ace inc.

IPSO FACTO

DEVOTED ENTIRELY TO MICROCOMPUTER TECHNOLOGY

AUGUST 1985 ISSUE 45

INDEX

DEPARTMENTS

ace inc publication

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A membership is contracted on the bases of a club year - january 1 to december 31 Each member is intitled to, among other privileges of membership, all issues of IPSO FACTO published during the year.

SPECIALS

See back page for bargins on circuit boards. We haver lowered prices to get rid of them.

ARTICLES WANTED

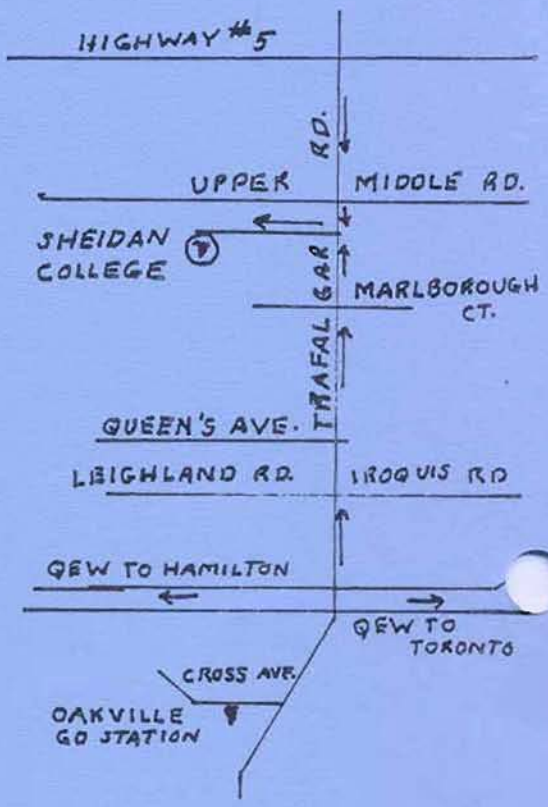
We need articles on sixteen bit CPU'S Such as the 8088, 8086, 68000,etc. If you have eny good circuits please send them in.

QUESTIONS

IF YOU HAVE ANY QUESTIONS OR COMPLAINTS SEND THEM IN WE WILL TRY TO ANSWER OR SATISFY THEM.

MEETINGS

MEETINGS ARE HELD THE SECOND TUESDAY OF EACH MONTH EXCEPT JULY AND AGUST AT SHERIDAN COLLEGE ON TRAFALGAR ROAD NORTH OAKVILLE.



MEETING DATES FOR 1985

12 FEBRUARY
12 MARCH
9 APRIL
14 MAY
11 JUNE
10 SEPTEMBER
8 OCTOBER
12 NOVEMBER
10 DECEMBER

ASSOCIATION OF COMPUTER-CHIP EXPERIMENTERS INC.
P.O. BOX 581,
BURLINGTON, ONTARIO,
CANADA
L7R 3Y5

EDITORIAL

SURVIVAL!

This is issue three of the club year, behind schedule but still providing some interesting articles. Our change to supporting other micros and processors is starting to bear fruit. I have bean getting more articles for both software and hardware for different makes of computers and their clones. So stick with us and we will revitalize our club.

A member of our executive has been expressing a desire to fold the club! This is defeatist talk. I assure you this will not happen. We will, with our new direction, and the emergence of new technology survive.

SURVIVE? WE WILL WITH YOUR HELP AND SUPPORT.

SUPPORT GROUP

We now have members with several different makes of equipment employing different CPU's. We can start a support group for them providing a public domain software library. The software could be distributed at the cost of copying, handeling, and shipping. We will call it NEarly FREE SOFTWARE. We can also supply hardware like we do presently at the cost of production plus handeling and shipping. If you have any public domain software send it to us and we will get started. We can support Apple CPM, IBM MSDOS, COMMADORE 64, XEROX, OR THEIR COMPATABLES. I think this is one of the better ideas to help our club.

BULLETIN BOARDS

If the SUPPORT GROUP becomes succesfull we my be able to implement a Bulletin Board system. There are a lot of factors to consider, with a membership dispersed over all of the US, Canada, and the rest of the world. The cost of a phone call, for example from B.C. or California to Toronto or Hamilton is quite significant. This would mean the implementation of the latest the fastest communications technology to reduce access times. But I am sure with enough backing and financial support we could pull it off.

ARTICLES

Have a pet project or idea? Send us the information and we will print it. The turn around time for publication is very quick and you could have help or advice from other members very quickly. Helping each other is what the club is for.

INFORM US

There will be two more issues this club year one in OCT. and one in DEC. Please send your comments as to what you expect to receive for your membership fee when you join next year. Tell us what type of information or service you think we should provide. I think our club is going to survive if all of us provide support and most important of all, INPUT.

FILL OUT OUR B.I.C.H. sheet at the back of the bulletin. B.I.C.H. Stands for Bitches, Information, Comments, Help.

....Fred....

ACE HARDWARE - PLEASURES, PROBLEMS & SUGGESTIONS

- by Dave Robinson, 6528 Montrose Trail, Tallahassee, Fl 32308

My apologies to Don Stewart for stealing his article title from IF 41, but it's a good title and I think it should be used more often.

No, Don, you're not the last person to get your ACE system up and running - I probably am. If I'm not - if there are others out there who have some of the hardware and gave up because you felt left in the dust, take note that you're not alone; but get with it. It's very satisfying and educational overcoming some of the obstacles you can run into.

During a recent trip to Toronto, I visited for a few hours with Mike Franklin and was somewhat relieved to notice that some of the problems that I was experiencing were common problems and not something that I had created.

I saw this as a good opportunity to make my first small contribution to ACE and vowed that I would go no further until I irradicated these little bugs.

The first bug I wanted to get rid of was the one that caused the CPU to step through memory, every once in awhile, until it hit my monitor rather than boot to my monitor.

After a lot of probing and circuit studying my novice mind came up with a theory and I proceeded to make the circuit modification that the theory called for, and to my utter amazement, the bug was gone.

I won't claim that I know exactly what's going on in the circuit but it appeared to me that the delay in the $\overline{CLR}$ circuit, which I assumed was there to inhibit $\overline{MRD}$ while the boot did its thing, was also delaying the signal for RUN at $\overline{CL}$.

I decided that I would remove the delay to $\overline{CL}$ and accomplished this by cutting the trace on the component side of the CPU board that runs from near pin 7 of IC1 to near pin 7 of IC3. I then jumpered from the plated through hole near pin 7 of IC1 to one of the plated through holes at BUSS contact pad 4 ($\overline{CLEAR}$). This connects $\overline{CLEAR}$ directly to $\overline{CL}$ of the CPU chip and with J13 installed leaves all other $\overline{CLR}$ circuits as they were.

The fix works, but if the reasoning is screwy, lets hear about it.

The next irritation that I wanted to get rid of was the noise that occasionally came from the speaker when the system was powered-up or reset. I also wanted to have a little less speaker volume.

After looking at the data sheet for the LM386 in my Radio Shack reference guide I figured I could have volume control and maybe eliminate the unwanted noise at the same time.

My first attempt to modify the circuit to gain volume control was discouraging and resulted in a bit of a mess to my backplane. I restored the backplane to its original configuration and proceeded to set the circuit up on a solderless breadboard.

None of the circuits shown on the data sheet provided good volume control and I always seemed to end up with as much or more unwanted noise than there was before.

In sheer desperation I began plugging in different capacitors and resistors. The circuit I found most acceptable was the same as that shown on the backplane schematic with the exception of substituting a 1UF electrolytic capacitor in the place of the 220UF between pin 5 of the 386 and the speaker.

The result was considerably reduced volume with fairly good sound quality.

The main problem with the unwanted noise, however, still remained.

Probing around the afflicted area (the area of the 386), my logic probe told me that I was getting pulses on the ground trace leading to that area. My first thought was maybe I needed a de-coupling capacitor in the region of the 386.... wrong....that didn't seem to do it.

What I ended up with was a .01UF capacitor across pins 2 and 3 of the 386. I haven't heard any unwanted noise since, but don't ask me why. I would appreciate it if someone would tell me why, or, better yet, if someone has a better way of handling this problem, how about sharing it with us.

The third problem I wanted to address was the one of the changing data in some of the real time clock registers. As it turned out, I didn't have to address this problem, because it disappeared. If I had to guess, I'd say it probably had something to do with the way the $\overline{CLR}$ circuit used to operate.

An explanation would surely be welcomed.

Speaking of the real time clock, here's a little program that might be of interest to someone like myself who has not yet reached the video stage but wants to see what the clock is doing.

When run, the program first displays the thousandths of seconds on the data LED's. Press "I" and the tenths and hundreths of a second will be displayed. Press "I" again, and the seconds will be displayed, and so on, for minutes, hours, day of week, day of month, and month. The next depression of "I" will take you back to the beginning for another look.

```
10 00       F8 10 B2 B9
   04       F8 FF B7 A2 A9
   09       F8 C0 A7
   0C          E2
   0D          22
   0E          62
   0F          07
   10          59
   11          E9
   12          64
   13          29
   14        3F 0C
   16        37 16
   18          87
   19        FB C7
   1B        32 09
   1D          17
   1E        30 0C
```

A modification to the front panel that I decided I would make right from the start, was to use HP 5082-7340's in my HEX LED display. I already had two from my Popular Electronics Elf and owning a Sym, I knew I wouldn't like the seven segment display. I hated the small case "b" and "d", especially the "b".

The HP 5082-7340's are expensive but I figured for me to get four more was only about $ 30.00 more than the parts for the seven segment display would cost.

I am quite happy with the way the display turned out (I have enclosed photographs with this article) and if anyone has any interest in using this display I would be glad to submit an article with complete details.

I had some problems with some of the schematics and I feel they could be greatly improved upon. If the Executives of the Association think it would be worthwhile to have better schematics, I think I can handle it and do hereby volunteer to tackle the job if so desired.

My thanks to all those responsible for making the fun I am having possible.

Dale Scott
3332-1wr 39St. S.W.
Calgary, Alberta
T3E 3J2

Dear Editors,

I'm not sure if this is up our alley, but I thought you might be interested in the enclosed construction article on expanding the old ATARI 400 into an 800 (the only real difference is memory). I don't know how many people would be interested, but there must be some who picked up the machine like I did at a clearance price when they were discontinued (eg. under $100).

It was originally written for the local ATARI users group, CALTARI, so the technical level might be a little low for most of the ACE members. Except for the actual construction, you need to have some idea of what you're doing. If you chose to publish the article, you may do so in its entirety (quite lengthy), or edit as you see fit, or even just print portions as a tutorial or general memory article. If anyone wanted the entire thing, I could photocopy at cost and mail directly, $2.00 in stamps would cover it.

Sorry its not an 1802 project, but I still have my ELF and it should be emerging soon as a dedicated something or other, possibly an audio test instrument: audio signal generation, frequency response measurements, tape deck bias set up, signal to noise measurements, etc. Nothing too fancy but accurate to at least 1 dB for home bench use in non-critical situations.

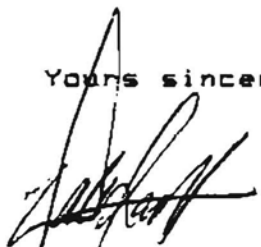
I know it's hard to keep going when it appears no one cares, but I've gained something from the club with each newsletter. I especially like the idea of a basically hardware orientated group, I'm not aware of the existence of any others.

If we have to shift our emphasis from the 1802 proto-board systems, so be it. Make it do something useful like control your jacuzzi, then build it into the wall and move on. I guess what's important is how many groups have designed disk interfaces and drives from the ground up FOR ANY SYSTEM? There is a lot of knowledge floating around that would benefit all of us if we can distribute it. Informal information networks such as ACE are vital to Canada's emergence into the technological 21 century, unless we'd rather join the developing nations and start over (please excuse the melodrama).

I've been a technician for the last 5 years but I'm going back to school in the fall for a degree in computer/telecommunications engineering. I guess work just stopped being fun, so I decided it was time to do something about it. If its fun, its not work; I hope we can keep the fun in ACE.

If there's anything you would like a western point of view on, please ask. If it would be of any interest, I have a friend who could do a short article on the Southern Alberta Institute of Technology's new digital multiplex system switching lab. It includes a Northern Telecom DMS-100 switch (100,000 lines) with in-house microwave and fiber optic transmission/reception loops.

Yours sincerely,



Dale Scott

P.S. Any thought of a bulliten board for program distrubution, article submission, "networking with people", etc.?

AN ADC FOR YOUR VIC-20 (OR ELF)

by - G. Kadziolka, 307-160 Market Street, Hamilton, Ont., L8R 3J6

Hello everybody! I'm going to show you all a neat little circuit that I use with my VIC to gather information from that great big analog world out there. The circuit is based around the National Semiconductor ADC0808 (TI is another source). Some of the chip's highlights are 8-bit resolution, 8-channel multiplexed analog inputs, 100us conversion time, and it also interfaces readily with any micro.

A 555 timer is all I'm using for a clock and there haven't been any timing problems yet. The clock is set to oscillate at about 300kHz. I found that this is the highest frequency I could attain and still maintain a good square wave. The clock should be kept under 500kHz. The circuit is fairly straightforward as illustrated below.

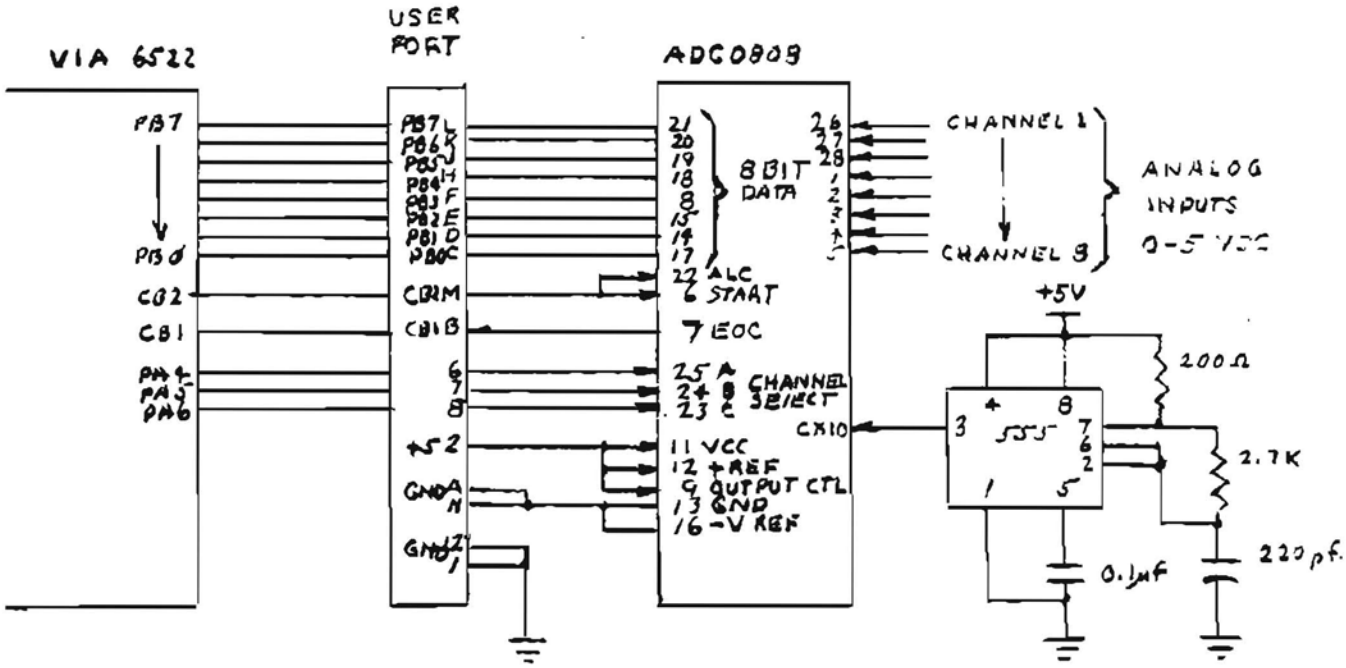


FIG-1

The 8-bit output of the ADC goes to port B of the VIA (Versatile Interface Adapter - a 6522 is made available to users at the USER PORT). Part of port A (PA4 to PA6) is used to select which channel we wish to sample. Control line CB2 is toggled high then low again to load the address (channel select) and simultaneously start the conversion. CB1 is checked to see when the conversion is finished (EOC or End Of Conversion toggles low then high to indicate the end). The VIA is mapped into memory as

16 consecutive memory locations. Here is a list of the memory addresses we will be using in our programs:

HEX	DECIMAL	DESIGNATION	COMMENT
$9110	37136	PORT B I/O	Location of ADC data
$9112	37138	DATA DIR'N REG B	Specifies I/O lines
$9113	37139	DATA DIR'N REG A	Specifies I/O lines
$911C	37148	PERIPH CTRL REG	Estab's ctrl line fnc
$911D	37149	INT FLAG REG	Test certain conditions
$911F	37151	PORT A I/O	ADC channel select

Listed below are a couple of programs you can use to test the circuit. They can also be used as subroutines in a larger program. The first is a simple BASIC routine that POKE's information into the VIA. It works fine but is limited in speed by the BASIC interpreter. The machine code subroutine in the second program should be loaded with a machine code loader or with the help of a machine language monitor cartridge. The BASIC part of the program simply calls on the machine code routine whenever it needs a conversion. Obviously, the second program is quicker.

PROGRAM 1

```
5  A=37136
6  INPUT"ANALOG CHANNEL-";C
10 POKE(A+2),0
15 POKE(A+3),112
20 POKE(A+15),C#16
25 X=A+12:POKEX,208:POKEX,240:POKEX,208
40 B=PEEK(A):PRINT"DIGITAL VALUE=";B
50 GOTO6
```

PROGRAM 2a

```
1C00 LDA #$00
1C02 STA $9112
1C05 LDA #$70
1C07 STA $9113
1C0A LDA #$80
1C0C STA $911F
1C0F LDA #$D0
1C11 STA $911C
1C14 LDA #$FC
1C16 STA $911C
1C19 LDA #$D0
1C1B STA $911C
1C1E LDA $911D
1C21 AND #$10
1C23 BEQ $1C1E
1C25 LDA $9110
1C28 EOR #$FF
1C2A STA $1C40
1C2D RTS
```

PROGRAM 2b

```
5  POKE51,0:POKE52,28:POKE55,0:POKE56,28:CLR
10 A=7168
20 INPUT"ANALOG CHANNEL-";C
30 POKE(A+11),(C-1)*16:SYSA
40 B=PEEK(A+64):PRINT"DIGITAL VALUE=";B
50 PRINT:GOTO20
```

So, getting tired of the 6502? Well, the ADC0808 interfaces with an 1802 just as easily (or easier). I used the P I/O ports on my GIANT BOARD for the hookup. POUT goes to the channel select and the DATA READY line loads the address as well as starting the conversion. The ADC output goes to PIN and the EOC pulse strobes the data into the port. See diagram below.

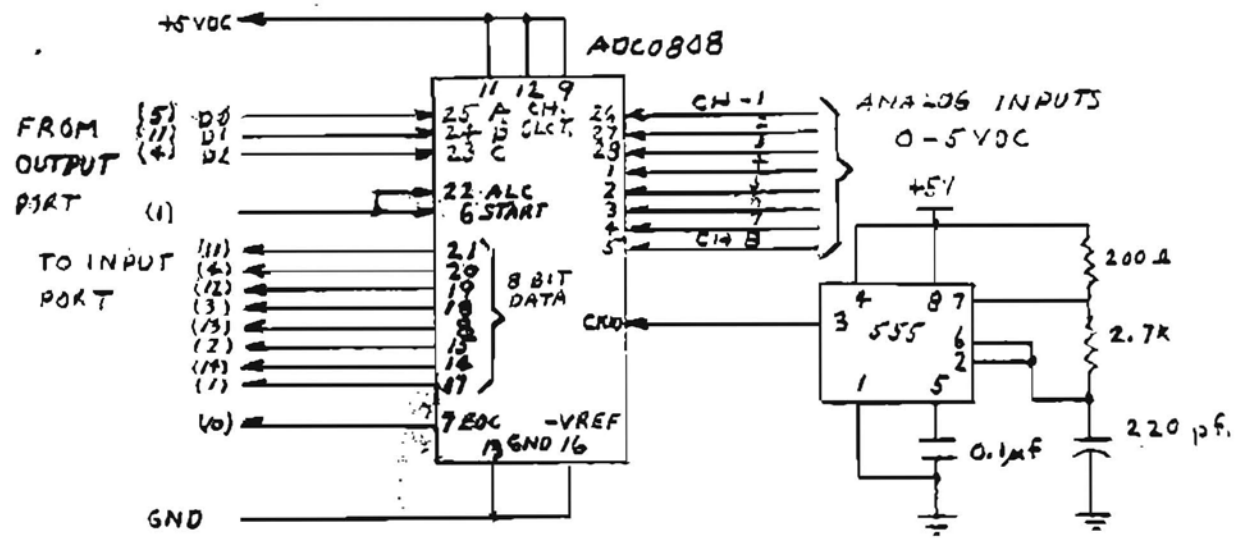


FIG-2 8 CHANNEL A/D FOR ELF-II

The software interface is also less complicated than for the 6502 (on paper that is; I haven't tried the software as of this writing but I am planning on using the ELF II as a preprocessor for my IBM PC. More on that later...). The subroutine is called from CHIP-8.

```
6XOK        X is a variable (X=6 here),K = Address (0-7)
OMMM        Jump to machine code subroutine at MMM
etc.

OMMM        E6          Set X = V(X) pointer
OMMM+1      67          Output V(X)
OMMM+2      36 M+2      Wait for EF3
OMMM+4      26          Decrement V(X) pointer
OMMM+5      6F          Input V(X)
OMMM+6      D4          Return to main
```

Now the digital value of the analog voltage should be contained in variable V(X) (the same variable used for channel no.).

That about does it this time. I will be finishing off the ELF II/IBM PC project in the near future so I'll let you know how that goes. Until then, goodbye.

NETRONICS DISASSEMBLER PATCHES

-Dave Ruske, R2 Box 250, Waupun, WI USA 53963

It's been quite a while since I've had the chance to work with my 1802 system, but at long last I'm getting back at it. Desert the 1802? What on earth for?!! I for one have no need for a Cray supercomputer, and besides, I like the 1802. Anyway, I purchased some software from Netronics (now out of the computer business) and found the documentation to be...well, you've heard about it I'm sure. If you have the Disassembler and do not have a serial terminal (I use a parallel keyboard and the club 6847 VDU), the following information may help you get it running.

```
0000  C4 C4 C4    (Allows execution to begin at 0000)

0016  06          (Relocates stack to top of Disassembler memory)
0019  FE          (allowing more room for my I/O)

00DB  C8 78       (Address of SCRT callable single character input)
                  (routine, customize for your monitor)

00DF  CF 00       (Address of single character output routine)

00F5  C8          (Monitor cold start address hi)
00F8  00          (Monitor cold start address lo)

01F1  30 E9       (Eliminates delay routine needed for serial I/O)

0600  D5          (Eliminates serial speed set routine)

0637  30 6A       (Patch for Input routine)

066A  D4 C8 78    (Call character input routine again)

0696  AF                      (Patch to allow byte output using your)
069A  F6 FC F6 3B A1          (character output routine)
069F  FC 07 FF C6 BF D4
06A5  CF 00                   (Address of routine goes here, customize)
06A7  8F FA 0F FC F6 3B
06AD  B0 FC 07 FF C6 BF D4
06B4  CF 00                   (Address of output routine again)
06B6  D5
```

The following changes will allow SCRT CALL and RETURN mnemonics:

```
04D2  02 43 41 4C 4C 20 23 D5 00 52 45 54 55 52 4E
```

HAPPY HACKING!!!

SPACE WAR

- Michael Smith, 1 Cranleigh Crt., Islington, Ont., M9A 3Y2 CANADA

After repairing some minor battle damage while orbiting Eros in the Aries system, your external sensors notified you of the Death Star's course change. The ship was headed directly for Altair! While waiting for another day to fill up the rest of your fuel tanks, you ask your computer to draw a map of the Death Star's position. Using the map, you plan your course to intercept the Death Star between Talus and Altair. The next day, you leave orbit.

Approaching the rendezvous, the shields are powered up and the electronic counter manouvers are activated. But the Death Star fires the first shot. A torpedo smashes into your armour and damages your computer. Checking the distance, you fire the light phasers—most of which was absorbed by the Death Star's shields. Soon, another torpedo rips through your armour and seriously damages your computers and your main engines.

Unable to use your main engines, you hyper-space to Altair to do some needed repair work. The death star creeps up quietly—its phaser and torpedo banks are silent, and its shields are high. Too late, you notice the Death Star—as it fires its heavy phasers at point blank range. Shields down, your phasers are destroyed. All you can do is sit back, watch your fuel dwindle, and see Altair crumble below you as another allied planet is destroyed.

Space War is a fascinating game of skill and foresight. Unlike most games, your opponent is intelligent. The Death Star utilizes some artificial intelligence to enable it to win easier. Hence, when playing this game, do not be surprised if the Death Star does some very peculiar things!

The Death Star has greater offensive power in this game that your star cruiser

does. It has phasers, photon torpedos, and the ability to destroy planets! The star cruiser's only offensive weapon for use against the Death Star are its phasers. It does have torpedos for ship to planet combat which are used to conquer any of the Death Star' planets. The star cruiser's strength lies in its defensive ability. Armour, shields, and electronic counter manouvers are hopefully enough to outwit the Death Star in battle. Finally, somewhere in the Death Star there is a weakness....

Space War will be released in January 1985 on ACE disk fromat and Netronic's tape format. The disk version needs Forth with disk virtual memory and 32K of RAM at page zero. The tape version will be precompiled Forth code. It also requires 32K of RAM and I/O patches which the user must supply. Instructions on implementing Forth are found in Ipso Facto number 29, May 1982. Furthermore, this game does not require a 6847 graphics board. The graphics used in this game can be used on any terminal.

Also on release in early 1985 will be a tape version of Cosmic Conquest. This program will also be precompiled Forth code and does need a 6847 video board. It will not work using a non-memory-mapped display.

Best of luck against the Death Star, and hopefully you will find its weakness.

DMA Adapter Board Problem

- Michael Smith, 1 Cranleigh Crt., Islington, Ont., M9A 3Y2 CANADA

While struggling to implement an ACE disk drive on my ELF II, I found an annoying problem with the ACE DMA adapter board. The original hex pad input key uses DMA-IN to enter data into memory. This DMA action is turned off when LOAD mode is left. However, upon installing the DMA adapter board, DMA-IN also occured when input was pressed during RUN mode!

This problem can be solved by cutting a trace on the DMA board, reinstalling a diode, and adding a wire. The problem resides in the reset action of the 4013s. The 4013s are reset when the 1802 recognizes a DMA request—by state code one going high. However, during RUN mode, the hexpad DMA-IN fuction should be in constant reset to disallow DMA action.

To disallow DMA action during RUN mode, diode eight on the ELF II has to be reinstalled. However, this disables all DMA action during RUN mode. Hence, the 4013 that controls BUSS DMA requests must be isolated from the hexpad 4013. This can be done by cutting the trace joining the two 4013s reset lines. Now a wire has to be installed between SC1 on the mother-board and the reset pins on the BUSS DMA 4013 (the middle 4013). This permits the 4013 to be reset after a DMA request to allow it to accept another DMA request.

This change should clear up any annoying problems you might be having with your DMA adapter board.

CLUB COMMUNIQUE

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SYMON - 2K - 0000H	____	10.00	___.__
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