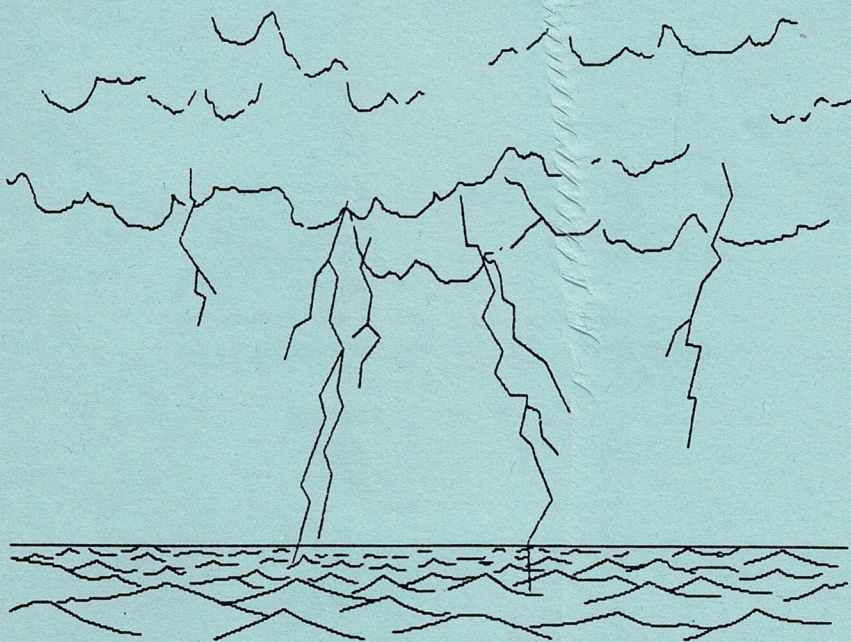


# S E G A M A G

NEW SOUTH WALES

1st JUNE 1987



Registered by Australia Post  
Publication No. NBS8403 X

\$2.00

**SEGAMAG**  
**NEW SOUTH WALES**

PRODUCED BY-  
SYDNEY SEGA USERS GROUP (SSUG)

**VOLUME 1**

**ISSUE 8**

Local Sega Users Group.

SSUG

Gladesville Public School.

Victoria Rd

Gladesville

10:00 AM second Sunday of each month.

Newcastle Sega Users Group (NSUG)

Cardiff Public School Library.

2:30 PM first Saturday of each month.

Contact Arthur Cottrell (049)828193

Sega Nepean Users Group (SNUG)

Victoria St Community Cottage.

79 Victoria st

Cambridge Park.

7:30 PM - 10:30 PM fourth Wednesday each month.

Canberra Sega Users Group (CSUG)

Contact - Claus Pinker

28 Alexandra St

Hall A.C.T 2618

PH (062) 302334

## INFORMATION

1/ President	- Scott MacDonald	(046)668956
2/ Vice President	- Rex Chandler	(02)8724256
3/ Treasurer	- Warren Gerdes	(02)4761184
4/ Asst. Treasurer	- Ted Hartley	(02)6222416
5/ Secretary	- Allan Rodd	(02)8161618
6/ Editor	- Warren Gerdes	as above
7/ Librarian	- John Carter	(02)8094082
8/ Tea Lady	- Elaine Schureck	(046)596310

## Help Desk

Scott MacDonald	(046)668956	all hours
Jeff Wilson	(02)704586	6.00pm - 9.00pm
Tim Anderson	(02)6611724	6.00pm - 9.00pm
Warren Gerdes	(02)4761184	6.00pm - 9.00pm
Brett Merriman	(02)7983072	6.00pm - 9.00pm

## Hardware & Software retail

Pandasoft	(02)7983072
Sega Source	(046)668956
Last Message	(02)8071668

## MEETINGS

2nd Sunday of each month. Admission \$1.00 single \$2.00 family. Start 10.00am finish 4.30pm.

**NEXT MEETING 14th JUNE**

## Servicing

Scott MacDonald	(046)668956
-----------------	-------------

## Mailbox

8 Brett avenue  
Hornsby Heights  
2077 N.S.W

Viatel Mailbox No. 247611840

Bulletin board service (300 baud) (02)6217487

## Editorial

Welcome once again to another exciting magazine. We have a number of features in this months magazine, including a Machine Code article by Scott MacDonald, and an article on the sound chip and how to program it.

It's taken nine months now to arrive at a magazine we can be proud of, and it looks as if we are getting better at it all the time. In fact we are starting to get people, who live interstate, interested in it. This is a good sign as we have spent some time working at it.

Moving right along now we come to last months meeting. As you know we elected a board of directors, who from now on will be called upon to discuss and review ideas put forward to the club. The names of the members are listed below.

Scott MacDonald  
Rex Chandler  
Alan Rodd  
Tim Anderson  
Brett Sterling-Levis  
Darren Miller

Warren Gerdes  
Ted Hartley  
John Carter  
Richard Heppell  
Janice Dambra  
George Ecet

From this list it was decided that eight of these members will constitute a quorum where a majority vote will need to be cast for any decision. It has also been suggested that we have a suggestion box provided for all the shy members who prefer to voice their opinions on paper. For the present we will collect any suggestions at the door or you can write in to the editor and label it "Suggestion Box". All suggestions must be in writing and will be put to the board.

The next thing I have to discuss is on the subject of membership renewal. Yes, it's that time again. All membership will expire, run out and even cease to exist on the 30th of June 1987 unless your name is on the list bellow. These are so far the only members who have cared to forward their dues to date. If your dues have not been paid then you have this meeting and two more weeks after that to do so.

W Gerdes  
J Thornley  
R Sheppard  
J Watling

S MacDonald  
S Jacobson  
M Bailey  
D Heslop

R Fenten	R Heppell
E Schureck	J Williams
D Gosper	P Robbins
R Waller	M Jameison
B Bingham	J Dor
A McPherson	B Sterling-Levis
F Spano	C Henderson
M Hemsted	A White
M El-Gendi	P Pinch
S Whitticker	P Kennedy

If on the other hand you have paid and your name is not on this list, please bring proof of payment to the next meeting or advise me by letter. I can only manage to do so much and maybe I have overlooked it.

As from next month, the magazine is going to switch to bi-monthly as the price of postage has gone up again and it will give me more time to gather information and correlate it. This in turn will produce a better magazine with more articles and bigger programs. Another thing starting next month, Scott MacDonald will re-produce the programs on tape for a small cost of \$5.00 plus postage for all those people who hate typing in programs. The cost will cover a small commission for the people who submitted the programs, a small charge for copying and the price of the tape.

Another point to remember, we are trying to make the club run better all the time, so I have started writing a new card file on Symphony so that the program will automatically tell me when membership is due. This means, when you re-subscribe to the magazine you will get a full years subscription from the date you pay. Don't forget all non-members will have to pay a \$2.00 entry fee at all meetings. Plus all software, hardware & servicing will cost more to non-members.

Next month I will be putting a little questionnaire in the magazine for all members to fill out. It will just have a few items in it to file on the new club file, I'm trying to get a business reply post category on it so it won't cost you a cent. This will help when we put our magazine national. Well that about wraps it up for this month so see you next meeting.

Warren Gerdes (Editor)

**THIS SPACE  
COULD BE  
YOURS**

Advertise in this space !!

*We have over 400 readers  
and still increasing*

Advertising Rates

**FULL PAGE ADD ..... \$25.00**

**HALF PAGE ADD ..... \$15.00**

**Send all artwork to :**

**The Editor  
Sydney Sega Users Group  
8 Brett Avenue  
Hornsby Hts  
2077 N. S. W.**

## GAMES REVIEW

This months games review is going to be a dungeons and dragons style of game. The game is called "Dungeons Beneath Cairo".

Specs:-

-----  
Type: available on tape.

Program: basic.

Rating:\*\*\*

This game is is an adventure game where you have been placed in a dungeon on level 1 and you have been given experience level 1 to start the game with. Every move that the monsters make helps to build up your hit points for when you fight these dreaded monsters. When fighting these monsters you can use a magic sword and/or a magic shield. This prevents you from losing as many hit points when fighting monsters. When you start you start on a stair well and you can not see the rest of the dungeon and the surprises that await for you, so you have to move your warrior around the screen by using the cursor keys or joystick. The object of the game is to retrieve the magic staff for the pyramid god. This staff is on level 16 which happens to be the bottom dungeon. You will be attacked by monsters like cyclops, rams, sabautors, gargyles, barbarians and many other types of deformed monsters await your challenge.

You can use a magic stone to slow down monsters or to go though the stone walls of the maze.

You also have healing potions so that when you lose all of your hit points you will automatically recieve hit points again to continue the battle.

On your journey for the staff you will find on every dungeon level rubies which it is to your advantage to pick these up and drop them off at the temple on that level.

Also on each dungeon maze you will find ziggerats which a surprise that could give you things e.g map, magic swords etc or it could take something away.

You can use beacons to teleport you to the temple to drop off your rubies or to escape from monsters.

## Handy Hints

-----

For best results in the game you try to get as many experience level points as possible and after you fight a monster wait for your hit points to build up abit before fighting another monster or the other monster may kill you.

John Carter

## FOR SALE

STAR GEMINI 10X  
centronics printer 120cps  
dot matrix. \$450.00  
phone (046)668956

Games Cartridges various  
titles - \$25.00 each  
phone (046)668956

ADD a 5 1/4" disk drive to your control station (expandable to 4 drives maximum). Why pay \$ 10.00 for a disk when you can buy 5 for that price. Modification price \$ 215.00 (Subject to availability of drives). Ring (02)4761184 for more details.

SOFT Keyboard complete. Exelent condition \$ 90.00 o.n.o Ring (02)841634 after 6.00p.m

CARTRIDGE games \$20.00, cassette games \$10.00 assorted titles, Music cartridge for \$ 40.00. Phone (02)865052

ASSORTED Text adventure games + learning programmes on tape from \$5.00 to \$10.00. Phone (02)6386153

SC-3000H & SF-7000 Super Control Station in good condition, also data cassette and joystick with 3 cartridges, cassette games and discs. \$ 600.00. Phone (02)5332430

SP-400 4 colour plotter printer. 3 months old. Must sell \$180.00 o.n.o. Phone (02)8082124

GAMES CARTRIGES from \$35.00 . With some titles not available in Australia. Ring David (02)7272869.

COMPLETE System with modem communications and heaps of software \$1200.00. Phone JEFF (02)704586



# UNDERSTANDING ASSEMBLER - part 1

by Scott MacDonald

You have had your computer for some time, played some games, generally understand BASIC and have even done some serious programming you probably feel that you are ready for something with a bit more power, why not tackle assembly language programming? It is a lot easier than you think and you will find it capable of doing anything. BASIC is fine for a lot of jobs, but there are a lot of things it can not do = like high speed bit fiddling, or input-output systems.

What is Assembly language? To understand that, it will be necessary to start with an understanding of the Sega. There is a Z-80A Micro Processor Unit at the heart of your Sega which does the real computing donkey work. Unfortunately the MPU only responds to cryptic and very simple instructions written in its own native Machine Code. Any BASIC statement that is to be executed has first to be translated into this MC before the MPU can execute it, and that is done by a program called an "interpreter", itself written in machine code. This translation takes time, having to be done every time a statement is to be executed.

FOR N = 1 TO 4 : this is a Basic statement

Now if we bypass the interpreter, by writing directly to the MPU in MC, we get a dramatic improvement in speed. A program may run something like 10 times faster. There are other ways how speed improvements may be made, but more of that later. Whether this increased speed is worth the hassle depends on what you are trying to do. Some moving graphics displays may be hopelessly slow in Basic or if waiting for the answer to some problem to be printed, you may be quite happy to sit around for 20 seconds or so rather than 2.

There can be positive disadvantages to writing in machine code. A program written in machine code can use more memory than its equivalent in Basic, (we will see why later). What I am saying is that machine code is not a cure all. It is a tool, like any other, to be used in its proper place.

The Binary language is the only language that computers can directly understand. Programming in Binary (as was done years ago was hilarious = imagine rows of programmers all switching single bits of information into the same machine) is a very painful and time consuming process. Because of this an MPU was created that could understand 8-bit information, so was born the 8-bit computer. Some problems still existed, who could remember all those 8-bit instructions (the Z-80 has 694 of them) easily, so a program was written that could convert one line statements into machine code - an Assembler -

When programming you will have to understand how information is stored in the computers memory and how to use Binary and Hex ( hexadecimal ) numbers. In everyday life we normally use Decimal numbers but computers do not, information is stored in Binary, with Hex being a compact way of representing binary. More simply, decimal is counting in tens ( base 1 ), binary is counting in twos ( base 2 ) and hex is counting in sixteens ( base 16 ). We can use any number system using any other base we like, with the largest possible digit always being one less than the base.

To indicate which counting system is in use an identifier is placed before the number ("&H" as in Basic), Hex numbers are prefixed by "#", (hash sign), Binary numbers by "%" (percent sign). Lack of an identifier indicates the number is decimal.

e.g. : #1101 is a hex number  
%1101 is a binary number and  
1101 is a decimal number

LD HL,#3CF1 ;this is an assembler statement

## DECIMAL, HEX, BINARY

DECIMAL : base 10 : Decimal uses the numeric characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 (ten of them). The position of each digit (from right to left) represents a "power" of 10, (1, 10, 100, 1000, 10000 etc). For example, the decimal number 15601 can be expressed this way :-

$$\begin{aligned} 15601 &= 1 \times 10000 + 5 \times 1000 + 6 \times 100 + 7 \times 10 + 1 \times 1 \\ &= 10000 + 5000 + 600 + 70 + 1 \\ &= 15601 \text{ (decimal)} \end{aligned}$$

HEX : base 16 : The hex numbering system uses 16 digits. The first ten digits are the same as for decimal, 0 through 9, but for the remaining six digits we need single character symbols. The chosen symbols are the letters A, B, C, D, E, and F, so that #A is equivalent to decimal 10 and #F is equivalent to decimal 15. A number like #3CF1 will now make sense in hex because each digit (of 3CF1) represents a power of 16, (1, 16, 256, 4096). For example, the hex number 3CF1 can be written as :-

$$\begin{aligned}
 3CF1 &= 3 \times 4096 + 12 \times 256 + 15 \times 16 + 1 \times 1 \\
 &= 12288 + 3072 + 240 + 1 \\
 &= 15601 \text{ (decimal)}
 \end{aligned}$$

BINARY : base 2 : This system only has 2 digits, 0 and 1. These binary digits are called "bits". A bit can be 0 or 1 (we just said that). Binary uses, as does decimal and hex, positional significance to represent a power of 2, (1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, and 32768) so a number in binary like :-

$$\begin{aligned}
 0011110011110001 &= 0 \times 32768 + 0 \times 16384 + 1 \times 8192 + 1 \times 4096 + 1 \times 2048 + \\
 &\quad 1 \times 1024 + 0 \times 512 + 0 \times 256 + 1 \times 128 + 1 \times 64 + \\
 &\quad 1 \times 32 + 1 \times 16 + 0 \times 8 + 0 \times 4 + 0 \times 2 + \\
 &\quad 1 \times 1 \\
 &= 8192 + 4096 + 2048 + 1024 + 128 + 64 + 32 + 16 + 1 \\
 &= 15601 \text{ (decimal)}
 \end{aligned}$$

Just a minute, if, according to the previous example, 15601 equals #3CF1 then it must follow that

$$0011110011110001 \text{ (binary)} = 3CF1 \text{ (hex)} = 15601 \text{ (decimal)}$$

This is not a coincidence, if you look at a "4-bit binary number" or "nibble" (i.e., a binary number made up of only four digits consisting of 0's and 1's), then the smallest value it could be is 0000 ( 0 or #0 ), and the largest it could be is 1111 ( 15 or #F ). Thus every digit in hex, 0-F, can be expressed as a 4-bit binary number or as one nibble.

Decimal	Binary	Hex	Decimal	Binary	Hex
0	0000	0	8	1000	8
1	0001	1	9	1001	9
2	0010	2	10	1010	A
3	0011	3	11	1011	B
4	0100	4	12	1100	C
5	0101	5	13	1101	D
6	0110	6	14	1110	E
7	0111	7	15	1111	F

Table 1

In other words, a hex digit is really just another way of writing 4 bits, or, every 4 bits in a binary number can be grouped as 1 hex digit. Let us see how that works with the numbers we just did. 0011100111110001 can be broken into groups of 4 bits (from right to left) as follows :-

0011    1100    1111    0001

Looking at each 4-bit group individually, they calculate to

0011 = 3 decimal (3 hex)  
 1100 = 12 decimal (C hex)  
 1111 = 15 decimal (F hex)  
 0001 = 1 decimal (1 hex)

so it can be written

0011	1100	1111	0001	binary
3	C	F	1	hex

so hex and binary are actually the same thing, with different groupings. Another example, to write #0F8D in binary

0	F	8	D	hex
0000	1111	1000	1101	binary

which, when peiced back together, becomes

0000111110001101 = 0F8D

## BINARY ADDITION

The basic rule of addition is that a "carry" is generated to the next higher character position when the highest value a character position can have is exceeded. This is valid for any numbering system. In binary, where only the numeric characters 0 and 1 are used, the rules of addition are :-

$$\begin{aligned}0 + 0 &= 0 \\0 + 1 &= 1 \\1 + 0 &= 1 \\1 + 1 &= 0 \text{ with a carry of } 1 \\1 + 1 + 1 &= 1 \text{ with a carry of } 1\end{aligned}$$

\*\* Two examples of the addition of two binary numbers \*\*

decimal	binary	decimal	binary
9	01001	15	01111
+6	+00110	+11	+01011
--	-----	--	-----
15	01111	26	11010

## BINARY SUBTRACTION

May be performed directly using binary subtraction rules :-

$$\begin{aligned}0 - 0 &= 0 \\0 - 1 &= 1 \\1 - 1 &= 0 \\0 - 1 &= 1 \text{ with a borrow of } 1 \\1 - 1 - 1 &= 1 \text{ with a borrow of } 1\end{aligned}$$

\*\* Two examples of the subtraction of two binary numbers \*\*

decimal	binary	decimal	binary
12	1100	10	1010
- 2	- 0010	- 9	- 1001
--	-----	--	-----
10	1010	1	0001

In the examples above the results are positive. However, when a subtraction has been executed the result may be positive or negative depending on the relative sizes of the minuend and subtrahend. To indicate if a number is positive or negative

the leftmost bit is used as a "sign bit". The convention is that if the sign bit is 1 then the number is negative and 0 if the number is positive. Consequently the Z-80 MPU, which has eight bits available for data, uses seven bits for the magnitude of the data and the most significant bit indicates the sign. Now the Z-80 MPU can not perform direct subtraction of binary numbers, to get around this the MPU adds the one's or two's complement of the subtrahend to the minuend.

The one's complement of a number is found by inverting each bit of a number. For example the one's complement of 00001100 (12 decimal) is 11110011. The two's complement is found by obtaining the one's complement and adding 1 to it. The two's complement of 00001100 (12 decimal) is 11110100.

### ONE'S COMPLEMENT SUBTRACTION

In this method the one's complement of the subtrahend is added to the minuend. If a carry (called : end-around-carry) overflow occurs a 1 is added to the result.

Examples : (1) 28 - 12      (2) 12 - 28

```
(1)      sign bit
          |
          0 ; 0011100 = 28 minuend
          +1 ; 1110011 = -12 in one's complement form
          | -----
          0 ; 0001111
          + ;         1 = + end-around-carry
          --+-----
sign positive 0 ; 0010000 = +16 decimal
-----
```

```
(2)      sign bit
          |
          0 ; 0001100 = 12 minuend
          +1 ; 1100011 = -28 in one's complement form
          --+-----
sign negative 1 ; 1101111 = -16 in one's complement form
-----
```

In both cases the sign bit indicates the sign of the result. In a negative result the answer is in one's complement form.





# Last Message

SUITE 1/257 BLAXLAND ROAD,  
RYDE N.S.W. 2112 AUSTRALIA

PHONE: (02) 807-1668  
FAX: (02) 808-3169

## LAST MESSAGE MAIL ORDER

- JUNE 1987 - CATALOGUE

### HARDWARE

- Sega -
  - Sega disk drives we have the last in Australia at a very special price (limited stock) \$349.00
  - Sega Micromodem 3 plus Sega Com software (enter the world of communications) \$349.00
  - New Sega Micromodem 4 plus AutoCom software, this package has the lot as well as all the features of the 3 package plus Automatic dial, redial, log on user codes, downloading of pages, answer, disconnect plus many more features. \$599.00
  - RS 232 Printer interface (Now you can use most printers with your sega) just plugs into the sega printer port. \$59.00
- Commodore -
  - Commodore Micromodem 3 plus 64 talk software \$299.00
  - Printers/Monitors (Suit most computer makes)
  - Brother M1109 (ideal to use with Sega RS 232 interface) \$399.00
  - Thompson Colour Monitor (Comp/RGB) \$399.00

### SOFTWARE - Sega Business

- Hu Cal (Spreadsheet on disk) \$59.00
- Sega Base (Data base on disk) LIMITED STOCK \$49.00
- Linkword professional word processor package \$99.00
  - \* with battery back-up \$149.00
- Business Pack (expense analyser, investment, finance disk only) \$25.00

\* ALL PRICES INCLUDE SALES TAX AND ALSO CARRY 3 MONTHS WARRANTY.



GAMES - SEGA

\$

Enchanted Forest (Arcade/Adventure)	\$19.95
CASTLE CHUMY (CARTRIDGE)	\$39.95
FLIKKY (CARTRIDGE)	\$39.95
BOXING (MY CORD, NEEDS ADAPTOR)	\$39.95
FIREFOX (FLIGHT/EMULATOR)	\$19.95
MAZES (GRAPHIC GAME)	\$19.95
SOLITARE	\$19.95
YAHTZE/BRIDGE	\$19.95
CHESS (TWO PLAYER ONLY)	\$19.95
VORTREX BLASTER (ACTION GRAPHIC GAME THAT TALKS)	\$19.95
ORB OF POWER (GRAPHIC ADVENTURE)	\$19.95
TIME CAPSULE (GRAPHIC ADVENTURE)	\$19.95
CHEO'S (GRAPHIC GAME)	\$12.95
RONDA'S CASTLE (TEXT ADVENTURE)	\$15.95
KRAGON (TEXT ADVENTURE)	\$15.95
CASTLE OF HORROR (TEXT ADVENTURE)	\$15.95
KINGDOM (LOGIC GAME)	\$9.95
HORSE RACE (GRAPHIC GAME)	\$9.95
TRADEWINDS (LOGIC GAME)	\$9.95
CONCENTRATION (LOGIC GAME)	\$9.95
VERMIN INVADERS (GRAPHIC GAME)	\$12.95
DEMON GOBBLEN (GRAPHIC GAME)	\$12.95

JUNE SPECIAL ACTION PACK (Inc, Vortrex Blaster, Vermin Invaders  
and Demon Gobbler, ONLY - \$35.00  
SAVE - \$10.85

- COMING JULY SEGA MYCARDS AND ADAPTORS  
MORE GAMES FROM SEGA JAPAN.

- EDUCATIONAL

SCHOOL II (MATHS)	\$19.95
LUSA (MATHS)	\$19.95
ROWDY RATIOS	\$19.95
SPEED READ	\$19.95

CALL THE MAIL ORDER HOTLINE ON 807-1668 BETWEEN 9.00am-7.00pm

MONDAY TO FRIDAY

Now to convert the decimal integer 116 to a binary integer

		Quotient	Remainder	
start -->	2)116 =	58	0	
	2)58 =	29	0	
	2)29 =	14	1	
	2)14 =	7	0	
	2)7 =	3	1	wards
	2)3 =	1	1	up
finish ->	2)1 =	0	1	read

the decimal integer 116 = the binary integer 1110100  
 therefore : decimal 116.8 = binary 01110100.110011

---

At last we can execute the two's complement (2) example

sign bit ;		sign bit ;
116.8 = 01110100.110011		31.875 = 00011111.111

sign bit ;		
0 : 1110100.110011 = 116.8 minuend		
+1 : 1100001. = 31 two's complement +1		
+1 : 1111111.001 = 0.875 two's complement +1		
-----		
+-----		

sign positive 0 : 1010100.111011 = 84.921875 (decimal)

---

It never ends : how do you get the decimal fraction .921875 from the binary fraction 111011, well :-

binary point ->		decimal point	finish
1		;	;
1		2)1.84375 = 0.921875	
1		2)1.6875 = 0.84375	-----
0	2)1.375 = 0.6875		
1	2)0.75 = 0.375		
1	2)1.5 = 0.75		
start>	2)1 = 0.5		

To obtain greater accuracy with bin/fractions (one's that do not "come" out eg .8) expand the fraction out to 12 places.

While we are at it we might as well convert the decimal number 116.8 to the equivalent hex number, the decimal integer part is converted to a hex integer as follows :-

	Quotient	Remainder
start -->	116/16 = 7	4
finish ->	7/16 = 0	7 read upwards

: therefore the decimal 116 evaluates to #74

Now convert the dec/fraction .8 to a hex/fraction :-

hexadecimal		.8
point	-->	x16 <start
		---
:	C <-- replace the 12 -->	12.8
:	with hex equivalent	x16
:		---
V	C <----->	12.8
read		x16
down		---
wards	C <----->	12.8
	ad infinitum	etc.

: therefore decimal .8 evaluates to #.CCC

What about converting the hex/fraction back to a dec/fraction

hexadecimal		decimal point
point	-->	:
	C < note 1 >	16)12.796875 = 0.7998
	C	16)12.75 = 0.796875
start -->	C < note 2 >	16)12 = 0.75
		finish

You should see by now that binary fractions should extend to at least 12 places otherwise the accuracy will only be good too two places if rounded off. eg 0.7998 = 0.8

note 1 : replace the hex value with the decimal equivalent and add to the remainder of each division.

note 2 : replace the hex value with the decimal equivalent

# \*TAWARRI\* SYSTEMS

2 Coolalie Avenue. Camden. 2570

Two new programs have been released : one is a utility for those people with modems who wish to communicate with the outside world via either the Sega Micromodem or a RS-232 type modem. The other is a game - PANDAMONIUM 2 - from the house of PANDASOFT. If you survived PANDAMONIUM 1 now is the time to find out if you could exist in the fungal forests of ARAKNID. If you survive long enough you may qualify as the winner in the competition being run by \*TAWARRI\* in conjunction with PANDASOFT. \*TAWARRI\* is offering a first only prize of \$150 worth of software for the top score ( displayed in a photograph of your screen ). The contest ends on the 31st. of July.

The name of the utility program is *SEGALINK* - a disk based modem program written by Henri Parfait which supports four systems :-

## VIATEL - ASCII - VT100 - KERMIT

*SEGALINK* comes with a 16 page manual all costing \$50.00

\*TAWARRI\* have been granted sole distribution rights in the state of New South Wales of all PANDASOFT products.

**For Sale :-**

1 Sega SP-400 plotter printer .....	\$150.00
1 SC-3000H computer with \$200.00 programs ...	\$200.00
Cassette programs - ex John Sands old stock	
Games - tutorials - educational etc .....	\$ 10.00

## BITS, BYTES, ADDRESSES, and "K"

Enough about decimal, hex, and binary, we will return to these numbering systems often enough. We now know how numbers are written on the Z80. Let us take a look at how memory is organized. The smallest unit of information that can be placed in the memory of just about any computer made, including the Z80, is a bit, the same bit we saw earlier. This only holds a 0 or a 1 however, and is too small for numerical use. So a larger unit was created called a "byte". A byte is just 8 bits or two hex digits grouped together.

A byte can contain a number from 00000000 binary ( #00, 0 ) to 11111111 binary ( #FF, 255). Each unique byte in the Sega's memory space is assigned a four-hex digit (two byte) number called an "address". This address identifies the particular byte and its contents. Addresses start at #0000 and end at #FFFF (65535). Thus the Sega (Z80) can have up to 65535 bytes of memory. Another way to put this is to use the term "K". A "K" is just another way of saying the number 1024 decimal (400 hex). So 65536 boils down to 64K ( $64 \times 1024 = 65536$ ).

### NOTES on the MSB and the LSB

\* The Most Significant Byte and the Least Significant Byte \*  
Take the 16-bit binary value 1011110001110001 and breaking it up into two 8-bit values we get :-

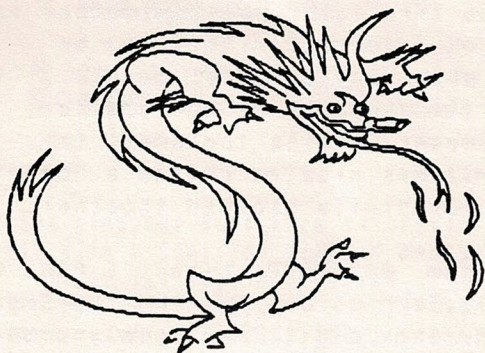
10111100 = #BC : Most Significant Byte  
01110001 = #71 : Least Significant Byte  
= #BC71

The "most significant bit" of the above MSB #BC is bit 7 :  
value 1 : the bit is turned "on" : set "high" : SET :

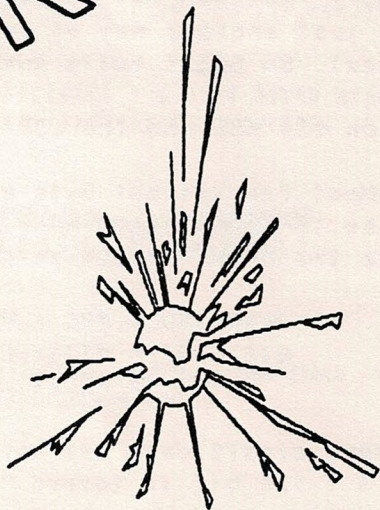
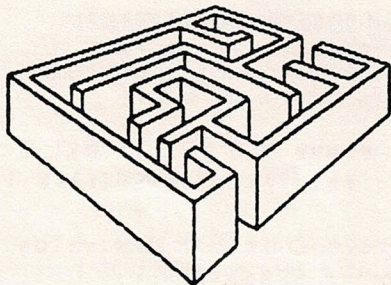
The "least significant bit" of byte #BC is bit 0 : value 0 :  
the bit is turned "off" : set "low" : RESet :

What about a most significant nibble followed by a least significant nibble, that's enough. You tell me, I am hungry

More next month



# PROGRAMS



..... SO YOU WANT YOUR COMPUTER TO TALK ! .....

Over the next two issues I am going to explain the SN76489 Sound Generation Controller (SGC) and give a few practical examples which will include an Analogue - Digital - Analogue conversion routine, or as it is more commonly known .....

### SPEECH.

As an overview, this chip consists of three programmable tone generators, each with separate frequency and volume controls, and one (white) noise generator which is also separately controlled or can be adjusted by the third tone generator.

The SGC is referenced via a command which is probably new to many readers. This command is "OUT" which is short for Output. This command tells your computer to send specific data out to a specific port. The SGC is attached to a port with the hex value of &H7F (127). The syntax of this command is, for example, OUT &H7F,&H80. This is sending the value of &H80 out to port &H7F.

For the non hexadecimal readers (all further numbers will be in hex) this example would be OUT 127,128. Also the hexadecimal notation "&H" will be shown as "#". This is only for simplicity in my typing and MUST be written as &H for any of the practical exercises!

All calculations for the output data are arrived at by "BIT" arithmetic and as this is a very hard subject to master I am going to try to simplify matters for you.

Firstly, The three tone generators can be prefixed in the following manner...

```
Tone generator 1 ..... #80
Tone generator 2 ..... #A0
Tone generator 3 ..... #C0
```

To send the first frequency value for any tone generator (channel) to the SGC you must send two numbers. If you are using more than one channel then each time you update a different channel you must also send two numbers. Otherwise, thereafter only one number need be sent to update the current channel.

..... SO YOU WANT YOUR COMPUTER TO TALK ! .....

eg. To start channel 2 you could send the following...

OUT #7F,#A2:OUT #7F,#28 (Spaces are for clarity)

The first digit of the first number sent defines the channel you wish to operate.

The second digit of the first number sent is the minor adjustment to the frequency.

The range of this digit is #0 to #F.

The second number sent is the main frequency required.

The range of this number is #00 to #3F only.

The main part of the tone value is the second number sent while the second digit of the first number is the minor adjustment. ie Between main tone values of #28 and #29 there are 15 (#0 to #F) steps.

Therefore, the two numbers put together are A2-28. Take away the channel and you have 2-28. The main tone of this frequency is #28 with a minor adjustment of 2. Obviously some frequencies are too low or too high to be of any value. To update the current channel either of these two numbers could be changed and sent again by itself to change the sound.

As for the volume, the three controls are as follows...

Channel 1 ..... #90  
Channel 2 ..... #B0  
Channel 3 ..... #D0

The left digit defines the channel and the right digit defines the volume in the range of #0 (very loud) through to #F (sound off).

To set or update the volume level for a particular channel simply OUT#7F with the data. ie OUT #7F,#B1 (channel 2 and volume 1 loud).

When you turn on the volume for any channel, that sound will remain constant until you either update the frequency, change the volume, or force your Basic programme to break. If these commands are sent directly and not within a Basic programme, then you must turn off the volume yourself to stop the noise. ie channel 2... OUT #7F,#BF.



..... SO YOU WANT YOUR COMPUTER TO TALK ! .....

Now for some practical examples of what you have just learnt.

#### PROGRAMME ONE.

Here is a sound which could be used in Space Invaders.

```
10 A = #7F
```

This defines the output port.

```
20 OUT A,#B2
```

This sets the volume of channel 2 to loud.

```
30 OUT A,#AF
```

This sets the channel to number 2 with an adjustment of #F.

```
40 FOR I = #1F TO #2F
```

This is the counter.

```
50 OUT A,I
```

This changes the main tone value.

```
60 NEXT I:GOTO 40
```

This increments the counter and starts again when done.

#### PROGRAMME TWO.

This will give you the total range of main tones used in any one channel.

```
10 A = #7F
```

```
20 OUT A,#B0
```

```
30 OUT A,#A0
```

```
40 FOR I = #01 TO #3F
```

```
50 OUT A,I:NEXT I
```

```
60 OUT A,#BF
```

# PANDASOFT

7 Mallery Street  
Ashbury NSW 2193

Phone (02)798-3072

Cobrax is at it again. Transport yourself to the fungal forests of Araknid and there do battle with hybrid creatures of all kinds. Arcade game for one or two players. 100 percent machine code, keyboard or single joystick.

## ANNOUNCING A GREAT NEW COMPETITION FROM PANDASOFT

With the release of our latest game...

### PANDAMONIUM II

We are running a national competition to find the highest score in this great new game. The winner will receive a selection of software (of their choice) from the titles listed below to a total retail value of one hundred and fifty dollars.

To qualify you must fill out the form below and send with a photograph of the screen (no other proof will be accepted) showing your high score, to the address at the top of this page. There is one condition of entry.....

You must write on your entry the name of the Project Commander in the game.

This contest will run until the 31st of July 1987, entries received after this date will not be accepted. The winner will be announced in the August issue of your local club magazine. Each fortnight until then the current highest score will be given to your club so you can keep up to date.

Most major state dealers of Pendasoft products are also offering a state prize for the highest state score. Contact your local dealer for details.

This competition is open to all Sega owners except Pendasoft dealers, their employees, and their immediate families.

### GAME TITLES

	Cassette	Disk
Pandamonium I	\$ 20.00	\$ 30.00
Pandamonium II	\$ 20.00	\$ 30.00
Aerobat	\$ 30.00	\$ 40.00
Maths Hangup	\$ 20.00	\$ 30.00
Munchman/C.Combat	\$ 25.00	\$ 35.00
X*BERT	\$ 20.00	\$ 30.00
Burgler Bill	\$ 25.00	\$ 35.00
Caverns of Karanor	\$ 25.00	\$ 35.00
Diskwasher	—	\$ 30.00
backgammon	\$ 20.00	\$ 30.00
One Day Cricket	\$ 15.00	\$ 25.00
Sir Roderick's Quest	\$ 25.00	\$ 35.00
Basword	\$ 25.00	—

To Pendasoft  
7 Mallery St  
Ashbury  
NSW. 2193

Name .....

Address .....

.....

My score is ..... Phone .....

The name of the project commander is .....

I purchased Pandamonium II from .....



excellence in computer software

..... SO YOU WANT YOUR COMPUTER TO TALK ! .....

### PROGRAMME THREE.

This is the sound of a new style phone.

```
10 A = #7F
20 FOR I = 1 TO 10:GOSUB 80:NEXT
30 OUTA,#BF
40 FOR I = 1 TO 40:NEXT
50 FOR I = 1 TO 10:GOSUB 80:NEXT
60 OUT A,#BF
70 FOR I = 1 TO 450:NEXT:GOTO 20
80 OUT A,#B0:OUT A,#AF
90 OUT A,#9:OUT A,#A:OUT A,#B
100 RETURN
```

In all of the above examples, spaces have been included for clarity only. REMEMBER... replace all of the #'s with &H in your programmes or convert to decimal.

For those of you who are programming in Machine Code, the SGC requires approximately 32 clock cycles to load the data so don't try to send it too fast!

Next month, part two will continue and describe how the (white) noise generator operates. There will also be more Basic examples and the speech file which is used in the new game PANDAMONIUM II. This will be listed in both Basic data statements and in a Machine Code source file with "how to operate" instructions.

Till next month.....

Brett Merriman

# SLIDER

```

10 REM          BY NEIL KUBE
20 REM  ADELAIDE SEGA USER'S CLUB
30 REM
40 CLS:GOSUB330:SCREEN2:COLOR1,3,,3:CLS
50 POSITION(64,40)
60 COLOR,15,(0,0)-(119,119)
70 FORX=0TO120STEP24:LINE(X,0)-(X,120):NEXT
80 FORY=0TO120STEP24:LINE(0,Y)-(120,Y):NEXT
90 DIMB$(5,5):FORN=65TO88
100 X=1+INT(RND(1)*5):Y=1+INT(RND(1)*5):IFB$(X,Y)=
""THENB$(X,Y)=CHR$(N):NEXT:GOTO120
110 GOTO100
120 PRINTCHR$(17):FORX=1TO5:FORY=1TO5:IFB$(X,Y)=""
THENSX=X:SY=Y:GOTO140
130 CX=24*X-16:CY=24*Y-15:CURSORCX,CY:PRINTB$(X,Y)
140 NEXT:NEXT:SCREEN,2
150 A$=INKEY$+" ":IFA$="S" THENERASEB$:BLINE(1,1)-(
119,119),,BF:GOTO70
160 A=ASC(A$):IFA<28ORA>31THEN150
170 ONA-27GOTO210,240,270,300
180 CX=24*SX-16:CY=24*SY-15:CURSORCX,CY:PRINTB$(SX
-DX,SY-DY):B$(SX,SY)=B$(SX-DX,SY-DY):SX=SX-DX:SY=S
Y-DY:B$(SX,SY)=""
190 CX=24*SX-16:CY=24*SY-15:BLINE(CX,CY)-(CX+14,CY
+7),,BF
200 GOTO150
210 REM Right
220 IFSX=1THENBEEP:GOTO150
230 DX=1:DY=0:GOTO180
240 REM Left
250 IFSX=5THENBEEP:GOTO150
260 DX=-1:DY=0:GOTO180
270 REM Up
280 IFSY=5THENBEEP:GOTO150
290 DX=0:DY=-1:GOTO180
300 REM Down
310 IFSY=1THENBEEP:GOTO150
320 DX=0:DY=1:GOTO180
330 CONSOLE0,23:CURSOR12,0:PRINT"-----":CURSOR1
2,1:PRINT" Slider ":CURSOR12,2:PRINT"-----"

```

```
340 PRINT"   Use the 4 arrow keys to 'slide' the l
etters into position. Try to arrange them in order
. Sometimes this may not be possible. Press 'S' to
start a new game at any stage. Please wait.....
"
```

```
350 CURSOR12,20:PRINT "By Neil Kube "
```

```
360 RETURN
```

## SLIDER 2

```
10 REM           BY NEIL KUBE
20 REM   ADELAIDE SEGA USER'S CLUB
30 REM
40 CLS:GOSUB330:SCREEN2:COLOR1,3,,3:CLS
50 POSITION(80,40)
60 COLOR,15,(0,0)-(95,95)
70 FORX=0TO96STEP24:LINE(X,0)-(X,96):NEXT
80 FORY=0TO96STEP24:LINE(0,Y)-(96,Y):NEXT
90 DIMB(4,4):FORN=1TO15
100 X=1+INT(RND(1)*4):Y=1+INT(RND(1)*4):IFB(X,Y)=0
THENB(X,Y)=N:NEXT:GOTO120
110 GOTO100
120 FORX=1TO4:FORY=1TO4:IFB(X,Y)=0THENSX=X:SY=Y:GO
TO140
130 CX=24*X-24-4*(B(X,Y)<10):CY=24*Y-16:CURSORCX,C
Y:PRINTB(X,Y)
140 NEXT:NEXT:SCREEN,2
150 A$=INKEY$+" ":IFA$="S "THENERASEB:BLINE(1,1)-(
95,95),,BF:GOTO70
160 A=ASC(A$):IFA<28ORA>31THEN150
170 ONA-27GOTO210,240,270,300
180 CX=24*SX-24-4*(B(SX-DX,SY-DY)<10):CY=24*SY-16:
CURSORCX,CY:PRINTB(SX-DX,SY-DY):B(SX,SY)=B(SX-DX,S
Y-DY):SX=SX-DX:SY=SY-DY:B(SX,SY)=0
190 CX=24*SX-18:CY=24*SY-16:BLINE(CX,CY)-(CX+15,CY
+7),,BF
```

```

200 GOTO150
210 REM Right
220 IFSX=1THENBEEP:GOTO150
230 DX=1:DY=0:GOTO180
240 REM Left
250 IFSX=4THENBEEP:GOTO150
260 DX=-1:DY=0:GOTO180
270 REM Up
280 IFSY=4THENBEEP:GOTO150
290 DX=0:DY=-1:GOTO180
300 REM Down
310 IFSY=1THENBEEP:GOTO150
320 DX=0:DY=1:GOTO180
330 CONSOLE0,23:CURSOR12,0:PRINT"-----":CURSOR1
2,1:PRINT" Slider ":CURSOR12,2:PRINT"-----"
340 PRINT" Use the 4 arrow keys to 'slide' the n
umbers into position. Try to arrange them in order
. Sometimes this may not be possible. Press 'S' to
start a new game at any stage. Please wait.....
"
350 CURSOR12,20:PRINT "By Neil Kube "
360 RETURN

```



## **USER GROUP COPYING**

<b>No of copies</b>	<b>Charge per copy</b>
1 - 49	10 . 0 cents
50 - 99	9 . 5 cents
100- 499	8 . 5 cents
500 +	8 . 0 cents

Prices are subject to change without notification and are based on standard A4 size. Special rates available on enquiry. Phone (02)4761184

# **WARRINGAH PLASTICS**

**168 HARBORD ROAD, BROOKVALE 2100**

- "Perspex" acrylic sheet and cutting service
- Fabricated displays, lighting, etc.
- Vacuum & Blow Forming
- Marine windows, hatches and decklights
- P.V.C. fabrications
- All plastic machined parts.

**PHONE: 939 2900**

SEGAMAG New South Wales  
Published by Sydney SARA Users Group  
8 Brett Avenue  
Hornsby Heights  
2077 N.S.W.

Registered by Australia Post  
Publication No. NBG8403 X

MR GREG TAIG  
122 HILLENB RD  
DOONSIDE  
2767 N.S.W.

POSTAGE  
PAID  
AUSTRALIA