01A

COLOUR MICRO COMPUTER



 TATUNG  
**Einstein**  
**256**



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published for users of Einstein (and other) computers  
by Steam Computer Society. Chief Editor and Publisher:-  
A E Adams, Ivy Cottage, Church Road, New Romney, Kent. TN28 8TY  
(opinions herein are not necessarily those of the publisher)  
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(tracks/sectors, pinouts, frequency response)

(overswing, bandwidths, compensatory circuits)

(and all your other favourite everyday topics)

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GROVEL, GROVEL GROVEL DEPARTMENT

If you are an average user and want it kept simple, or you only have three games disks and don't imagine you'll ever need any more -- and wouldn't have a clue how to format one so you could use it on your Einstein anyway -- there may not be much in this issue for you to really get your teeth into.

We're genuinely sorry if this is the case, or if you were following a series of articles that got squeezed out of this issue, but we can only include in the magazine what gets sent in, we can only ask for contributions on specific subjects if members tell us what they need to know about, and we urgently need to thrash out all the technicalities of using 3.5" drives as an economical and practical diy upgrade option if the Einstein is to have any real future at all.

A succession of editors playing musical chairs has left the "Waiting To Be Published" files in total chaos, but we hope that normal service will be resumed in the next issue or two, with some fundamental improvements to follow.

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# THE FUTURE -- YOUR OPINION IS REQUESTED AND REQUIRED

On taking over responsibility for the Einstein User Group 4 years ago it was obvious that the Einstein was obsolete and it had no real future unless significant hardware update options such as 3.5" disks, 80-column display, hard disks, CP/M- and MsDos-compatibility, silicon disk (or other RAM disk), etc., were made easily available to Einstein users.

A start was soon made on sorting out the neglected Einstein software library, plus its commercial software, and a superb team of Einstein Hardware Boffins And Practical Tinkerers was carefully nurtured and encouraged too. Lack of resources has badly hampered progress on the software side, but our Boffins And Tinkerers (The Einstein BAT Club?) have come up trumps, though some technical issues still need resolving.

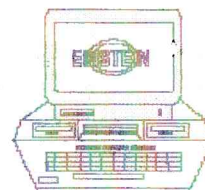
Routine Administration and magazine production/distribution falls almost entirely on one pair of shoulders. This is not a healthy situation for many reasons. Membership (& magazine input) dwindles inexorably, & diminishing income means Yours Truly has to find near-zero-cost -- but very time-consuming -- ways to print and distribute the magazine, when other demands on his time are already heavy and increasing daily.

The fact has to be faced that I could become unavailable to the user group at any time, possibly at short notice or even without any warning, and this eventuality must be addressed, and adequate provision made for it NOW, not after the event.

Ted Cawkwell, very concerned at this prospect, suggested he could manage to run a photocopied newsletter and a group of maybe a dozen active users at the present subscription rate. This would not even begin to meet our obligation to you, but it would be a very useful way of bringing our "Boffins And Tinkerers" together more effectively if used that way, so Ted's first newsletter as Team Leader is part of this issue.

Other "Einstein-Only" options have been considered, but on the basis of their track record to date there's no guarantee that they could even maintain the existing level of service to you, which itself leaves much to be desired. The sensible answer is clearly to resolve the printing and distribution problems by arranging for them to be transferred from the Steam Computer Society to one of the other computer user groups who have a proven track record in this area, plus spare in-house capacity, who we already co-operate closely with. This would ensure continuity, improve the service you get, and hopefully would allow Yours Truly to get all the Einstein software properly organised. Is this OK with you?

# Einstein Computer Preservation Society?



## Newsletter No2

Since the first issue of this Newsletter I have had 3 phoned support votes, including Sid Dunn, who I thought had emigrated! Andrew Dunipace wrote with some good suggestions and becomes a member. There have been no dissenters.

I have tried in vain to make a decent acronym from 'Einstein Computer Preservation Society'; I don't fancy Eincops but a comment in Andrew's letter referred to an 'inner circle' being a Good Thing so I propose we call ourselves EININC, from EINstein INner Circle. The inner circle is not exclusive, all that is needed to be a member is an active desire to keep Albert on the map.

As I see it, and I welcome other ideas, we have a few essential priorities and a good number of desirable ones. The main essential is to have a source of easily fitted 3.5 inch drives and idiot-proof instructions for fitting them. I have been making some progress in this as you will see later in this issue.

Assuming 3.5" drives are to be standard in the near future then there will be a requirement for programs on the appropriate disks, no small task even discounting the extra difficulty of copy protected software. It should be quite possible for owners of both 3" and 3.5" drives to do a lot of the transfer to the larger size themselves, but, as Backup does not work from one size to the other, it is a tedious business using COPY for all of the transfers.

Once 3.5" drives are fitted a user has three options; he may continue with the standard DOS 1.31 and be satisfied with just 188k per disk, or use the Potts side switch and get twice 188k per disk, or obtain DOS80 or System 5 and get the full 786k per disk. (There is also the possibility of



the third option using CP/M plus, but I feel that the jury is still out on that one. I do intend to look into it, though).

It is a pity that options 1 and 2 are not compatible with 3 but a fact we are stuck with. There is no doubt that System 5 seems to offer most as it also has an enhanced Basic which can be compiled and a number of other purpose written programs. I wonder if it will ever be possible to offer Sys 5 to all members at a reasonable price?

I think the above covers all of the ESSENTIAL steps required. 80 columns would be nice as it means more good programs could be used, but the available 40 col. range is quite comprehensive and adequate for many purposes. Duncan Elvin has shown a way round the 80 col. card and there may be more to come yet. I still have no information on Duncan's hard drive solution and look forward to that with interest.

In his letter, Andrew suggests that everyone needs a stimulus to keep going otherwise they lose interest and go on to something else. He would like to see everyone looking for worthwhile projects to undertake, work together to achieve, and build on results. He also suggests that a list of FAQ's (frequently asked questions) should be compiled - with the answers, of course! This would be of great benefit to new owners of machines, and very likely some older owners, too. There could be enough material right there for a 3rd. Compendium, I should think.

Also, thanks to Andrew again, I have a copy on PC disk of his Einstein Index (from Vol 1,1 to 72 in current series). I may not have the time to update this myself as intended, so a volunteer is needed. Any takers?

There are innumerable other matters needing attention which will have to wait for a later issue, and I am sure that, in the spirit of the last but one paragraph, members will be writing in with more suggestions.

I do realise that, unlike myself, many members have jobs and other interests to take up their valuable time. Nonetheless, I hope that those already engaged on important matters for the Einstein will find it possible to write to me giving

the Einstein will find it possible to write to me giving details of progress, or lack of it, so that the rest of us may be encouraged by what is going on. There is always the chance that other eyes and minds will see a shortcut or better way of doing something, but only if they know what is going on! Also, like all Newsletters, this one can only be published if there is INPUT.

The input does not have to be technical; simple ideas for the rest of us to bat around would be fine. Anything to keep our active members stimulated is good for the future of the machine and that is what we are trying to assure.

### WHO'S WHO - STAN GIBBS

Stan's name has been cropping up in EM lately since he wrote in asking for a fix for the annoying Printer Error which crashed the computer. From his lead the fix was found, and he went on to inspire me to write the driver for bubblejet printers.

In fact, he has been active in the printer area for some time and has written Xbas programs for 9 pin and 24 pin printers which enable the selection of a precision output including colour for printers which provide it.

He has also written programs to print address labels from both 80 column and 40 column versions of the micro, the latest of which will print all of your Xmas Card labels at the touch of a key!

The most recent program he is working on is to convert hex to decimal and vice versa, to make it easier to decipher and use printer ESC codes. He also does a Perpetual Calendar program.

I find his programs most refreshing, he spends a lot of time getting a nice screen layout and uses some techniques which are new to me. He always tries to cover every eventuality and his routines run very smoothly.

All of his programs are available from me for an SAE and disk, or direct from Stan.

He also has some software for sale, 9 Einstein games in



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original wrappers, and The Cracker with Manual. He invites anyone interested to ring him at West Bromwich 0121 553 5093 to discuss and settle on prices.

Stan has been a great help to me in the quest for 3.5" drives and is also knowledgeable about recharging inkjet cartridges, both B&W and colour. He appears to have a vast library of Einstein software, and if he doesn't have it in stock he usually knows where to get it.

#### THE DRIVE SITUATION Ted Cawkwell

As a result of a recent experience I have had to change my recommendations for fitting 3.5" drives to the Einstein. What once appeared to be an easy task has proved extremely fiddly in practice due a couple of things which were not noticed in my original article.

Before I get to that, a quick resume of which drives are known to work. There are 4 of these of which I have details:

1. TEAC FD235F 100U, 5volt. Users, Stan, Ted
2. NEC FD1036A, 12 volt 1.1w, 5 volt 1w. Users, Stan
3. Sharp ER01FD, 1.8 volt DC 12w. Users, Stan
4. Citizen OSDC-29C, 5 volt. Users, Ted

#### 5 TEAC DX99FS FD-35FN-13-U

The above shows that the operating voltage varies and is a detail which must be known. I presume the Sharp drive is intended for laptops or similar but is useable with Albert with the right PSU. I am now beginning to think that ANY 720k drive for the PC will probably work with Ein.

Details of Members units would be very useful. I did look at the drive of John Luther's machine before I passed it on to John Murray but cannot find a record of it. I think it was a Western Digital but may be wrong. John?

The details required are Make and Ref. No which is usually on a flat plate above the drive cable socket (not the Nos. on the circular motor) plus operating voltage. The latter is not marked on my two drives so advice of the seller should be sought. I would suggest that a two wire power lead would have to be 5 volts and a 4 wire MAY be 5 and 12 volts. It does pay to get a power lead with the drive, they are not easy to obtain even in computer shops in

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my area. The power plugs for the Ein sockets are even more difficult, I can't find them in the Maplin cat. any more, but these can be replaced by others. I actually used Lucar connectors in my latest installation.

I obtained the Citizen drive at the Humber Bridge Rally last month and it cost £1 in 'probably working' order! 720k drives were thin on the ground except for ones with the front plate missing, some of these were only 50p! I obtained the phone no. of the seller but when I rang after finding the drive OK they said they did not have any more. It seems

they were in the business of gutting 'old' (!!) PCs and replacing all the bits with the latest parts before selling them on. The old bits are then flogged off at Computer Fairs, etc. There were plenty of 40 Mb hard drives but the 130 Mb ones were sold out within minutes of the show opening. I wanted one to upgrade my 386. Hard cheese, Ted! There appeared to be several firms at this business.

The Citizen is exactly the same size and appearance as the TEAC but has one feature that makes it more useful to Einy folks. There is a tiny - about 4x2x1mm - switch at the back edge of the PCB which switches between drives 0/1 and 2/3. The selection of the second of each pair being made with a twist in the control cable a la PC. This is an excellent idea and makes this drive quite the most suitable I know. The Teac ones come with an assortment of drive choices but often with one soldered in place or the choice limited to 0 or 1.

As I had a driveless TC01 in the attic I decided to fit the drive to it as drive 0 and try booting up, etc. The first snag was quickly on the scene. The drive would not centre in the 0 position due to the alpha lock PCB which forced the drive about a quarter of an inch out of place to the right. I therefore fitted the drive in the 1 position at the right of the keyboard.

I cut 2 bits of 16 gauge aluminium 3" x 1" and bent 1/4" of one long side at right angles. Holes were drilled in the narrow strip to suit the fixing holes in the drive and the brackets fitted with 6 BA x 3/16" screws, the wide flange inward. The drive now fitted inside the drive fitting



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brackets in the Ein with a little space to spare. This was taken up with 1/16" plastic washers but metal would be OK.

The drive was aligned with its rear end resting on the Ein. brackets and the front on the blanking plate which was cut down by the thickness of the drive and refitted, thus covering the aperture below the drive. Position of screw holes was then marked and drilled and the drive screwed into position with self-tapping 1/8" screws. A small amount of filing of the front panel was found necessary for a good fit. A disk was now inserted and found to be slightly tight, so the file was put to a little more use.

During all of the filing care was taken to cover the keyboard and blow away all traces of black dust.

Then I fitted the top casing - and hit the second snag! Because of the dip in the casing about two inches behind the front panel the top was fouling the drive and could not be persuaded to fit. The rear of the drive needed to be about 1/4" lower. The only way to do this was to slice a triangle off the top edge of the Ein bracket sloping down from the front screw slot to 5/16" at the rear. As the bracket is steel it had to be removed for serious attention with a hacksaw. Removal involved unshipping both the keyboard and the entire front panel!

Some time later.....it all went back together very nicely and looked unusual but quite smart, I thought.

I fitted the power lead using insulated Lucar spade connectors to fit the pins of Einy's power outlet, pin 4 is 5 volts and pin 3 is ground. A lead with 2 34 pin plugs was connected to the drive with the lead running to the internal drive socket, making sure the marked line 1 went to the correct edge of each connector.

Now to boot up. A disk with XDOS 2.05 was inserted and Control/Break pressed. Nothing! After some time the penny dropped - Drives 0 and 1 were still configured as 40 track single sided on my current Dos! Once this was corrected everything in the garden was lovely. Copied all the Master Disk files across and all programs ran perfectly, thank goodness.

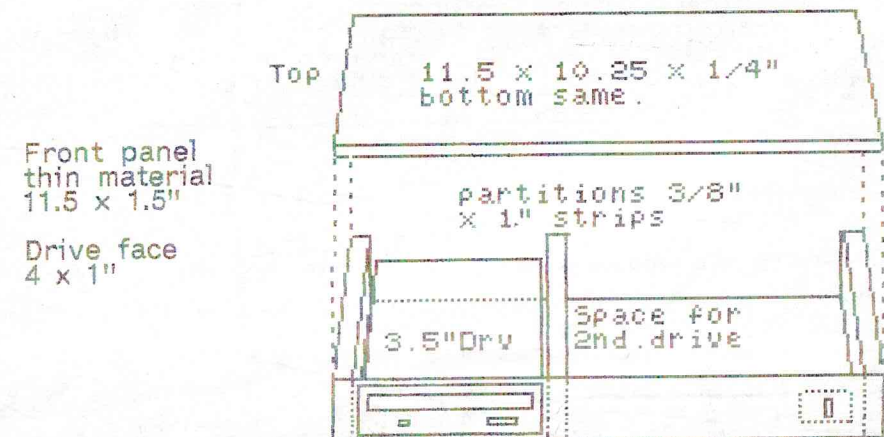
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A successful outcome, but there is no question that this performance is not going to endear itself to members! I think we are going to have to recommend an external fitting for 3.5" drives, possibly based on my existing flat box between micro and monitor. This will hold two drives and the 40/80 switch. It is 11.5" across by 10.25 deep and 1.5" thick and made of plywood painted to match the computer. The front panel is thin ply 11.5x10.25x1.5". Joints are glued and pinned except the top which is screwed on. The front has apertures for the drives and the back is open. The drive cable goes to the external socket but the power cable goes in through the mains cable slot to the power socket. The drives are held by screws through the base. I have a drawer for function key cards in place of the second drive.

As two 3.5" drives should be all that is required (I am assuming that BACKUP will work between two similar drives, but have not tested it.) no difficult work on Einy's innards will be necessary, and it will be possible to retain 3" drives as usual, if desired.

In theory then, if we find a source of Citizen drives at £1 and an amateur carpenter to knock out boxes for a couple of quid each, we could offer members a double 3.5 drive unit to assemble and paint up for less than a tanner! Dream on!

The box looks very classy when mounted between the micro and monitor and of course has a footprint of nil, leaving plenty of room on the bench for disk boxes, printers, Psions and PCs, cups of coffee and ashtrays, cheese sandwiches and mice. (Funny how they always go together!)





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A couple of facts about 3.5" drives may be helpful. A 720k drive may be identified by the lack of a microswitch on the underside of the unit. Looking at the front of the drive as if you are about to insert a disk, on the left is a twin microswitch for the write protect cutout and there is a similar single switch on the right to line up with the extra square hole in the HD disks. The ABSENCE of this switch indicates a 720k drive. It is often possible to see the plunger of these switches by lifting the drive flap, but the best way is to check the PCB underneath.

Re the disks themselves, all DD disks seem to format OK for XDOS 2.05 and until recently I thought that all HD disks did not, but I have discovered that PC Line HD disks from Dixons can be successfully Formatted and verified and work fine in the Ein. Stan Gibbs has also sent me an HD disk of unknown make which works. It is black with only HD by the shutter. Expensive Tandy and other disks never got past the format stage, but a few ex magazine types formatted but failed to verify. I do not know whether the above applies to DOS80 as well, not having tried it.

According to the System 5 manual 80 track doublesided disks format to 800k. The system takes 10k and the directory 4k, leaving 786k available. 128 directory entries are possible, rather few compared with 64 for 188k disks.

In the course of using 3.5" disks I have noticed that it is rather difficult to fill them up. This is due to the limitation of 128 Directory entries. 786k divided by 128 gives a little over 6k per file, and I find that PD software, which I transfer to get free 3" disks, only seems to average about 2-4k so I run out of directory space before the disk is full. I wonder if using Extents might be the answer? I have a program somewhere that allows the use of Extents. I wonder if anyone has experience in this?

There could be exciting times ahead for programmers using 3.5" disks. The biggest Xbas program that will run is about 38k but CHAINing can increase this up to the limit of 188k on a standard drive. The possibilities of 786k seem to be rather attractive, are we in sight of a DTP program for the Einstein, for instance? A combination of WP80 (with Popup and SSSpell), Grafdraw and Bjdriver to set up an inkjet printer? Just a thought!

Ted Cawkwell 9 King St. Winterton N.Lincs DN155 9RN

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Newsletter No.2. Page 9. Chief Editor's Response/Feedback.

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Sorry chaps, but the cupboard is completely bare, and the budget will only just stretch to printing & mailing out the magazine, so this newsletter will have to be beautifully printed on clean-one-side scrap paper, and be mailed out in used-once-before envelopes. The stamps, however, will be new ones, as Royal Mail gets very heavy with stamp recyclers!!!

As regards the ideas expressed by Ted in the newsletter, I agree that development of reliable, economical easily-fitted 3.5" drives as a replacement for the original 3" ones must be a high priority item if the Einstein is not to die out very rapidly. They will rapidly repay their cost, or even show a profit. I haven't checked PC Mart or Micro Mart for ex-equipment suppliers in a long time, but FRC Electronics were the experts in floppy as well as hard drives a couple of years back, and may be a good bet as reliable suppliers.

I've supplied library and commercial software to plenty of Einstein users, copy-protected software included, & I don't know of any problem in copying onto 3.5" disks. BACKUP works fine for same size-disks, NEWSWEEP works fine for non-same-sized disks, there are plenty of other programs/utilities available if you prefer, and it's not a major job for us to copy protected software onto 3.5" disks instead of 3" ones.

The 3 different voltages powering the 3.5" drives almost certainly reflect the fact that Sharp has concentrated on battery-powered laptops since going IBM-compatible, & these need a design that allows the RAM and screen to continue to function independently of the floppy drive battery pack if it runs down & needs replacing; and high-density and double-density disks require different write currents due to their different media coercivity (i.e. resistance to change in orientation of magnetic flux), with hd drives almost always being designed to be switchable to either mode of operation.

On operating systems, if you start pirating copies of Dos 80 or Dos 2 (System 5) you are going to get hauled into court on criminal charges by the Federation Against Software Theft and by far the best bet (when we can persuade Duncan to sort out our problems with getting the config utility to work) is undoubtedly to upgrade to EINSTEIN CP/M PLUS, which Duncan has hacked so as to be XtalDos-compatible, & which UKEUG can supply quite legally to user group members, enabling you to run not only all your existing programs but all your XtalDos utilities too. TRANSFER (read from or write to PC MsDos disks) doesn't work reliably under Dos 80 or Dos 2.xx, being written for CP/M PLUS by Duncan himself, but it's a delight to use under that system. CP/M+ will have Mallard BASIC too.



As regards checking for the microswitch on 3.5" drives (that detects the extra hole on HD disk cases) to tell whether you are looking at a dd or a hd drive, this isn't a foolproof test. The presence of one will certainly tell you that it's a hd drive (actually almost all of them are really dual-mode drives, and therefore switchable between hd and dd), but the absence of such a switch doesn't conclusively prove that it is dd-only, since Amstrad -- always fond of cutting corners in order to shave a farthing off the production cost of their kit -- didn't bother to include these detectors in at least some batches of their IBM-compatible business PCs.

As regards the problems of formatting hd disks to dd format, my own experiments prove that you can format & use dd disks in either mode, though you'll need to fool the "extra hole" detector if you have one -- and plastic shavings/chips are not a good disk drive lubricant!!! -- but you may well get problems of data migration/corruption, tho' I've not really tested out what you can get away with and what you can't.

I strongly suspect that some disk manufacturers (and/or bulk disk importers/suppliers?) have checked this out thoroughly, have discovered that if you format a virgin dd disk as a hd disk, and always use it in that mode, you do actually get perfectly acceptable performance (if the media quality is good enough), & that they are putting their best quality dd media into hd cases, just as was the practice in the very early days of quad-density and high-density 5.25" disks.

The lack of directory space is definitely a problem, but I'm sure that Duncan has cracked this, or it wouldn't make sense to try and use hard disks -- details on his hard disks will be in the next Einstein Magazine, wind and tides permitting.

I don't know if it's possible with CP/M+, but MsDos overcame this limitation when hard disks came in by using a system of modified files, of unlimited size, which act as additional directory space. The original directory area is known as the "root directory", and this accesses the next level, which are called "sub-directories". You can create additional sub-directories files at any level with meaningful names of your choice. Once you've got the hang of it it's a delight to use. Duncan's MsDos-disk TRANSFER program can negotiate this type of structure when running under CP/M+, so it should be possible to patch CP/M+ itself to do the same. This would be a vast improvement on USER areas, which were only useful in the dark ages when several people had to share a disk drive.

Well that's enough from me, now it's your turn to comment.

## A HARD DRIVE FOR THE EINSTEIN -- by Duncan Elvin

As a general rule I have found that for serious work a computer without a hard disk is like a car without an engine. It may be nice to look at and fiddle around with, but it's not a lot of use. And a hard disk is exactly what the Einstein lacks.

I know a number of years ago a couple of firms did make them, but I don't think their take up rate was very high -- mainly due to the price -- about 1000 pounds -- which was more than a lot of people paid for the computer in the first place!

Before talking about my project I'd better give you a short background in hard disks. A hard disk is logically the same as a floppy disk except that it has a larger capacity, the media is non-removable, and it has a much faster access time. It has a higher capacity because of three reasons:-

- (1) Because the disc is non-removable the head can be positioned with higher accuracy and so more data can be stored on a surface.
- (2) It will have more than one 'disc' (called a platter) inside the unit, so the delay in traversing the read/write head to the correct track is minimised.
- (3) With non-removable media, the read/write head is designed to "fly" a fraction of a millimetre above the surface of the media (instead of in contact with it, as it does with a floppy disk). This enables much higher speeds to be achieved without any "bounce" or damage, reducing wear on the media to virtually nil, and enabling much higher data read/write rates to be achieved.

This physical geometry gives rise to some of the terms used when describing areas on a hard disk:

- sector: a section of a track.
- track: one concentric ring on a disc surface.
- head: device to r/w data on a disc surface. There will be one head per disc surface, and so there will be 2n heads on a drive with n platters.
- cylinder: the cylindrical surface formed by the same track number on vertically stacked disks.

Also it may be helpful to mention the various interface standards which have been used to physically connect hard drives to the host system:-



ST506/412.

(The name was derived from the manufacturer's type number of the first drives to implement it). This is the simplest interface, signals include step, raw read data etc. It is very similar to the interface on floppy drives. It is also sometimes known as MFM or RLL. A separate 'hard disk controller' is needed to interface a drive of this type to the host system.

## ESDI

(Enhanced Small Device Interface). The next step on from ST506. The drive has a small amount of intelligence, but it still needs a controller to interface it to the host system. Not common, only used by people like IBM.

## SCSI

(Small Computer System Interface). The first intelligent drive interface. The 8 bit bus is tailored around an ANSI standard and is designed to work on any system.

## IDE-AT

(Intelligent Drive Electronics). Also known as the ATA (AT Attachment), the result of the integration of the standard AT hard disc controller (the Seagate ST07/08) onto the actual drive. The 16 bit bus is therefore tailored around the AT ISA bus.

I have two CP/M computers with hard disks. One has a SCSI drive & the other an IDE-XT drive. I designed & built the interface for both of them, but both drive types are quite rare now, and only IDE-AT drives are commonly available at modest cost. This also has the advantage of allowing us to connect a CD-ROM drive!

The 16 bit interface of the IDE-AT presents us with a problem when interfacing to the Z80, as this only has an 8 bit bus. Fortunately this problem has been solved by German engineer Tilmann Reh[1] who has developed a Z80 Generic IDE interface (or GIDE). It mounts 'under' the Z80 with the CPU plugged into the GIDE board and a cable connecting the GIDE board to the CPU socket (a sort of piggy-back arrangement). This is not possible on the Einstein, as the CPU is soldered in, so we will have to connect the CPU socket on the GIDE to the 'Pipe' on the rear of the Einstein.

Further technical details of the GIDE can be obtained from The Computer Journal[2]. This article will only deal with the details of connecting it to the Einstein.

To make the cable from the pipe to the GIDE, make a one ended lead with a short length (max. 6 inches) of 60 way ribbon cable & a 60 way IDC plug, attaching it with the help of a vice. Next fan out the last 1.5 inches of the wires at the unterminated end with a knife, then strip & tin with a soldering iron the last 1/2 inch of each wire. Now connect each wire to the CPU socket on the GIDE as follows:

GIDE Skt.	Pipe Conn.	Desc.	GIDE Skt.	Pipe Conn.	Desc.
1	22	A11	21	44	/RD
2	21	A12	22	42	/WR
3	20	A13	23	40	/BUSAK
4	19	A14	24	56	/WAIT
5	18	A15	25	58	/BUSRQ
6	60	CLK	26	34	/RESET
7	8	D4	27	38	/M1
8	10	D3	28	36	/RFSH
9	6	D5	29	5	GND
10	4	D6	30	33	A0
11	1	VCC	31	32	A1
12	12	D2	32	31	A2
13	2	D7	33	30	A3
14	16	D0	34	29	A4
15	14	D1	35	28	A5
16	54	/INT	36	27	A6
17	52	/NMI	37	26	A7
18	50	HALT	38	25	A8
19	48	/MREQ	39	24	A9
20	46	/IORQ	40	23	A10

Assemble the rest of the board in accordance with its instructions. If a small slot is made in the Einstein's case, this can then be mounted internally (fixed down with tape). Note that the base address of the GIDE board will have to be changed as i/o addresses below 50 (hex) are used by the Einstein. See instructions with the board for details on how to do this.

The hardware should now be complete. WITH THE EINSTEIN POWERED-OFF, connect the GIDE to the pipe, connect the GIDE to the hard disk with a 40 way IDC cable, and connect power to the hard disk using a Y drive power adapter. Only use this power supply arrangement if the computer has only one internally powered disc drive, else provide an external PSU.

## Parts List and Approximate Cost (£)

ATA Hard Disc	100 or less	60 way IDC plug	2
GIDE Kit	45	40 way ribbon lead	5
60 way ribbon cable	6	Power Y adapter	5



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## Testing, Testing 123

To test the GIDE run the program GIDETST.COM and enter the base port address when prompted. A page of data about the hard disk should be displayed. If this is correct (make, model no. etc.), then the interface can be assumed to be working.

## Software

The board will simply provide the hardware interface to the hard disk. To provide the software interface the operating system will have to be modified. I have identified two options here:

1. A BIOS Extension RSX for XtaIDOS, CP/M 2.2 etc. This would not require the BIOS source code. Or
2. Modify the BIOS for CP/M Plus. This requires the BIOS source code, which we already have. CP/M Plus for the Einstein will be available from the user group once a few minor bugs in the beta test version have been resolved.

I am willing to assist anyone wishing to attempt any of these options, and can supply a large part of the code as well as technical help. If you are interested, contact me via the user group.

Details of GIDE design (from back issues):- The Computer Journal, PO Box 3900, Citrus Heights, CA 95611-3900, U.S.A.

Purchase of GIDE kits in Europe:- Tilmann Reh, AutoMeter GmbH, Kaenerbergstrasse 4, 57076 Siegen (Weidenau), Germany

GIDETST.COM is available from user group HQ, or from The Einstein Boffins And Tinkerers Club Team-Leader Ted Cawkwell as a ready-to-run file if you send a formatted Einstein (or PC) disk with suitable packaging and return postage. It is also available as source code in "C".

\*\*\*\*\*

As Pretty as a Picture-- By C.F. Kane

The Einstein has a rather good graphics chip. Unfortunately there is no way to easily create images on the Einstein, as it does not have a mouse as standard. Dave Arts designed an interface to use a mouse and he also wrote an art package to use the mouse, but I have never seen the package running and do not know the costs involved (would anyone like to furnish

\*\*\*\*\*

me with details?) I am in a position that I'm certain I share with many other Einstein owners, owning several computers as well as the Einstein. These include machines that can use a mouse and high resolution art packages.

It would seem only sensible to try to take advantage of this situation and to create artwork on larger machines. I could then transfer the images over to the Einstein using the serial port. Once on the Einstein it would be possible to use the images in any program you wanted.

The obvious problems with this idea are:

- \* Different computers use different formats for the pictures so I would need to create a new format that the Einstein can understand.
- \* Sending the picture to the Einstein without losing any characters. The Einstein serial port isn't 100% reliable.
- \* Converting the picture to an Einstein screen and save it as an .OBJ file.

As a source machine I used an Amiga A1200 with an 85 Mb hard drive and 6 Mb of RAM. The artwork was created using Personal Paint and the programming done using AMOS Professional. Both of these programs have actually been given away on recent magazine coverdisk! I have also taken the opportunity to use some clip art on the Amiga from the public domain.

Despite references to the Amiga in this series, the transfer has been successfully carried out using an Atari ST as well. There is no reason why any other machine cannot be used to create and send pictures to the Einstein.

Having already established what we want to do, get pictures onto the Einstein, we now have to take the first step.

## ON THE AMIGA/ST/PC/SOMETHING ELSE....

=====

Using a standard art package (I picked Personal Paint) create a picture that is 256x192 pixels in black and white. Make sure the picture is in a format that the BASIC you are going to use can read. I made my picture an IFF type which AMOS, my programming language of choice, can read directly.

I then wrote a program on the Amiga that would load in an IFF type picture, scan each line and convert it from binary to hexadecimal. The resulting data is then saved as a standard ASCII file. This gives us a nice size of file (192 lines of 64 characters) that is relatively easy to move between computers and is a fixed size, allowing us to ensure that no character has been lost in transfer.



I then wrote another program on the Amiga that loaded in the hex file of the picture. This allowed me to confirm that the hex file was saved properly. The basics of this program will be used at a later stage for a similar program on the Einstein. The next step is to get the data over to Albert.

I connected the Amiga to Albert using the RS232 port. I ran JRcomm on the Amiga and TTY on Albert. I sent the file to Albert. And lost 30% of the right hand side of the picture! I guess I'm going to have to do this the hard way.

Having created the picture data file. Now we have to send it to the Einstein through the serial port. The problem is, the Einstein's serial port software is bugged. It can read the incoming data OK under normal circumstances. The errors occur when the text reaches the bottom of the screen.

The Einstein uses an oddball way of scrolling. The Einstein designers in their wisdom chose to ignore the text modes of the chip and in fact the Einstein Plots the characters as pixels onto a graphics screen. The problem occurs when the computer has to scroll up a line. Normally that is easy as it is built into the graphics chip, but because it has to plot each character (64 times more information!) it puts a lot of work for the Z80 processor and causes the screen to jitter. This in turn means that the processor is too busy and so it ignores characters being sent through the serial port.

I tested this several times and every time the screen scrolls, you lose information. Altering the baud rate makes no difference. The solution to the problem is actually quite simple. Make sure that the screen is cleared before the cursor reaches the bottom of the screen!

I then wrote a program to load in the picture hex file and send it line by line to the Einstein. The file is loaded into the Einstein using the program GETHEX.XBS.

Each line is sent to the Einstein in sequence, with the screen cleared afterwards. To indicate the end of the file, a single space is sent.

The code to send looks like this:

```
dim a$(200)
open textfile to be sent
count=0
repeat
  increase value of count
  load in a$(count)
```

```
until the end of the file is reached
open serial port output
for loop=1 to count
  send a$(loop) to serial port
next loop
send a space " " to the serial port
end program.
```

The code on the Einstein to receive the text is similar:

```
dim a$(200)
sep 254 - This command allows the einstein to receive
commas. If you do not use it, the Einstein thinks that it
has reached the end of a line and moves to the next line.
input #2 - get input from the serial port.
count=0
increase count by 1 <-----<-----<-----<-----
input a$(count)
cls and print a$(count)
if a$(count) is not a space go back to start of loader-->
input #0 - get input from keyboard.
cls
prompt user for name to save file as
create a file in that name
for loop=1 to count
  write a$(loop) to the file that has been opened
next loop
close file. ** end of program **
```

As you can see, the program to transfer the file between computers is actually fairly simple. The only thing you must be careful of is ensuring that the serial port is set up properly in the first place. I generally load in TTY - the terminal emulator for the Einstein first to ensure that the link is operating.

This program is far from perfect, but it has the advantage that once the baud rates are set in this program they remain the defaults of the Einstein until you reset the machine.

You can make sure that the serial link is operating properly before entering BASIC, and you do not have the problems of trying to set the baud rates from MOS! You can use any speed you want, but I generally stick to 300 baud, 7 data bits, even parity, 1 stop bit:

B33 7A27

You can always increase the speed once you know it works but generally keep the speed down to prevent line noise and loss of characters. We should now have a picture transferred to



the Einstein and save as a hex file. Next, we have to turn it into something pretty, by getting the Einstein to display the picture that we created so long ago on the Amiga.

We have a file e.g. FLYBOY.HEX that we want to convert to a standard .OBJ file for the Einstein. The program to do this is simple to use:-

Run "SHOWHEX"

At the prompt, you type in the name of the hex file - in our case FLYBOY.HEX. The file will be loaded in and as it is being converted to an image, it is plotted on the screen. Due to length of time that it takes the program beeps at the end of each line. This is to let you know that the program has not crashed. Once the screen has been completed another program is run, SNAPSHOT.XBS. This program saves whatever is on the screen as a .OBJ file called SNAPSHOT.OBJ.

Programming exercise: using the routine in VRAM.XBS, alter showhex and snapshot to allow the user to specify the name the screen is to be saved as. Go on - do it now! Remember that if you run the SNAPSHOT.XBS twice, the picture previously saved as SNAPSHOT.OBJ is overwritten. If you want to keep the picture, remember to rename the file!

You should now have a pretty picture on your Einstein that you can use for anything you want.

The following is an explanation of how the hex file is converted into a picture:

Each character represents 4 pixels on the screen. A line of 256 pixels comprises 64 characters. We are basically converting from hexadecimal into binary. e.g. a line of 8 pixels ..... is FF in hexadecimal and 11111111 in binary

The program SHOWHEX.XBS basically loads in 192 strings of 64 hex characters representing 192 lines of 256 pixels for each string:

the 64 characters are converted to 256 binary characters and for every 1 in the string, a white pixel is plotted. A beep is sounded to indicate the end of the line.

When the program SNAPSHOT.XBS is run, the SCREEN.OBJ M/C driver is loaded and the current screen is saved as the file SNAPSHOT.OBJ. Now you know how it's done - Have fun!

[This article is reproduced from Einstein Diskmag No.1, (edited by Andrew Dunipace) which is available free from user group HQ (with the files referred to) if you send an Einstein disk plus suitable packaging & return postage.

More on using 3.5" drives on the Einstein -- John Marriott

[John's files do weird and wonderful things when translated from PC 1.44Mb disk to Einstein format, rushed madly between various frantically-resigning editors all round the UK, and then translated back to the PC again, and this file was in a real mess. Half of it missing completely, and the other half fragmented, multiplied & embedded in other text all over the place. Your wonderful Chief Editor has endeavoured to prove that Humpty Dumpty CAN be put back together again, despite all those rumours to the contrary. Sorry, it's more about those boring old 3.5" disk/drive technicalities, but this issue is crucial to saving the Einstein's bacon. [CH.ED]

Using a 3.5" drive as the "A" boot drive worked on the original DOS, but it's better with System5, DOS80 -- [or Einstein CP/M+ in the near future] -- as the full 80 tracks can be used for the B/C & D drives after initial booting up. Alas, when I sold on my TC-01 last year, I included my notes on setting this up, thinking that my Einstein-256 with its 26 way termination drive would be too much trouble to uprate to a 34 way drive, so I would have no need of those notes ... hindsight's really wonderful, isn't it!

Although there's a lot of cheap BBC-type 5.25" 40/80, ss/ds disk drives floating around, with the early 180/360K disks available at about 2p a disk(!) -- DON'T ever be tempted to use the newer 1.2 Meg/high density disks on these old drives. Anyway, 5.25" drives take up far too much space on the desk (let alone the TC-01 itself!), especially as the 3.5" drives can be fitted in the places designed for the 3" drives with very little difficulty. If you have a single-drive TC-01 and you install a 3.5" drive in its place, the original 3" drive can be kept and used externally (when needed!) (as drive "B") to copy across any "new" information/data/programs.

[\*\*\* You can easily build a d-i-y case for 5.25" drives to sit atop the TC-01 and under the monitor, but dd 5.25" disks will be a problem when everyone's cleared all their stocks.]

For now I'm assuming that you currently have a single drive TC-01 with the standard 3" 40 track drive and DOS version 1. Unless you're really sure about taking power supplies off the TC-01's PCB use a self-powered 1.4 Meg 3.5" drive set to drive "B" attached to the external drive port. If you're lucky you might find that your TC-01 already has a double-drive ribbon cable - BUT don't try balancing this "extra" drive on your open TC-01! Terminal connectors are usually "keyed" in some way with Pin 1 being the red stripe one of the ribbon cable ... notice the word USUALLY.



Turn on the external drive and then the TC-01 with a boot disk in drive "A", and all being well it'll go, although you might find the drive configuration is set to show them BOTH as 40 track single sided - think about it! Personally ... I'd keep things simple and accept the limitations of the "program age" and "hardware design".

Funny enough, it's this "age" which allows the use of a modern 80 track drive to be used as a 40 track - simply, when a disk format is made ONLY the FIRST 40 tracks are formatted with the inner 40 unused/ignored! This actually works to a "media benefit" as far as "error faults" are concerned.

Personally, if I only had Dos 1.xx, I'd be happy enough with 2x3.5" 40-track single-sided disks as compared to staying with 3" disks/drives, on the basis of savings/convenience.

Assuming everything seems to be working OK, load up the FORMAT program, making sure the WRITE PROTECT tab is set on drive "A" disk! Now format drive "B" and BACKUP/COPY your drive "A" disk across to "B". You now have a 3.5" 40 track BOOT disk. To test it, power down, unplug drive "A" and set drive "B" jumper to "A" and with your new boot disk in what is now your boot-up "A" drive, power up. All well, we hope!

The same can be done if you have twin drives and DOS80, System5 (Dos 2.xx), or Einstein CP/M+ (it's due out soon, so watch this space); but re-configure the drive setting to show drive "B" as 80 track single sided to format what disks you want to boot up from in it. After making enough boot disks/copies as 80t/ss disks, jumper the drives so one of the 3.5" drives is the new "A" drive.

You'll have to ensure that your DISK DRIVE CONFIGURATION is set to show the new configuration of tracks and drives, and you'll have to clearly mark your disks so you don't mix them up in use, if you have more than one 3.5" format, as neither can read the directory tracks of the other, and DOS will think you've got an empty disk in the drive ... something which MURPHY'S LAW thrives upon for "losing" expensive/important/that-was-the-only-copy-of-it information!

[Ted Cawkwell has been experimenting recently, and suggests that it is actually perfectly feasible to use an 80t/ds drive in that mode as the drive "A" boot-up drive if you have DOS80 or System 5/Dos 2.xx, though there are some minor complications in setting it up. We'll need to check out with Duncan Elvin whether his Einstein CP/M+ can do this too, as it boots up in Dos 1, then loads CP/M+ over the top of it.]

Hopefully, by the time you've read this I'll have contacted Les Foskett and passed on some info about his BBC Compact disk drives - for some reason only known to ACORN they decided to use a non-standard drive port, which I think was to do with the availability of a stack of 3.5" drives with 26 pin/edge connectors at that time, allied to a design intention of a packaged computer/monitor/drive system akin to the later Amstrad PCW. Don't jump instantly to the conclusion that it's a direct swap for the 256!

Some drives will be the normal 34-way pin/ edge connector with the ribbon "doctored" to "thin" it down to the 25-way D-type socket, which according to the BBC Compact manual is 1-Index 2-Drive select 0 3- Drive select 1 4-No connection 5-Load head/motor control 6-Direction 7-Seek/step 8-Write data 9-Write enable 10-Track 0 11-Write protect 12-Read data 13-Side select 14/25-Ground. NOTE - that is for the socket ... NOT the ribbon!

Looking through the remnants of my files, I see that the SONY OA-D32W 3.5" drive which was a 26 pin/edge connector doesn't bear any resemblance to the above OR the 256, yet another minefield!

A little bit more info on disk/drives which you raised in your letter - we tend to overlook the fact that it doesn't matter whether it is mechanical, magnetic or mechanical energies concerned, they are all affected by MASS/INERTIA versus TIME. A 40 track drive has a "wider" magnetic recorded track, so this requires more energy to "imprint" a signal onto that track width/media and a resulting overswing of excess energy to cope with - the switched "pulse ring" of a car's HT coil being an example of taking advantage of an energy overswing.

With a re-designed head and changed media, a "narrower" magnetic recorded track can be laid down with less energy and overswing problems, which means more information can be "laid down" in a given time. The problem is that a disk recorded on a 5.25" 80 track drive used in 40 track mode, i.e. the head "steps" 2 tracks per "normal" track increment, still has that "narrower" recorded track which results in a "weaker" read-back signal for a standard 40 track drive which hasn't the 80/40 switched track compensation circuitry.

Any wear/muck on that head is likely to accentuate any high frequency fall-off problems. Also, if the 80-track drive has over-written a track that a 40-track drive had written to previously, your 40-track drive will be trying to read two different sets of data at once!



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*** APOLOGIES if you were looking forward to reading John's
next programming article in this issue, but we do need to
get the incompatibilities of 3.5" disks/drives thrashed out.
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We badly need your input in material form -- RIGHT NOW!! -- if the magazine is to avoid severe anorexia nervosa in the very near future. We also need to know if you are being seduced away by more modern machines, if you don't need a user group any more, or if you aren't satisfied with what you get from it. We know much of the magazine is far too technical, but it is crisis time for finding out how to get the Einstein upgraded to a machine that still has a future -- before you are the only person left who is still using one! If you don't support our efforts to support you, & don't write to tell us what you need and aren't getting, we can't wave our magic wand and provide it for you!



# STEAM COMPUTER SOCIETY - EINSTEIN USER GROUP

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To quote Canadian RailRoad Historical Association:  
"Knowledge has little value unless it is shared  
with others."

Einstein User Group is sponsored by Steam Computer Society, a division of the not-for-profit RPM Historical Society, whose purpose is to advance the cause of public education by promoting increased individual knowledge, awareness & skill, & by facilitating free interchange of information in printed, machine-readable and other forms.

Einstein User Group is a vehicle for the mutual support and encouragement of Einstein users by sharing information, knowledge, queries and ideas between Einstein users for the benefit of Einstein users. Your input of information, opinion, views, opinion, question and feedback is essential to the continued publication of your EINSTEIN MAGAZINE.

Written/typewritten/computer input is welcome from all who have something to share with other Einstein users, or who seek information about the Einstein. Practical projects are specially welcome.

Preferred format for your input is ASCII file on Einstein, PC, CPC or PCW disk, plus a paper copy. Sketches, diagrams and/or clear photographs to illustrate your contribution are very welcome.

All Micro News (for all non-Einstein and non-PC computers/users) and MessyDos Journal (for MsDos and equivalents users) are published on an "as and when" basis, depending on input. Your regular or occasional contribution to these is welcomed too.

Einstein Diskmag No.3 is now available free if you send a 3" disk and return postage to New Romney, or direct from the publisher, Andrew Dunipace, at Burnhouse Cottage, Lennoxton, Glasgow, G65 7NH.