APPLE-BUG

>>> In this issue <<<

[CREDITS]

Once again the credit for getting this issue to press, must go to Dale Rodgie and the tireless efforts of the Executive Committee, along with the help of a few members who have taken the time to put fingers to the keyboard. The Hooper Education Centre has once again performed the impossible task of accepting our pages, making enough sense out of them to make the plates, doing the actual printing, collating, stapling, folding and stapling again, and getting them to Australia Post, who in turn attempted to get them to you in time for you to read them before the sun sets on another Open Day, for yet another month.

>>	Dale Rodgie	--	He typed it all in	<<
>>	Graham Black	--	He typed some too	<<
>>	The Members	--	For their contributions	<<
>>	Appleworks	--	Word Processing	<<
>>	ImageWriter II	--	Typesetting	<<
>>	The Hooper Centre	--	Printing & Distribution	<<
>>	The APPLE Computer	--	The reason for it all	<<

$1.50

[Executive Committee]

Bernie Benson	- President	Ph.(07) 345-1545
Eric Conolly	- Vice-President	Ph.(07) 261-1860
Bob Godbehere	- Secretary	Ph.(07) 808-3892
Tony Truscott	- Treasurer	Ph.(07) 266-4795
Graham Black	- Registrar	Ph.(07) 883-1525
Dale Rodgie	- Editor	Ph.(075) 38-6942
Ken Smith	- Software Librarian	Ph.(07) 345-1995
Brett Dutton	- Hardcopy Librarian	Ph.(07) 870-8599

[Bulletin Board System <BBS>]

```
          Apple-Q BBS : online 24 hrs
            Telephone : (07) 284-6145  (DATA)
                      : (07) 883-1525  (VOICE)
           Baud Rates : 300. 1200/75, 1200 and 2400 (CCITT and BELL)
           Data Specs : 8 Data bits - 1 Stop bit - No Parity (Full Duplex)
               Sysops : Graham Black - Vince Crosdale - Brett Dutton
 Calls to the system : 393
     Registered Users : 89  (as of 9.30 p.m. 30th June)
     SYSOP stands for : SYStem OPerator
       BBS stands for : Bulletin Board System
```

[What's When]

at the Hooper Education Centre - Kuran Street - Wavell Heights

Open Day
Sunday 17th July 1988
Hours: 9.00.am. till 4.30.pm.

Committee Meeting
Monday 18th July 1988
Starts: 7.00.pm.

Open Day
Sunday 21st August 1988
Hours: 9.00.am. till 4.30.pm.

Committee Meeting
Monday 22nd August 1988
Starts: 7.00.pm.

Machine Language SIG
    Time: 1.30 pm this Open Day
    Where: Software Library Room
Interest: Apple II Machine Language Programming

Serious Users SIG
    Time: 1.00 pm. this Open Day
    Where: Room 22. Main Hooper Building
Interest: Business programs & programming on the Apple II & Macintosh

[Membership Fees]

```
      Adults/Family: $20   Joining Fee: $10
         Pensioners: $12   Pensioners on production of Pensioner Card
  Full Time Students: $12  Full Time Students under 21 years on production of
                           Student Card
Corporate Membership: $50
Associate Membership: $ 5   plus $5 Joining Fee (BBS only)
```

[.....at the discretion of the Executive Committee]

Copying tees for the Club's Public Domain Software are 50 cents per disk side. with
a minimun charge of of $2.00 for 5.25" disks. The copying fee tor 3.5" disks is
$3.00 per disk. We cater for the][,][+, //e. //c. //GS and MAC. The copying of
Commercially produced software cannot be sanctioned by APPLE-Q Inc. and members who
do so risk expulsion from the group.

All contributions for the newsletter should be handed to a committee member at the
Open Day. or posted to P.O. Box 6375, Gold Coast Mail Centre. Bundall. Queensland
4217. The deadline date is the committee meeting immediately following the Open Day.

[Editorial]

by Dale Rodgle

This is a big month for the group. This month we have Frank Ravill comming to
demostrate the new Apple CD-ROM. Frank Ravill took up the job of Apple as Apple II
Promotions Manager a few months ago. He will connect the CD-ROM to both the
Macintosh and Apple IIGS. The group welcomes you Frank and thank you for comming.

Logo Competition
The committee decided that the winner of the Logo Comp. is Vince Colsoale.
Unfortunately. we were unable to print his entry in this edition, however. you can
see the winning entry in the next Apple-Bug. Vince has donated the prize of one
years tree membership back to the club. So we will raffle if off at this Open Day.
It will be 50 cents a ticket or 5 for $2.00. If you can't be at this Open Day, you
can mail your money to Graham Black, P.O. Box 698, Redcliffe. Queensland 4020.
Please include you name. address. phone number and membership number.

Auction
We are holding an Auction at the Open Day in September. So if you have any 'computer
related' item you wish to sell. then bring it along in September. More details in
the next Apple-Bug.

Membership Renewals
You can now pay for your membership renewal by post if you have either a Bankcard or
Mastercard. Simply till in your details on the coupon at the end of the newsletter
and send it to:- The Registrar. Apple-Q Inc., P.O. Box 698. Redcliffe. Queensland
4020. Please enclose your old membership card with the coupon.

Kerry Nagle would like to do a questionaire of computer users which is part of her
thesis for her Ph D. Anybody wishing to participate in the questionaire can receive
a copy be telephoning Kerry Nagle at home: (07) 300 2782. work (07) 377 3710 or you
can pick up a copy of the questionaire at this Open Day. The questionaire will also
be placed on the Bulletin Board.

If you are looking for a job in the computer industry, you should contact Portfolio
Personal Services. They are looking for both permanent and temporary staff to work
on the Macintosh. If you are interested. phone Margot for permanent work. or Noeline
or Deanna it seeking temporary work. You will need to attend an interview with a
Consultant - you are asked to bring resumes and references covering any previous
employment. Their phone number is (07) 221 2733.

Remember to display your membership card on your Apple this Open Day. There is only
limited space available. so only Apple-Q members can set up their machines. People
not displaying their membership card will be asked to pay the membership tee or
remove their computer.

Both the Trading Table and the Software Library will close at 1.30 p.m. this Open Day. So please orginize your business around these new business hours. Also. please don't go behind the counter at the Open Day.

A small number of power boards are available, at Open Days, for a deposit of $20.00. Due to the number of missing power boards, we had to increase the deposit. I recommend that you bring your own as the few available will not last long.

[Hardcopy Library]

by Brett Dutton

There were a few magazines that didn't come back last month. They were a few Australian Apple Reviews. So if the person that has them could bring them back and save from having your name published.

The Assembly Language class had a few less people than I had anticipated. but the class still went well. I will see those people next open day at about the same time.

I would like to here what sort of books you would like to see in your library so if you have suggestions. mention them to me next open day.

[Software Review - DataWorks]

by: Graham Black

DATAWORKS - a communications package for the enhanced //e.

Developed by: Joe Altoff (Electric Dreams BBS)
              & Byron Newton

I have recently taken possession of a really fantastic communications package which works extremely well with my Enhanced Apple //e. I have tried many communications packages in the past. and I have found that they all lack something. and therefore not suitable for my requirements.

DATAWORKS operates under ProDOS, and makes good use of any additional RAM that may be installed in the system. such as the 64k of memory in the extended 80 column card. or a 1 meg RAM card which may be installed in any slot.

DATAWORKS allows you to take full advantage of the features of the Apple. by allowing you to set up macros for each phone entry. It allows you to set up a directory of BBS numbers. with the specific data for connecting with the terminal at the other end of the phone. i.e. Baud rate, parity, start & stop bits, Full or Half Duplex. modem initialization. data storage allocation, and up to 10 macros for things such as passwords and signatures, etc.

When you boot up DATAWORKS, the software can automatically load the files it requires to the extra ram in the extended 80 column card (/RAM, or the RAM card you may have installed in another slot), and this allows the software to operate at a very fast rate. There is no need to wait for it to load files off the system disk every time it needs to access a different file. Accessing the RAM card is extremely fast. and almost instantaneous.

File transfer is especially catered for. and this is where the directory allocation for storage comes in very handy. Dataworks automatically downloads to the directory you have previously specified in your system setup, which can be any disk or RAM card.

Dataworks automatically splits the screen for 'chat' mode. This means that half of your screen is reserved for the incoming message, while the other half is there for you to type your reply while still receiving from the other computer. When you press <RETURN>. the software automatically sends what you have already typed on the screen, as one continuous message. This is a very handy feature to have built-in.

When you are connected to another computer which is also using Dataworks. and you want to download a file to your system, Dataworks automatically collects the required data for the file specifications, and retrieves and saves the file for you in the specified directory.

Dataworks also has a very extensive set of file management utilities. which I have yet to see in operation. I only have a limited demonstration copy for review. and I am waiting on the completed version to arrive.

[TML Basic Review — Part 1]

by Dale Rodgie

The Apple IIGS has Applesoft built into ROM. This makes it compatible with the older Apples. however. the Applesoft in the GS is the same as the Apple IIc. Because most of the GS's new features use 16 bit programming, Applesoft can not directly use the Tools. the Sound Chip or Super Hires Graphics Screen. This must be done through machine language routines. Nibble magazine have published two programs that increase the number of Applesoft commands. These commands allow you to draw on the Super Hires Screen. So What Software have also published two programs called Sonix and Iconix that use the Toolbox routines (see Apple-Bug Volume 7 Number 5).

However, Applesoft has one restriction that can be a pain. Applesoft programs can only run in a 35 K section of Main Memory (Bank 0). This memory also must contain the file buffers. varible and string storage. Clearly, anyone wishing to write reasonable size basic programs look toward another form of basic.

This is where TML Systems came on to the scene. They published TML Basic. Not only does TML Basic allow you to use all the Tools and more memory, it also compiles the basic program into a machine language program. This machine language program will run independantly of TML Basic. You can even sell your programs without paying a licence fee to TML Systems.

TML Basic uses the standard Apple Human Interface (Mouse, Menus. etc.) to write and compile your basic programs. The source code are stored as text file on the disk. So you can also use it to edit other text files. In fact this article was written using the TML Basic editor.

You can have up to four files open at the one time and copy code from one to another. Unlike most word processors. the editor does not word wrap. This is where it a word does not fit on the end of a line, the word processor moves the word to the next line. The TML Basic editor has lines up to 256 characters. Although I would recommend that you keep each line under 80 characters.

The commands in TML Basic are largely the same as Applesoft. Other commands have been added to use the Tools and to continue where Applesoft left off. File commands have been improved - you don't need the Control-D in front of them anymore. In fact. file handling is quite different to Applesoft. You even treat the printer or modem as a file.

In the next Apple-Bug, we will look at some on the TML Basic commands and compare them to their Applesoft counterparts.

[GSWorks Press Release]

EDITOR: This article was downloaded from the Incider BBS in the US. GSWorks should be in Australia by the end of this year. This Australian price will be two and a bit times the US price.

Contact David Macdonald Styleware, Inc. Phone (713) 668-4046 (US)

March 25. 1988

Styleware Announces Integrated "Works" Program for Apple IIGS

HOUSTON - Apple IIGS software publisher Styleware, Inc. will use the Boston AppleFest conference. May 20-22, as a forum to announce the August 1 release of GSWorks. an integrated software package for the Apple IIGS.

Designed to provide Apple IIGS users with an integrated package that takes full advantage of the advanced features of their machines. GSWorks includes in one program the six software applications most frequently used by personal computer owners-word processing with spell checker/thesaurus, database, spreadsheet. page layout. graphics. and communications.

"GSWorks is to the Apple IIGS what AppleWorks was to the Apple IIe" said StyleWare President Kevin Harvey. "AppleWorks set a standard for easy-to-use integrated software when it was released for the Apple IIe. We've created GSWorks to provide a similar standard for Apple IIGS owners." According to Harvey, GSWorks "improves on the three AppleWorks applications-Word processing. database, and spreadsheet" by offering "true IIGS" versions of those applications what "work faster. have more features. and fully utilize the user friendly IIGS interface." GSWorks will also read all the AppleWorks file types word processing, database. and spreadsheet - so AppleWorks owners can upgrade to GSWorks without having to abandon their AppleWorks files. In addition to the basic AppleWorks applications. Harvey said that GSWorks also offers IIGS owners "the types of applications where the IIGS has a real advantage in terms of performance"-page layout and professional-quality graphics.

The GSWorks Word Processor features different fonts, character styles and sizes. and text colors. as well as advanced features like the on-line 80.000-word Merriam-Webster/Proximity spell checker and thesaurus. The word processor also works in tandem with the database application for mail merge.

The Database employs a graphical interface based on user-created forms to provide GSWorks users with easy data entryform design, according to Harvey. Database files can also be viewed in a speradsheet-like List display. The GSWorks database includes a variety of numeric and string-handling functions, several search and sort options. and built-in report and mailing label generation.

GSWorks features a revolutionary approach to computer-aided illustration in it's Graphics application. The program uses object-based graphics of the sort found in draw programs such as TopDraw, but its objects can be edited as if they were bit-mapped images (employed by paint programs such as PaintWorks Gold and Deluxe Paint II). Users benefit from the ease of use offered by the paint functionality while at the same time benefitting from the increased precision output of the object graphics. "Anyone who has ever used either a paint or a draw program will love the GSWorks graphics application. because it's a perfect marriage of the two approaches [to graphics]." said Harvey. "It's something so sophisticated that it's never been done before-not even for the Mac or IBM-and yet. to a user, it's very intuitive and very easy to use."

Like the other GSWorks applications. the Spreadsheet is mouse-based. which Harvey claims is a distinct advantage over non-mouse spreadsheets. "Spreadsheets really

benefit dramatically from a mouse interface," said Harvey. "Using the mouse to select the cell or group of cells you want to work on is much more intuitive and a lot easier to learn" than using a keyboard, according to Harvey. As with the database application, the GSWorks spreadsheet includes a full range of numeric and string functions. and includes both absolute and relative referencing. In addition. the GSWorks spreadsheet employs "intelligent recalculation"-updating only those cells affected by changes each time a single value is changed. The GSWorks wpreadsheet also provides automatic color chart and graph generation.

GSWorks includes a full-feature Page Layout application, allowing users to integrate text from the word processor with graphics application in professional-quality documents. The GSWorks Page Layout application features multiple column capability. compatibility with wll IIGS graphics formats, complete text editing, and built-in tools for creating object graphics, rules, and lines. "The Page Layout application includes all the features you'll find in expensive page composition programs for Macintosh and IBM computers. and it's very fast," said Harvey.

The GSWorks Communications application works with both internal and external modems. and supports most popular modems, including Appple, Hayes. and Hayes-compatible modems. It includes a special Review Buffer, which saves text as it scrolls off-screen, so a user can scroll back and review the text.

"Each GSWorks application is so powerful and so full-featured, it sould stand alone with the best IIGS software in its field," said Harvey. "But what really sets GSWorks apart is that it"s more than just six great programs put into one package. As an integrated package. GSWorks is much more than the sum of its parts." Citing a Macintosh-like window-based environment, Harvey claimed that GSWorks offers a level of integration never before seen in microcomputer software. Users can move from one application to another by just clicking on a different application window. In addition. all six applications can be used at one time, and a user can open up to 14 windows at once. Harvey believes the GSWorks environment
offers IIGS users the same sort of functionality found on a Macintosh running under MultiFinder.

"Like MultiFinder. the GSWorks environment lets you move effortlessly from one application window to another, and this lets you move from one application to another with an ease many IIGS owners would not have thought possible." For example. Harvey said. a user could read figures from a GSWorks database file into a spreadsheet. create a chart with the figures, edit the chart in the Graphics application. write an analysis of the chart's information in the Wordprocessor. and then bring the chart and analysis together in the Pagelayout application. "What's more." said Harvey. "GSWorks includes a new way to move information from one window to another by just selectin the text or graphic to be moved and dragging it to a new window. It adds a whole new dimension to integrated software."

GSWorks supports the Apple LaserWriter and ImageWriter. as well as Epson printers. Styleware includes a special printer driver to produce near letter quality print on the LaserWriter.

GSWorks will retail for $249.95 (US).

[Special Interest Groups — SIG]

We have two special interest groups operating on Open Days. If you are interested in Machine Language programming on the Apple II's then join Brett Dutton in the Software Library Room at 1.30 pm. We also a special interset group for serious users. So if you are interested in Business programs. Programming, etc. for both the Macintosh and Apple II's, the meeting will be held in Room 22 in the main Hooper Centre Building between 1 and 4 p.m. on Open Day's.

[Apple Assembler]

by Craig Johnson

Last month we looked at the components of a microcomputer, discussed the use of high level languages and learnt how to access the the Apple's "mini assembler" from the monitor. That's all well and good, but let's extend our knowledge a little further and take a closer look at the heart of the Apple; presenting the 6502.

The 6502 microprocessor was originally designed by a company called MOS technology Inc.. who were a "breakaway" group from the giant American manufacturer Motorolla. Since then other companies such sa Synertek and Rockwell have also produced them. The original bipolar version has been superceded by several CMOS versions of the chip which boast higher clock speeds and increased instruction sets between the different versions of the same chip will not affect the newcomer.

It is this microprocessor which adorns the inside of several popular microcomputers (hereinafter affectionately called the "micro") including the Apple II series.

The early days micros were called just that, microcomputers. These were the Tandy TRS 80's and not far behind - the Apple II's. There were others and just who was first I'm not sure but they represented what were soon to become known as personal computers. The phrase didn't really catch on though until the belated but well timed entry into the market of the big, bold, blue IBM PC. And since the world of microcomputers has all but faded into oblivion.

The 6502 mircoprocessor is an "8 bit" device . this means it can deal with 8 bits or one "byte" of data at a time. It has 16 address lines and can there access a total of 65536 memory locations dirctly.

Figure 1 shows a pinout of the chip showing the data and address lines as well as various control signals. clocks and power supply. These signals aren't particually important at this stage. however an understanding of the internal structure of the chip is more so.

```
                    -------------------
      VSS ----: 1                40 :<--- RES
               :                 39 :---> CLK2
      RDY --->: 2                   :----
      CLK1 <---: 3                37 :<--- CLK
               :                   :----
      IRQ --->: 4            35,36 :----
               :                   :
      NMI --->: 6                34 :---> R/W
      SYNC --->: 7                 : ---
            ----:              26-33 :<   > DATA
               :                   : ---  BUS
  ADDRES   ---:                    :--- ADDRESS
  BUS      <  : 9-20         22-33 :   > BUS
  A0-A11   ---:                    :--- A12-A15
               :                   :----
                    -------------------
          Fig 1: 6502 Pin-out
```

Figure 2 shows a programming model of the 6502. It shows several blocks. known as registers. starting with the accumulator, then the x-register. the y-register. the stack pointer. and finally the program counter. These are all part of the internal memory of the CPU. They also provide a good example of the internal working of almost all microprocessors. Variations, of course, are great but all CPU's share in common the use of internal dynamic memory
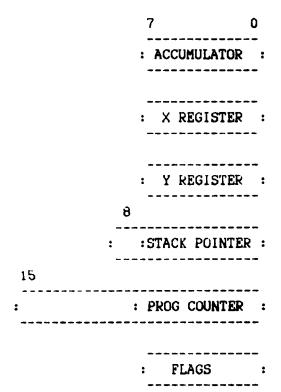
```
        7                  0
        --------------
      : ACCUMULATOR  :
        --------------


        --------------
      :  X REGISTER  :
        --------------


        --------------
      :  Y REGISTER  :
        --------------
     8
      ------------------
      :   :STACK POINTER :
      ------------------
 15
 ----------------------------
 :            : PROG COUNTER  :
 ----------------------------


        --------------
      :    FLAGS     :
        --------------
```
Fig 2: 6502 Programming model

locations within the package itself. You may be wondering how the initials CPU
represent the word "microprocessor".

Well in fact. they don't. CPU actually stands for "Central Processing Unit"which is
again historical and originally refered to the "brain" in mini computers which
actually took up several circuit boards rather than one IC package, as in the case
with tne relatively recent invention of the microprocessor.

The correct mnemonic is in fact MPU (microprocessor unit) but to be consistent with
most texts and my own basic habits, I will continue to refer to it as the CPU. In
this outline I will endeavour to keep the description of the structure broard
enough to be general whilst pointing out those features perculiar to the 6502.

The registers of the CPU are vital to the operation of a program. They can broardly
categorised into three types:

GENERAL USE   - These can be used for anything you like and are usually involved in
                     most of the CPU's instructions. The accumulator is a general use
                     register.

INTENDED USE   - These have one thing they do particually well but can also be used
                     for other purposes. The X and Y registers are examples.

DEDICATED USE - These have only one use and cannot normally be used for any other
                     purpose. The stack pointer, program counter and flag (or status)
                     register are examples.

Some CPU's have many more registers of varying sizes. The Zilog Z80. for example,
another very popular CPU among micro's, has several registers which can be used to
emulate 16 bit processing. True 16 bit processors such as Intels 80286 and
Motorolla's 68000 family have incredibly complex architectures making assembler
programming a very difficult task. More recent chips have areas of memory available
as well as serial ports and "memory management" capabilities.

Let's take a closer look at what each component does. The accumulator, as already mentioned, is a general purpose register. It is often used to recieve data from the "address space" (memory/input output), to hold intermediate results of calculations, and to be the source of data to be stored in the address space. Most commands that involve arithmetic, logical, or testing will end up with the result in the accumulator.

The name is yet again historicaland relates to the days of early serial bit-at-a-time computers where the accumulator was a funnel through everything had to go.

The X and Y registers are general purpose registers which do their share of comparisons and logic operations as well as the very useful task of indexing: I will expand on this later.

The stack pointer is a dedicated to the use register which keeps track of a vital area of memory called the "stack". The stack is an area, external to the CPU (stored on the first "page" of memory) used for fast and easy storage of data. Every time something is put or taken off the stack the stack pointer is incemented or decremented accordingly. Placing data on the stack only requires one instruction, making it a very useful programming tool.

The programcounter is the 6502's only 16 bit register. It needs to be that long since it is used to store a 16 bit address. The program counter always points to the next instruction to be executed. It is incremented upon completition of an instruction.

The flag register contains the condition or status of the CPU after an instruction has been executed. The flages have a significant use in programming. They can be used to direct program flow by "testing" them and making a decision depending on their condition. The meaning of each flag is as follows.

N - Negative result. The previous instruction resulted in a negative value when this flag is set (logic 1)

v - Overflow. Indicates that the result of an addition or subtraction required more bits than available in the 8 bit register used to contain the result.

B - Software interrupt. This is used to different between a software BRk and a hardware inturrupt.

D - Decimal. When this flag is set to result of an arithmetic instruction should be interpreted as BCD (binary coded decimal.

I - Inturrupt. This flag is used to "mask" or hide a maskable inturrupt. Inturrupts will be explained in future articles.

Z - Zero. When set the result of an instruction (operation or comparison) was zero.

C - Carry. This indicates an arithmetic carry or borrow occured during an operation. Carry. somewhat confusingly, is also used to "catch" the remaining bit in a shift instruction.

Before we dive into the instruction set of the 6502, we need to have an understanding of the way in which the memory is arranged.

We know the CPU is equipped to address a total of 64K memory locations (1K = 1024 bytes). Because of the addressing features of the 6502, it is convenient to partition memory into logical "pages".

A page is simply a block of 256 bytes. Thus memory locations 0 to 255 are page 0 of memory. The first page is referred to as zero page and is used a lot in assembler programming. The next page is used for the stack but the remainder of the address space is unconstrained by design.

On the Apple, certain areas of memory are used for other specific tasks such as housing DOS and BASIC variables. The reference manual contains a detailed description of the use of memory and what areas are available for user programs.

To access a particular memory location we must first select the page and then the location within the that page (this is actually done in reverse order). This requires a total of 4 hex digits.

We have a total of 256 pages of memory each containing 256 bytes, thus we need a number between 0 and 255 to select the page and another to select the location on the page. 255 decimal corresponds to $FF in hexadecimal, consequently location $FF FF represents the highest memory location (and largest value) we will ever need.

When dealing with memory don't forget to include zero as the first location. Zero is a perfectly respectable number in computing!

Right. let's take a look at our first assembly instructin.

    LDA $A56B

This instruction says: LoaD the Accumulator with the contents of memory location $A56b ($ implies hex notation).

When this instruction is executed. a copy of the data is held in location $A5 on page $6B is transfered along the "data bus" to the accumulator. In this example we have used Absolute Addressing. There are 12 main addressing modes on the 6502 each of which have certain advantages and disadvantages and have specific uses. I will introduce them all eventually, by example.

The above example takes three bytes of memory. By that I mean the CPU will require three location to store the instruction in memory when it is assembled (translated to hex machine code): i.e. one byte to store the code for "LDA" and the remainder to store the two byte address. Other addressing modes take more or less memory and consequently may be faster or slower to execute. Here is another example using Immediate Addressing.

    LDA #$2B

This is the same instruction but using a different addressing mode. The instruction says LoaD the Accumulator immediately with the value $2B. The hash sign before the operand implies immediate addressing. It requires no memory access since it doesn't need to store or fetch anything. It uses only 2 bytes to assemble the instruction.

    STA $9F

Here is another instruction using a slightly different addressing mode. The command is to STore the Accumulator at memory location $9F. This copies the contents of the accumulator to the required destination (as with the first example, the data held in the accumulator is only copied- not taken away or destroyed).

You may notice that the address to which the data is to be copied is only two digits. we haven t specified the page address. Aha! This brings us to Zero page Addressing. When we access zero page there is no need to specify the page address since it is automatically assumed to be zero. Consequently we have eliminated the

third byte and are left with a faster 2 byte instruction. We have saved ourselves one whole microsecond!

You may indeed laugh but reducing the amount of time involved in executing instructionsis of prime concern in large programs, particually in commercial applications. Fast and efficient programming is always important no matter what language is used.

```
TAX
TAY
TXA
TYA
```

These are all single byte instructions and use Inherent Addressing. TAX instructs the CPU to transfer a copy of the contents of the accumulator to the X register. TAY is the same except transfer to the Y register. TXA transfers from the X register to the accumulator and TAY - you guessed it - transfer from the Y register to the accumulator.

Innerent addressing means the address is inherent in the instruction: i.e. there is no need for an operand to specify where the data is to be transfered from or to.

Don't be concerned if these instruction seem meaningless at this stage, their significance will be revealed once we develop an understanding of the device.

So far then. we have seen that there are a number of different ways to manipulated data with the 6502. The other addressing modes and instructions will be discussed in furure articles. In the mean time, however, the reference manual provides a list of the instruction set to ponder over.

[Apple IIGS Plus — The Future]

EDITOR: I downloaded this article from the National US GS Users Group BBS the other day. I have heard that Apple Computer are working on the next version of the GS - could this be the next Apple computer.

I got a wonderful little package from apple this afternoon: the long-awaited GS+. Boy. this machine is AWESOME!

Technical Specifications
Well. my GS plus came with a great wad of technical information. but at the expense of the pricing info. but knowing apple, that pricing info will be much different come release.

The technical information I have has no copyright message and no clauses of confidentiality. I have editted the parts that get repetitive (you will understand what I mean when you see them) I will use '<' to denote a comment of mine.

The following information is deemed reliable, but not guaranteed. Any or all of the following is subject to change at any time without notice.

General Architecture
>a bunch of stuff about the 65C816, IWM, and so on.
>The only new information is the clock speed: 7.8 MHz resulting in an effective speed of about 7.4 MHz

The 'Slotmaker' has new expanded capabilities which have been implemented in the ProDOS 16 Operating System.

Slot shadowing allows a peripheral card to be in a physical slot and be mapped to another slot. The main uses of slot shadowing are most likely peripheral cards with "piggyback" cards, large components, and cards with inconvenient or numerous connectors, although this type of design is discouraged. Slot shadowing was implemented in order to allow ProDOS 16 a more expandable and less restrictive environment to operate under.

Slot shadowing allows for selected devices to be mapped to no slot. Devices connected to the smart port and ADB (the mouse) will not be directly hardware accessible when this feature is turned on. It can be turned off via the Control Panel or softswitch due to a large software base which makes direct hardware calls to such devices. The main purpose if InvisiSlots is to expand the number of active peripherals at a given time.

The SCSI port is no longer independant as it previously was, with the independent SCSI card. It is now part of the Smartport device chain.

The Video Graphics Controller (VGC) has been improved as some problems with older VGC models were repaired. In addition, four new graphic modes were added.

< a few notes: for VGC/graphics info, see the SHR section
< the connectors on the back are rearranged. The ADB connector is now on the side (both left and right) of the GS. Looks like a new case for the new GS, but how will apple work the upgrade path?

Memory
Internal system memory is divided into three categories: ROM, Main RAM. and I/O RAM. 256k of ROM now holds the most of the toolbox <more later> as well as support routines for emulation of Apple //c software. Main RAM or "fast RAM" is now 512k. This is not only an increase in capacity, but do to the faster operational speed of the computer, it is necessary to use higher grade memory components. 150ns memory will NOT work at the 7.x operating speed. 120ns does work. but 90ns is strongly suggested to prevent errors.

    I/O RAM, "slow RAM" is now 256k. This is only an increase in capacity.

< more later on I/O RAM in SHR technical information does not
< mention sound RAM. It appears to have 64k, but there are bare
< sockets which can hold up to 192k more. I do NOT know if
< this is for Sound RAM or for other purposes as the prototype
< motherboards are poorly labeled

Extended Super-High-Res
The Video Graphics Controller now incorporates four new SHR modes labeled XSHR for eXtended Super-Hi-Res.
   1> 320x200 w/ 256 colors/line
   2> 320x400 w/ 16 colors/line
   3> 640x200 w/ 16 colors/line
   4> 640x400 w/ 4 colors/line

Due to the amount of memory these modes require and to facilitate ease of use for the programmer. a new method of data storage has been employed which also increases the capabilities ot the machine. Data is contained in memory banks $E2 and $E3. Shadowing capability trom banks $02 and $03 is selected by
writing a 0 to bit 5 of the SHADOW register ($C035). In order to invoke XSHR. you must enable the SHR screen. make it linear, and enable the XSHR screen. This can be done by writing a $D1

to the NEWVIDEO register ($C029). Scan-Line Control Bytes have been expanded. If bit 4 of the current SCB layout is set, then the XSCB (extended SCB) is used for palette data. The XSCB is a single byte containing a palette from $00 to $FF. When using XSHR, XSCB must be set, otherwise, the output is not guaranteed to be correct or incorrect.

< Palette data is stored in the same way, just more of them.
< 512 bytes/256 colors

         The Basic Map for XSHR:
bank $02/$E2:
  $0000-$F9FF: pixel information
  $FA00-$FBFF: reserved
  $FC00-$FDFF: SCB information
  $FE00-$FFFF: XSCB information
bank $03/$E3:
  $0000-$01FF: Palette $00
  $0200-$03FF: Palette $01
  ....
  $FE00-$FFFF: Palette $ff

< I won't type out all the pixel information because I'm getting tired. The layout should be very obvious -- it's basically identical to the old SHR modes. For mode 1. use a byte per pixel; modes 2 & 3 get a nibble, and 4 gets 2 bits. Modes 2,3.4 use only the first 16 colors of the designated palette....
< Mode 4 will do the 4 color groups like the old 640 SHR did. The memory manager now has SetXGraf & GetXGraf which allow for the allocation and deallocation of memory which would otherwise be used by an application

QuickDraw has:

     SetStandardXSCB
     GetStandardXSCB
     SetXSCB
     GetXSCB
the functions of these should be clear. Also. the spec sheet has a RegToExt which converts a regular SHR to an Extended, but it's crossed out. That operation isn't a very difficult one anyway.

Toolsets now in ROM:
  Tool Locator
  Memory Manager
  Miscellaneous Tools
  QuickDraw II (all)
  Desk Manager
  Sound Tool Set
  ADB Tools
  SANE
  Integer Math
  Text Tools
  Window Manager
  Menu Manager
  Control Manager
  LineEdit
  Dialog
  Note Synthesizer
  and...Font Manager

Also, the new revision to the GSSystem Disk has been released to developers, with the long-awaited ProDOS 16 (TRUE 16-bit DOS)!!!

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