

Vol. 10 No. 3
MARCH 1987

THE MSP 99 NEWSLETTER

MARCH IS HARDWARE MONTH FOR THE MSP 99 USERS GROUP

At this month's meeting we'll be cracking open a TI 99/4A console to change the power supply, add a load interrupt switch and give it a thorough cleaning. If there is time we may even go so far as to add 32K of memory inside the console. If you have ever wanted to try modifying your TI, now is the time to give it a whirl. Anyone wishing to bring in their console to follow along step by step may feel free to do so, however you must also supply your own parts and tools. We'll supply as much technical know-how as we can muster together.

Keeping with this theme, you'll find this issue of the MSP 99 Newsletter crammed full of as many hardware modification articles as I could fit between the covers. I hope this doesn't put off any of you that are not interested in this sort of thing, but I just couldn't resist doing a hardware issue.

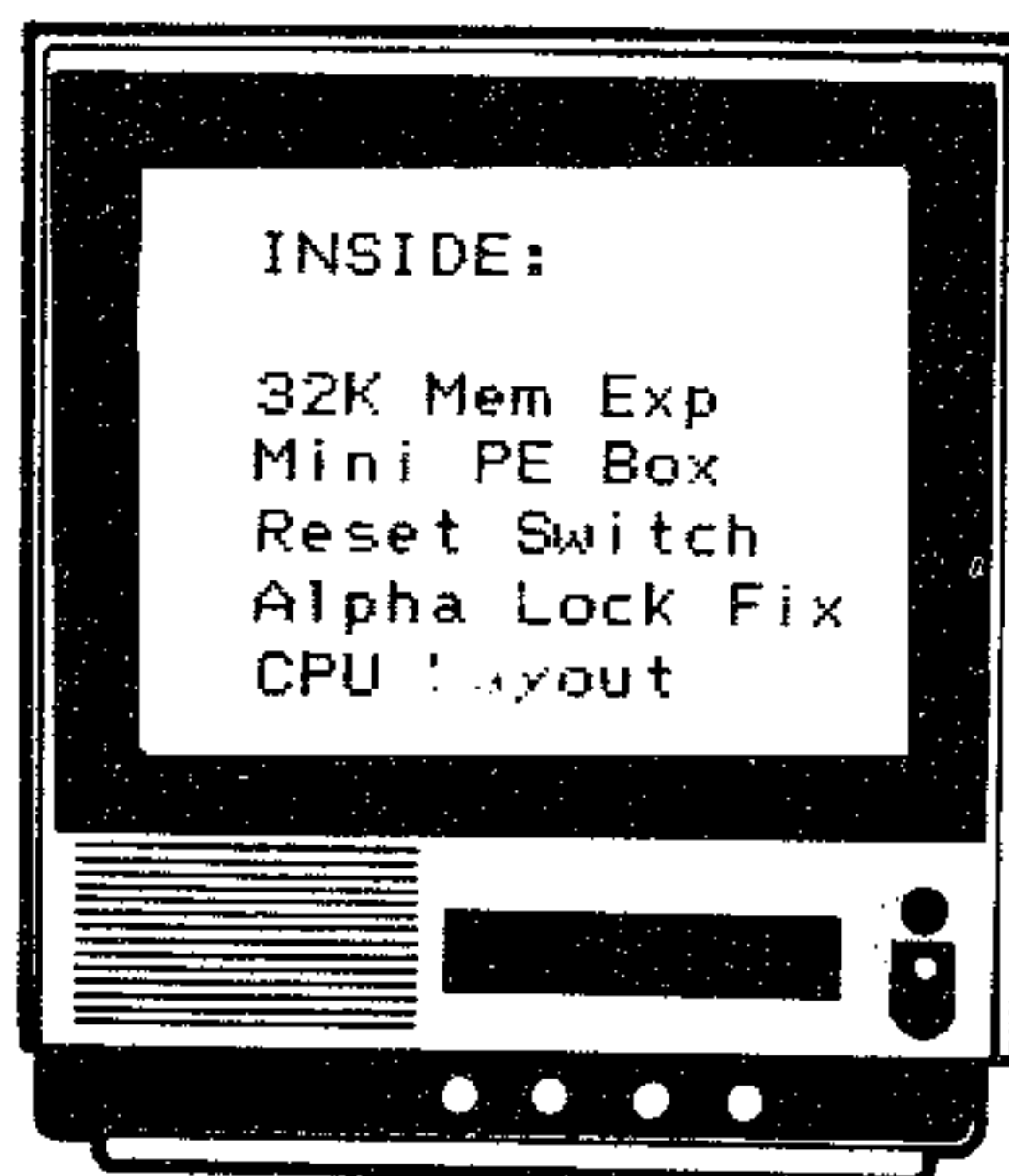
I'll be back on the usual track next month so for now, have fun. You just might find something of interest to you anyway. Those of you without expansion systems may like to add the 32K memory to your consoles or perhaps just give it a good cleaning. You won't believe how much crud can build up inside these consoles. With TI closing their local exchange centers, hardware maintenance has become every users concern.

RAFFLE NEWS

Last month's meeting was a sort of general discussion covering many different topics from hardware to software. The high point of the evening was, of course, the monthly raffle.

Grand prize was a neat little disk case which not only folded out to stand upright, but also had a lever that would elevate the rear disks so each and every one could be reached without fuss. The whole thing including 10 disks with sleeves, labels, etc. went to our own Poor Richard, Dick Dunbar. Let's hope he fills all those disks with more of his fine articles that we have all come to look forward to.

This month, we have something special for you hardware buffs. Keeping in theme with this month's topic we'll be raffling off a replacement TI power supply ready to drop right into your console. See you at the meeting.



The MSP 99 USERS GROUP meets each month for discussions and presentations that enable its members to be better informed about their computers. Users group members share and exchange information. Some members have a broad range of computer expertise, others are just beginning. We are not affiliated with or sponsored by any other group or company. Membership dues are \$18 a year for a family or individual, and \$50 for a sponsor member. You're welcome to visit a meeting as a guest before you join. Call or write for more information.

USERS GROUP MEETINGS are held the third tuesday of each month at Dunwoody Industrial Institute, 818 Wayzata Blvd., Minneapolis, MN 55403. Meetings start at 7:00 PM.

MSP 99 USERS GROUP
P.O. BOX 12351
ST. PAUL, MN 55112, U.S.A.

PRESIDENT: Dick Lauhead 429-5256
V. PRES: George Madline 341-3780
SECRETARY: Gary Gese 529-3989
TREASURER: Mark Tellevik 780-5856

The MSP 99 NEWSLETTER is published eleven times per year on a monthly basis, except during July, by the MSP 99 Users Group. Members are encouraged to contribute articles for publication. Opinions expressed are those of the writers and not necessarily those of the MSP 99 Users Group, its officers, editors, or members. Materials accepted by the editors for publication in the MSP 99 Newsletter, including software listings, are believed to be in the public domain. Newsletter articles may be reproduced by other users groups if appropriate credit is given to the author (if one is listed), and to the Minneapolis, St. Paul 99 Users Group.

NEWSLETTER EDITOR

Gary Gese 529-3989

Articles intended for the next newsletter should be submitted NO LATER than the users group meeting on the month prior to publication. Articles submitted after this deadline are likely to appear in the following month's newsletter.

COMMITTEE VOLUNTEERS are sought for all of our committees. (Education, Equipment, Program, Publicity, Software, Newsletter)
If you would like to join one of these committees or have an idea for a monthly program, please contact one of the officers.

COMMERCIAL ADVERTISEMENT RATES:

Business firms that wish to communicate with our members may do so by placing an advertisement in the newsletter. Rates are:
Full page \$40; Half page \$30;
Quarter page \$22.

Each ad must be camera ready in one of the sizes indicated and paid in advance. Inserts (printed by the advertiser on 8 1/2 X 11 or 8 X 10) may be inserted in the newsletter at \$20 per sheet. Contact the editor for more information.

CHANGE OF ADDRESS: Before you move, please mail a change of address to the Users Group. DO NOT rely on the standard Post Office change of address card since the P.O. will not forward this Newsletter.



HOW TO OPEN A TI 99/4A CONSOLE

Since so many of the hardware modifications in this month's issue require opening up the TI console, I will briefly describe the procedure here.

To begin with, prepare your work area. Place a soft, static free cloth or piece of cardboard on the table to set the console on and set up some small receptacles to hold the screws and other small parts you will be removing.

Disconnect all cables from the console and place it face down on the table with the keyboard towards you. Remove the 7 Phillips head screws you will find recessed in the bottom of the console. If this is a black-and-silver console, you must remove the ON-OFF switch knob by simply pulling it towards you. You should now be able to lift off the bottom of the console and set it aside.

Now that you have it open, what next? That depends upon what you are opening the console for. I will describe how to remove each of the individual circuit boards. You decide which ones need to be removed for whatever task you are attempting.

POWER SUPPLY

The power supply is located on the left, front side and is approx. 4 1/4 X 4 1/4" in size. Remove the 2 Phillips head screws on the right

side and lift the board noting the 12vac cable coming from the rear of the console and the DC cable going to the CPU board. Carefully disconnect these and remove the power supply from the console.

CENTRAL PROCESSING UNIT

The CPU is the long board at the rear of the console in the metal protection shield. Remove the 3 Phillips screws. 2 are on the perimeter of the board and 1 is to the rear but recessed through a hole about an inch from the rear edge. DO NOT remove any screws with retaining nuts on the other side at this point. Lift the CPU board up carefully until it is high enough to disconnect the cable to the keyboard. You may also have to work the cartridge connector through a hole in the plastic cover. Take careful note of how this goes together since this can be the tricky part of reassembling. Now you can take the top cover with the keyboard in place and set it aside. Handle the CPU board with extreme care since it contains chips that are easily damaged by static electricity.

That's really all there is to it. If you need to remove the keyboard you can readily see how this is done. Remember any modifications you do will void your warranty, so from this point on you proceed at your own risk. If you are unsure of what you are doing either get some help or give it up. It's better to be safe than sorry.


MSP 99 Calendar of Events


- MAR 17: Election Night / Hardware Night -- While we collect the ballots to determine the MSP 99 officers for the coming year, we'll be working on upgrading a TI 99/4A console. Come on down for the Hardware Wars.
- APR 21: DataBase Time -- This month we'll be looking closely at Navarone's DataBase Manager software package as seen through the eyes of a regular user Steve Gonnella. If you've ever had the need for a good data base you'll want to be there for sure for this one.
- MAY 19: XB II -- Tonight we get a peek at the new Extended BASIC II from Myarc.

Subgroup Meetings

- ASSEMBLY GROUP -- 1st Tuesday of month, 7:00 p.m.
Bryant Community Center
Bryant Ave and 31st St.
- BUSINESS and APPLICATION SIG
Call Dick Clemetson (926-8083)
- EDUCATION -- At monthly meetings
- YOUTH GROUP - At monthly meetings

Committee Chairs

- EQUIPMENT -- George Madline
(784-2395)
- NEWSLETTER -- Gary Gese
(529-3989)
- PUBLICITY -- Dave Wunderlin
(544-8266)
- SOFTWARE -- Steve Gonnella
(533-8494)
6281 Winnetka Ave
Brooklyn Park, MN 55428
- YOUTH GROUP --
Ed Johnson (690-3442)
Gordy Myers (377-6713)

NEW BBS

For you modem users, there's a new BBS in the area. So far I don't know too much about it, but it is supposed to have a message section as well as an upload/download section for all you software swappers. For access, call:

Golden Vally Techie
545-7292 No Parity

Weekdays:
Mon - Thur 6 - 12 PM
Weekends:
6 PM Fri - 12 PM Sun

SYSOP - Al Schuller

See ya' On-Line.

Don't forget, this month is election time for the new MSP officers for the coming year. Since few members were interested in running for the offices, all of the current officers are up for re-election. Anyway, I want to encourage all of you to vote. Vote for the officer of your choice, but vote.

FROM THE EDITOR

There are lots of goodies inside this month's issue for those of you that are hardware minded, and I'd like to take a moment here to discuss a few things about them.

To begin with, I feel it cannot be stressed enough that you modify your console at your own risk. Doing any tinkering inside any of the TI hardware will void your warranty and TI does not have to honor replacing any damaged equipment. However, all these modifications have been tested if not by MSP members directly then by TI users elsewhere so you can be assured that the circuits are accurate. Still, care must be taken since a computer is a very sensitive device and can be damaged quite easily especially by static electricity so BE CAREFUL.

The diagrams and circuits you will find included in this issue come to us from groups all around the world and acknowledgement is given where it is deserved. However I feel that there are some that deserve special recognition. The TISHUG Users Group of Sydney Australia has done much in the way of modifying the TI 99/4A and it appears will continue to do so in the future.

Another TI'er that has done several modifications to the TI that I would like to mention is John Willforth of the West Penn 99'ers. Several of John's layouts are included in this issue and I hear he's been tinkering with some very exciting ideas for future projects which I will be relaying to you as they become reality.

There are so many hardware projects in print from our other exchange groups that deciding which ones to include in this special issue was no easy task. I tried to pick the ones that would be of most interest to the most people while still being of fairly general application. Ease of construction and clarity of the explanations was also of major importance in making the final decision.

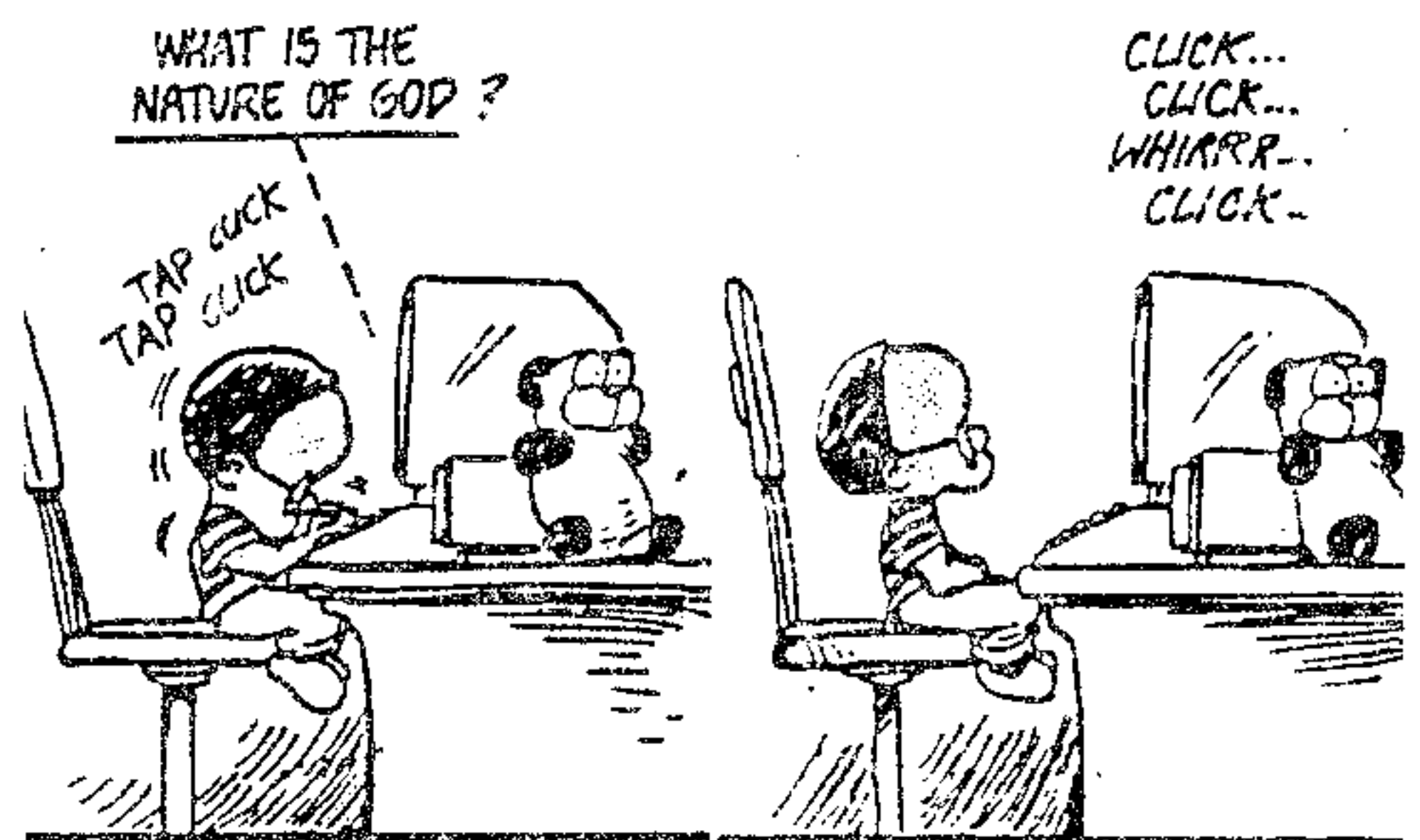
Among the modifications included herein you will find plans for adding 32K bytes of memory inside the TI 99/4A console or speech synthesizer complete with flashing LED's, adding a reset switch to the console, installing GROM chips inside the console and building

your own mini PE box.

There are many more hardware projects yet in my files and I will be including these in future issues of the MSP 99 Newsletter. I would like to know how the rest of our members feel about this issue in particular. I realize that there are many of you that don't have any interest at all in modifying your consoles or hardware projects in general. Still, there does seem to be enough interest in making this special issue justified. Let me know your feelings on the subject so I'll know how to handle this sort of thing in the future.

Next month, I'll have several interesting items for you including; an article from MSP 99 President Dick Lauhead on fixing a bug in the Horizon RAMdisk operating system, another fine Tips 'n' Thoughts article from Tom Fairbairn as well as more from our own Poor Richard Dick Dunbar, and more BASIC and XBASIC type-in routines for all you hackers.

By the way, if any of you have any interesting BASIC or XBASIC routines that you would like to share with the rest of us, please pass them along. I need more to fill up future issues. Come on hackers, let's see your stuff. I know you're out there, I can hear you hacking.



WHAT IS THE NATURE OF GOD?

CLICK...
CLICK...
WHIRRR...
CLICK...

TAP CUCK
TAP CUCK

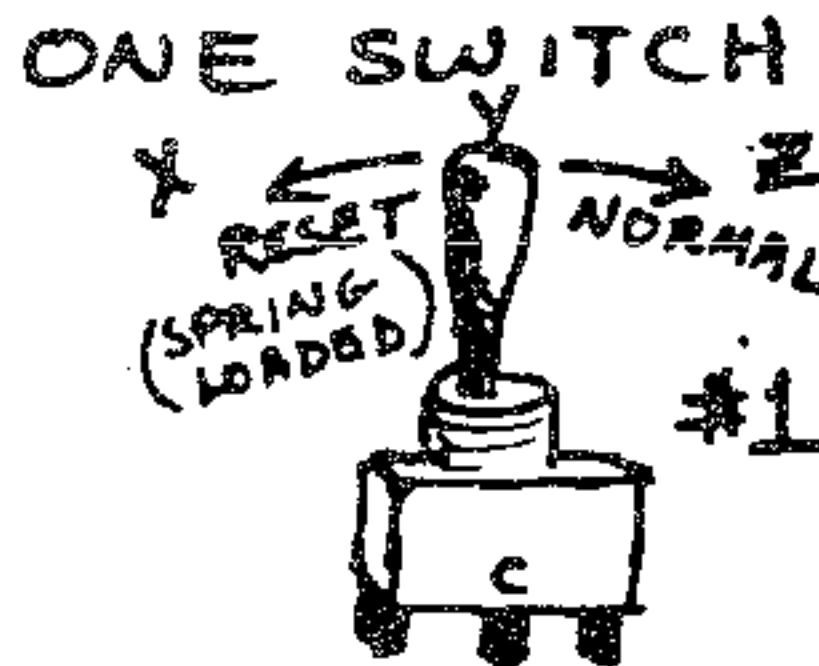
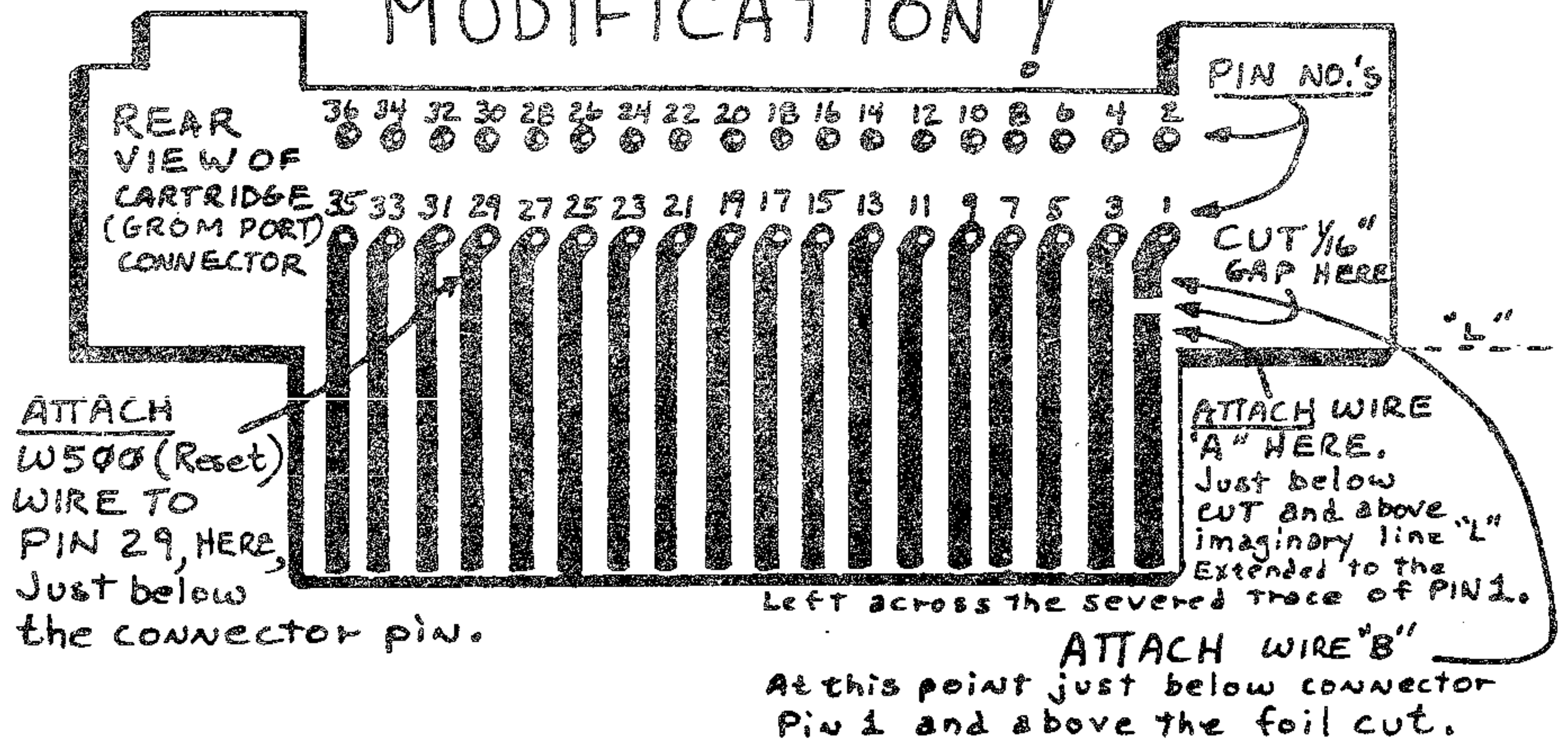
BEEP!

1 QT. SOUR CREAM.
1 TSP. SAUERKRAUT
1/4 CUP CHIVES.
STIR AND SPRINKLE
WITH BACON BITS.

I'VE JUST GOT TO
START LABELING
MY SOFTWARE...

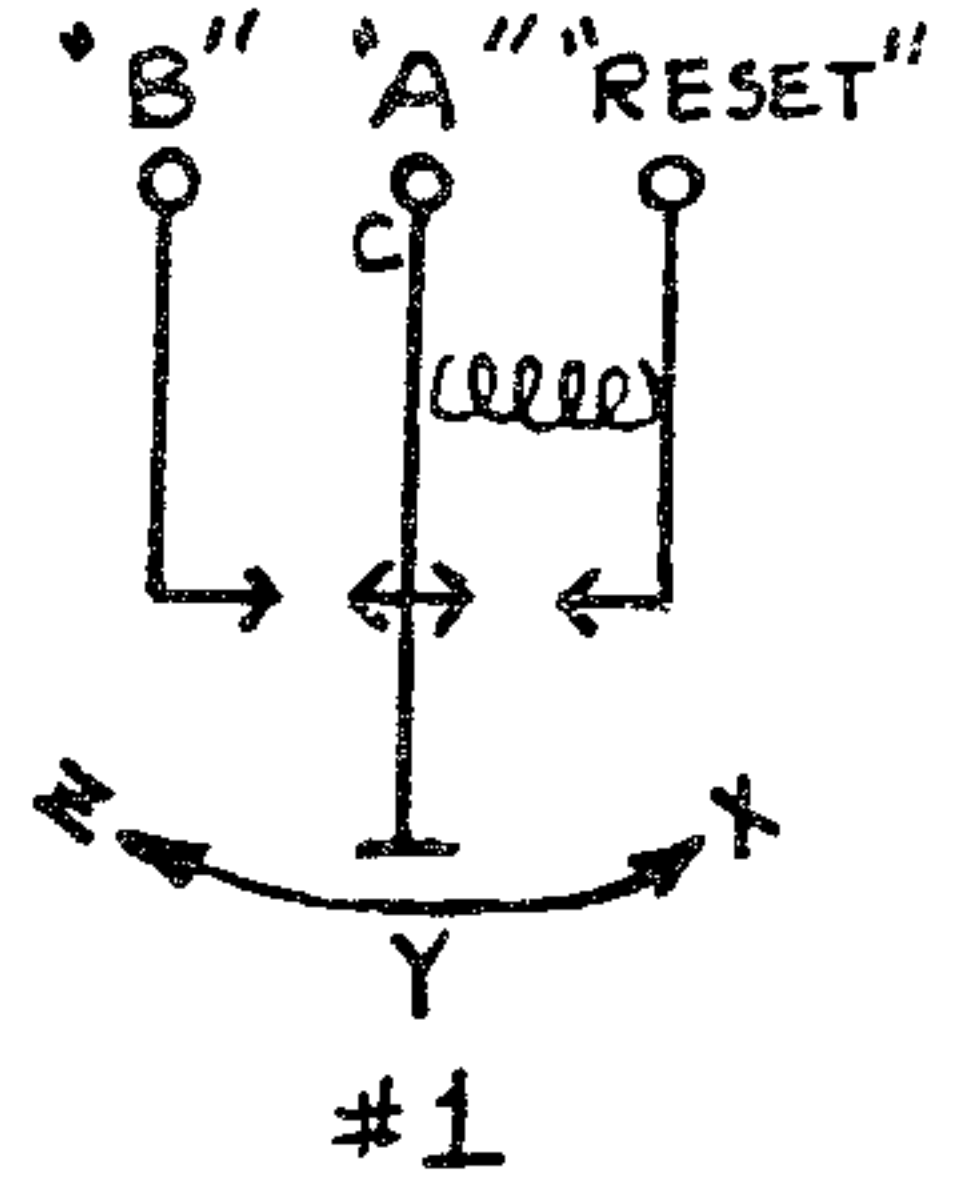
POING!

RESET SWITCH, CARTRIDGE INSERT BUT NO RESET MODIFICATION!

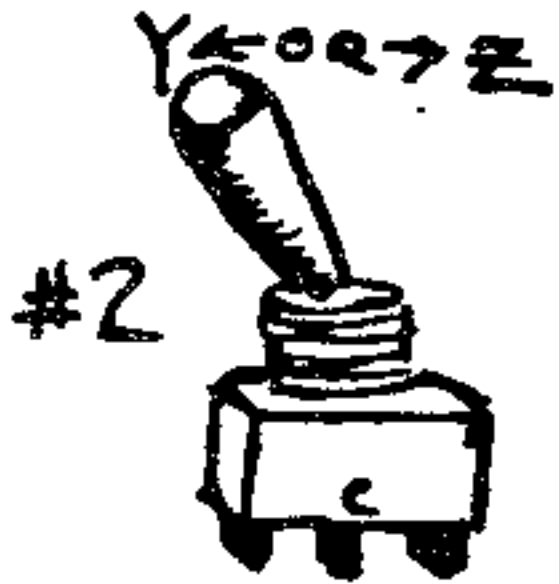


This switch exists but is relatively hard to find. Commonly used in MINI-COMPUTERS DURING THE 60's and 70's. SURPLUS GOOD SOURCE.

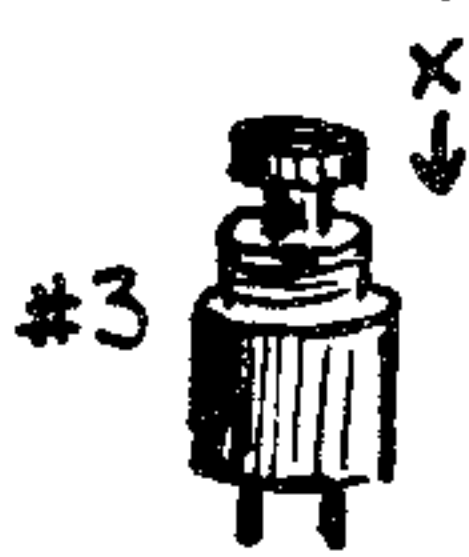
This switch actually has 3 positions:
 Y = Center position, allows for you to insert cartridge into your console with no reset occurring. (useful for cartridge or screen dumps of cartridges)
 X = Push and release allows the console to receive a reset (useful for freeing a locked console, without powering the console off).
 Z = Normal (switch stays in this position when selected) PUTS the cartridge slot back into the mode that T.I. originally designed.



TWO SWITCH OPTION: (IF YOU CAN'T FIND THE SWITCH SHOWN ABOVE)

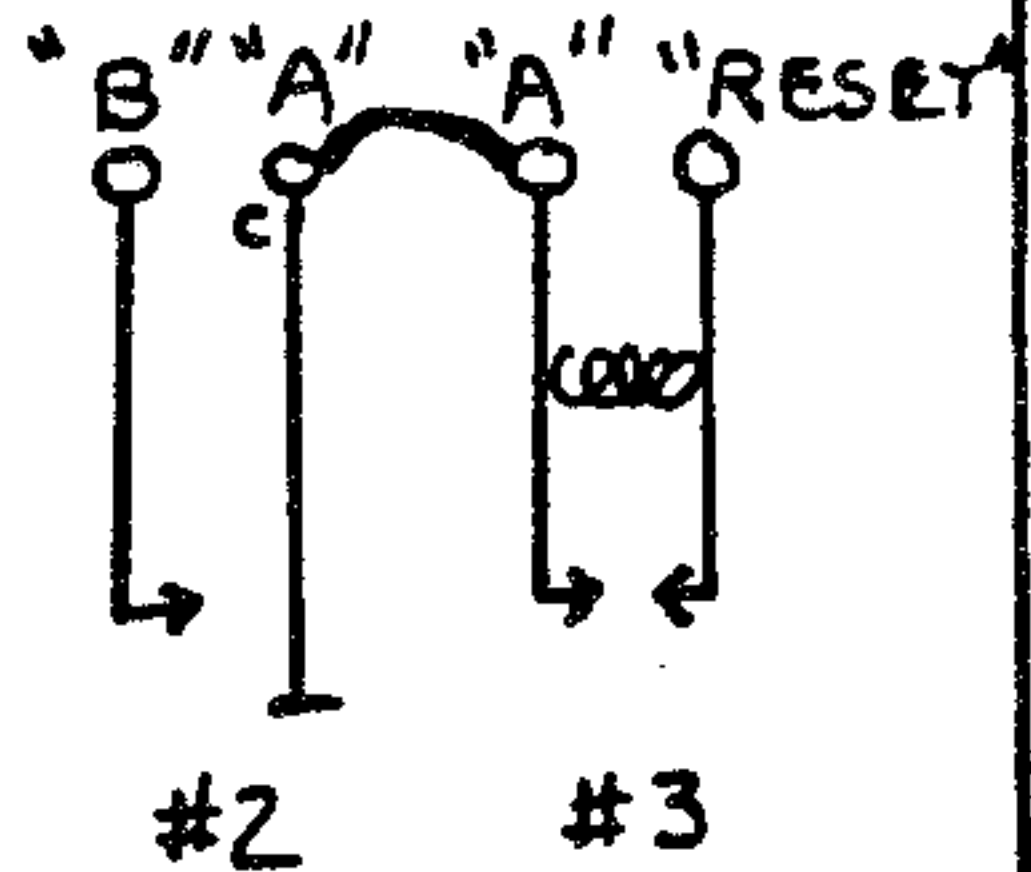


THIS SWITCH NEEDS ONLY TO BE SINGLE THROW, SINGLE POLE. (EITHER AN OPEN OR CLOSED CIRCUIT)



THIS IS A MOMENTARY CONTACT SW. JUST TAP IT TO CLOSE THE CONTACTS BRIEFLY

These 2 switches now can function the same as the single switch above. WIRE "A" WILL BE ATTACHED TO ONE SIDE OF THE TWO SWITCHES.



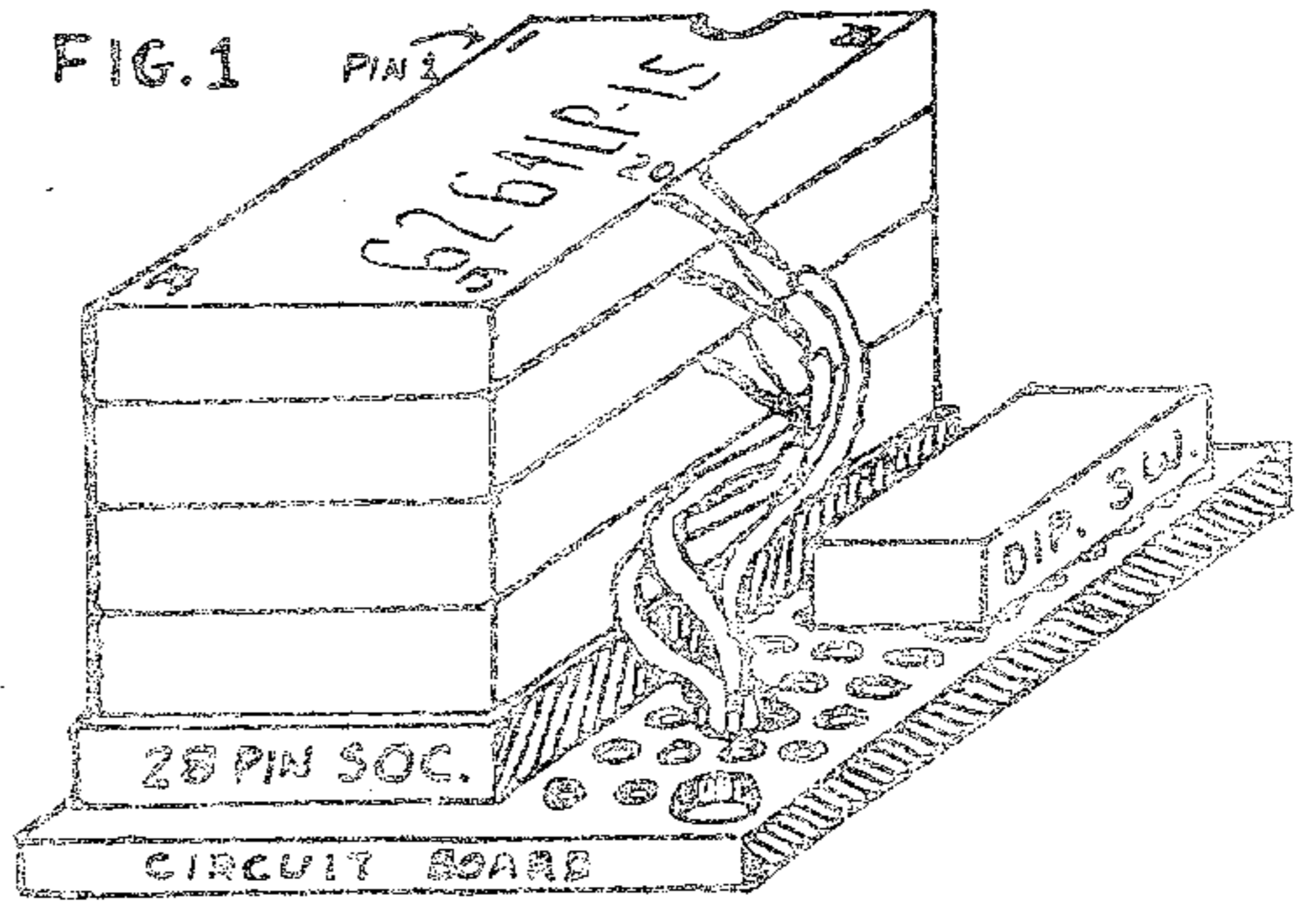
- FEATURES:
- RESET BUTTON FOR CPU WITHOUT SHUTTING OFF CPU.
 - CARTRIDGE INSERTION WITHOUT RESET (CARTRIDGE DUMPS).
 - NORMAL OPERATION NOT MODIFIED.

This is the easiest hardware modification I've written about yet. TRY IT, YOU'LL LIKE IT! (Your Responsibility) John F. Willforth (412) 527-6656

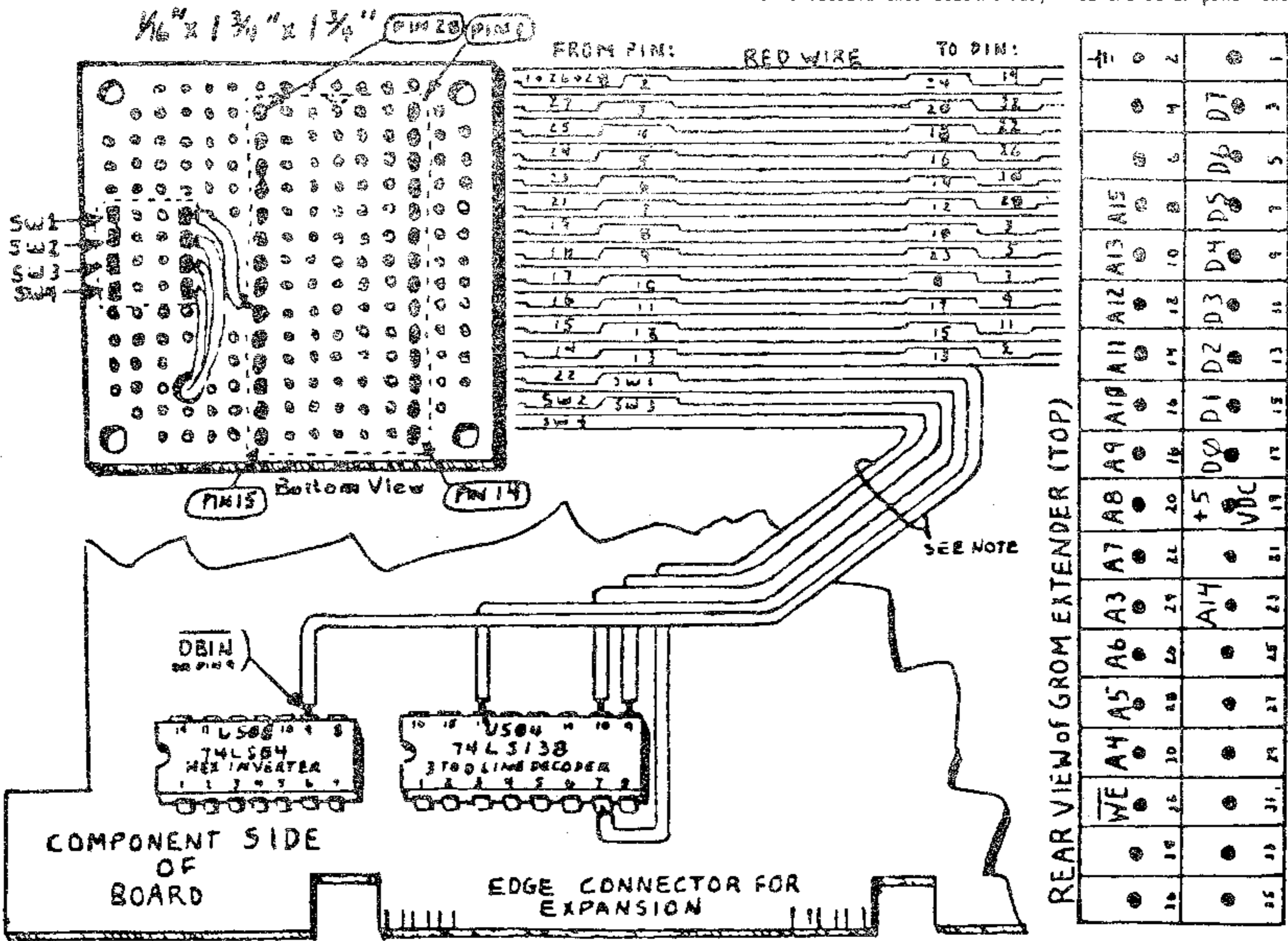
32K MICRO EXPANSION

By JOHN F. HILLFORTH (from AUSTRALIA)

Note: This is taken from an article printed in a Western Australian newsletter. I have condensed it's contents and altered it's physical layout, so that those with minimal electronics background can construct this marvelous device. GOOD LUCK!



The above figure is a very much enlarged drawing of the circuit card, with (4) 2k byte static ram chips in a single 28 pin low profile socket, and the optional 4 pole single throw DIP switch, used to disable selectively, any or all of the static rams in 8K blocks. If the switch is not used, the 4 wires coming from U504 on the CPU board, will go directly to the chips, with the one labeled as SW1 going to the socket pin #20, the one labeled SW2 going to the second chip up pin #20, the wire labeled SW3 to the third chip pin #20, and the wire labeled SW4 going to the top chip, pin #20. (pin #20 on chips 2,3,4 will be extended to isolate them electronically from the other pins numbered 20)



On the next page you will receive enough information to build this 32K memory expansion that fits inside your console, and will not cost you in excess of \$15.00 in parts, and should take between 4 hours and forever (depending on how many thumbs you have). You will find a parts list to help, and hints, if you want to approach it in the same way that I have done it. There are many other ways to accomplish this expansion.

The drawing above is a pictorial representation, rather than a schematic. I believe that because of the simplicity of this circuit, that it is better to use a drawing of this nature, than to try to use, and explain a schematic. This will enable nearly ANYONE with moderate technical ability to build this circuit, and install it in a console.

The drawing above is a pictorial representation, rather than a schematic. I believe that because of the simplicity of this circuit, that it is better to use a drawing of this nature. This will enable nearly ANYONE with moderate technical ability to build this circuit and install it in a console. The 32K micro memory expansion functions exactly as the 32K Memory Expansion used by TI and all the stand alone 32K's on the market.

First, please take note of the location of parts by using the above two drawings. The major component in the expansion is the circuit card. The card's bottom view (shown in upper left FIG.2), has copper lands (small donut shaped eyelets) around each hole. This will provide for better soldering of wires and components to the board. The circuit card is actually 1/2 of a board which comes from Radio Shack to be used as either a half or a whole.

You may use the placement of components as I did, or you may choose not to use the switch pack, in which case all of the board that is not directly under the chip socket may be clipped away easily using small side cutters. You will see later that if this course is chosen, that you can even mount the assembly directly behind the GROM connector, making a very tidy and secure module.

The use of ribbon cable was my choice here, but any multi-strand wire with a gauge no smaller than 26 could be used. The connector shown in FIG. 2 extreme right side, is the rear view of the GROM connector, with the black dot seen in the center of each rectangle representing the 1/8" long pin extending through the verticle connector card and to which you will be soldering your completed assembly.

Finally, the bottom left represents the component side of the TI99/4A's CPU board, near the right side expansion connector. You will note that I have soldered the 4 chip select wires to the decoder chips pins directly. You could, if you really feel squeamish about this, get the schematics for the console, and trace the lines to a better location. It can't hurt to try, but I've done three consoles and have not damaged one yet. You will

also note that the DATA BUS IN (DBIN), is also soldered to pin 9 on U508.

The best way to build this device is to acquire ALL the parts that you will need for the particular type of memory that you will build. After you have gathered the parts and proper tools, you must learn how to take your console apart.

Construct the module as viewed in FIG's. 1-2. I would first assemble the circuit board, locating the chip socket and DIP switch (if selected) to the circuit board, soldering all component legs lightly. Then, being very careful, gauge the lengths of the various cable wires so that as you start to solder them to the memory circuit board, the leads will be compact (neat). Since the Radio Shack ribbon cable is only 25 wires, you will have to use two lengths. I would use the full width (25 wires) for the top 24 lines (those that go to the GROM connector), and cutting the other length to 5 wires by slicing lengthwise 5 wires from the rest with an EXACTO-KNIFE or some other sharp instrument. These will be the 5 wires that will go to the two chips on the CPU board. You may find that if you strip about 3/16" of insulation off each lead and twist the bare lead ends, and then lightly solder these ends (otherwise known as "Tinning"), that later final soldering to the circuit board, the GROM connector, and the two chips on the CPU board will be much easier.

I cannot get into step-by-step instructions on what wire to put where. The drawings are correct and the completed device will function if the physical assembly is correctly done.

NOTE: In FIG.2 the note reference is that you may find it wise to put the optional connector (parts in list) to make it easier to remove this module in case problems do occur for you. You will not have to remove the shields from the CPU and unsolder the (5) wires. Repeated soldering and resoldering could cause chip damage.

After the above assembly is constructed and the 24 wires are attached to the GROM connector (soldered to the pins shown as black dots in FIG.2), and the (5) wires that will go to the CPU board have been prepared, now we must

expose the CPU board for what it really is. Get the shielded CPU, and remove the (3) phillips headed screws with nuts on the other end. Take careful note which direction these screws go through the board, mark them if you have to.

Now lift off the shield that had the GROM connector go through it. Locate the edge connector where the expansion devices connect to the TI. You will see these two chips (see FIG.2) that must have the lines for chip select and DBIN connected to them. Put a little solder on the wire end and carefully heat the wire (with solder already on it) as you press the wire against the leg of the chip. Repeat for all 5 wires.

NOTE: In FIG.2 the note in lower left of CPU card, draws your attention to an ideal area to notch the upper shield to allow the cable an exit to the outside of the shield. The notch need only be slightly wider than the (5) wires and 1/16" high. Carefully wrap electrical tape around the wires where it will pass through this opening.

Install the shield, put the GROM connector back into the top of the CPU board, and lay the board on a non-electrically conductive surface, such as cardboard. Now is the time to remove the 4 memory chips from their protective sleeve. Carefully take each chip and gripping each end of the plastic housing of the chip, press the chip down against the non-conductive material, in such a manner as to bring the two rows of legs toward each other in a more parallel fashion. The purpose is to enable the piggy-backing or stacking of these chips, with this action causing tension to be exerted by the legs of the higher chip on the legs of the lower chip. Except pin #20. Pin 20 must be bent out about 30 degrees on the 2nd, 3rd and 4th (top) chips for the connection of their respective Chip Select lines. Note: See instructions below FIG.1.

Now, with the four chips prepared, push one with pin #20 bent out onto the only one with pin #20 not bent out. Carefully solder the four corner pins between these two chips, and then add the 3rd chip above the 2nd, repeating the above procedure until the 4th chip is likewise in place. Now, at your

descretion, solder all the pins that contact another pin very lightly. Insert this assembly into the 28 pin socket with pin #1 located properly. Then solder the three chip select lines, one to each pin #20. (If you get these mixed up, the only thing that will happen, will be that you will find it difficult troubleshooting to the correct chip. It will be difficult enough since you have just soldered all the chips together.)

Put some wide protective tape in a large area, several layers thick, not covering any vent holes, where the memory module will rest chips up, about 2 1/2" to the left of the GROM connector. This is to insulate the electronics temporarily from the chassis for testing.

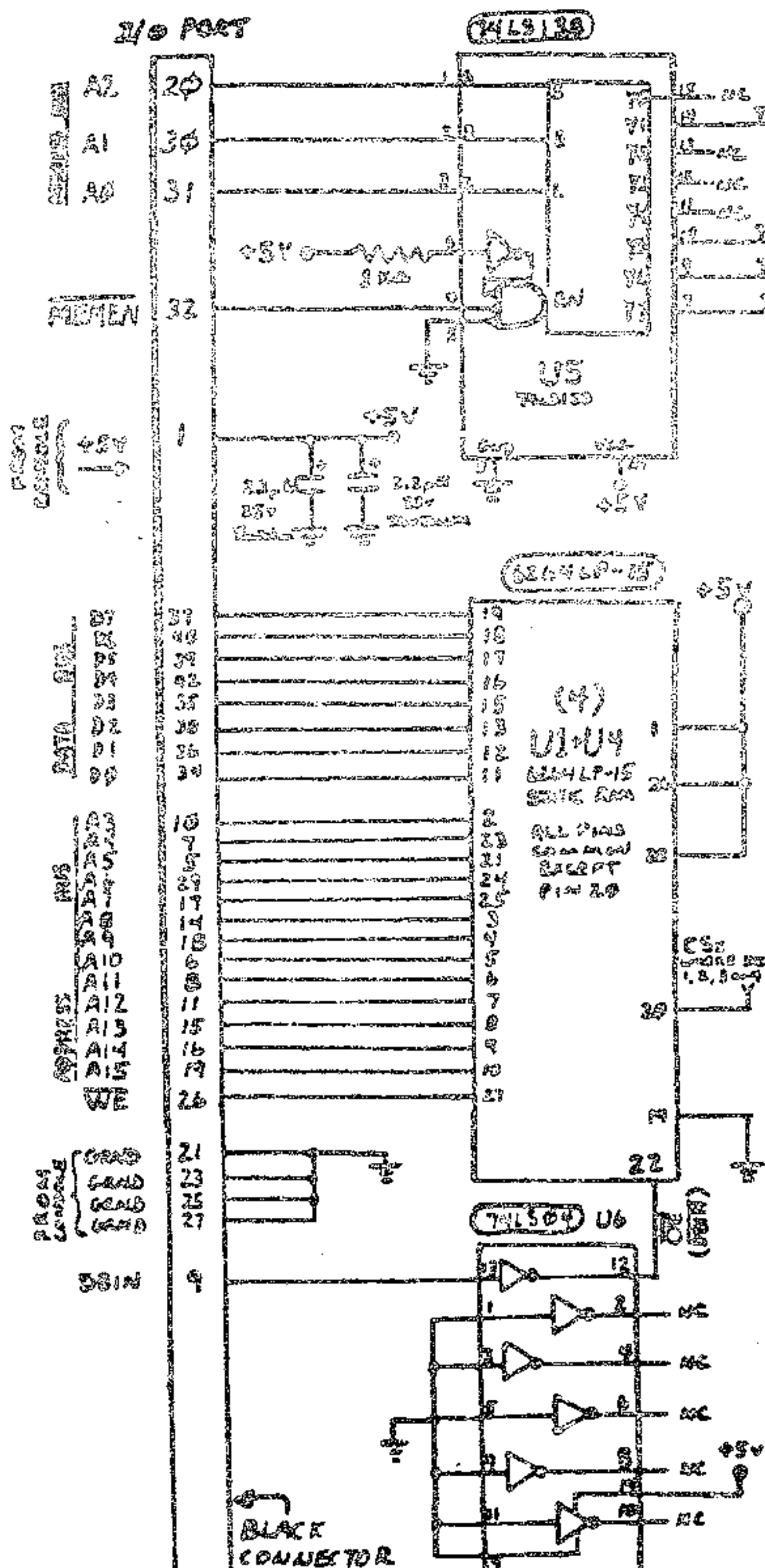
Attach your power supply out to the night, attach your keyboard and TV/monitor, and apply power. If you get the Title Screen, you are probably safe in going on. Now power down and insert your X BASIC, E/A or Mini-Mem module. With these, you can peek and load into an address on each of the 8K blocks. With X BASIC try CALL INIT and a SIZE. You should see an additional 24K of memory available to you.

```
Lower 8K...>2000 - >3FFF..Chip 1
1st 8K Hi...>A000 - >BFFF..Chip 2
2nd 8K Hi...>C000 - >DFFF..Chip 3
3rd 8K Hi...>E000 - >FFFF..Chip 4
```

If you are successful, then go on to the next step. If not, go back and check all of the previous steps. If you have an ohm meter, check continuity. Also, if you have a DC voltmeter check between pins 2 and 19 on the back of the GROM connector for +5 volts.

The GROM connector extends up through a plastic guide and support assembly in the top cover of the console. Remove the (2) screws holding it in place and remove it. Now lower this assembly down over the GROM connector just as it would be if it were still in an installed cover. Place the assembled memory unit to the left of the GROM connector with the leads going to the back of the GROM connector pulled to the left and toward the back of the connector as much as possible. Now mark the plastic with a knife where some relief will be needed, and relieve it. (Of course this is done with the power off.)

(Continued on Page 16)



INSIDE SPEECH SYNTHESIZER WHICH PLUGS INTO THE I/O PORT ON RIGHT SIDE OF THE TI-99 CONSOLE.

32 KiloByte MEMORY EXPANSION FOR INSIDE THE SPEECH SYNTHESIZER (OR ANY PLACE YOU WANT TO PUT IT).

by JOHN WILLFORTH
(based on ideas from the WESTRAILIA, and the CEDAR VALLEY USERS GROUPS)

I have written up several articles on the subject of putting 32K of static RAM inside of the TI console. I believe that most of the information for this came from the WESTERN AUSTRALIA U.G., and the work leading to the insertion of the same memory into the Speech Synthesizer, was done by the CEDAR VALLEY U.G.

Now I have put memory into both the console and the Speech Synthesizer. I thought that there should be no place you couldn't stick it. So I just finished putting it into the OLDE TI STAND ALONE DISK CONTROLLER (part of the old train). This made a nice quiet, sort of micro-expansion system (without RS232/PIO). If you already have a full blown system, or are just beginning to get int a disk system, and realize that you either don't have the funds, or will not need anymore than that just described, you should read on.

The long connector on the left of the schematic, represents the large 44-pin conn. that is inside the speech synth., or any other plug in peripheral ie: Stand-alone Disk Cont.. The big difference, however, is that ONLY the speech synthesizer carries pins 1,2,43, and 44 into the unit from the console. Therefore if you do decide to put memory into any other unit than the speech synthesizer, I would recommend that you wire across that unit, in other words

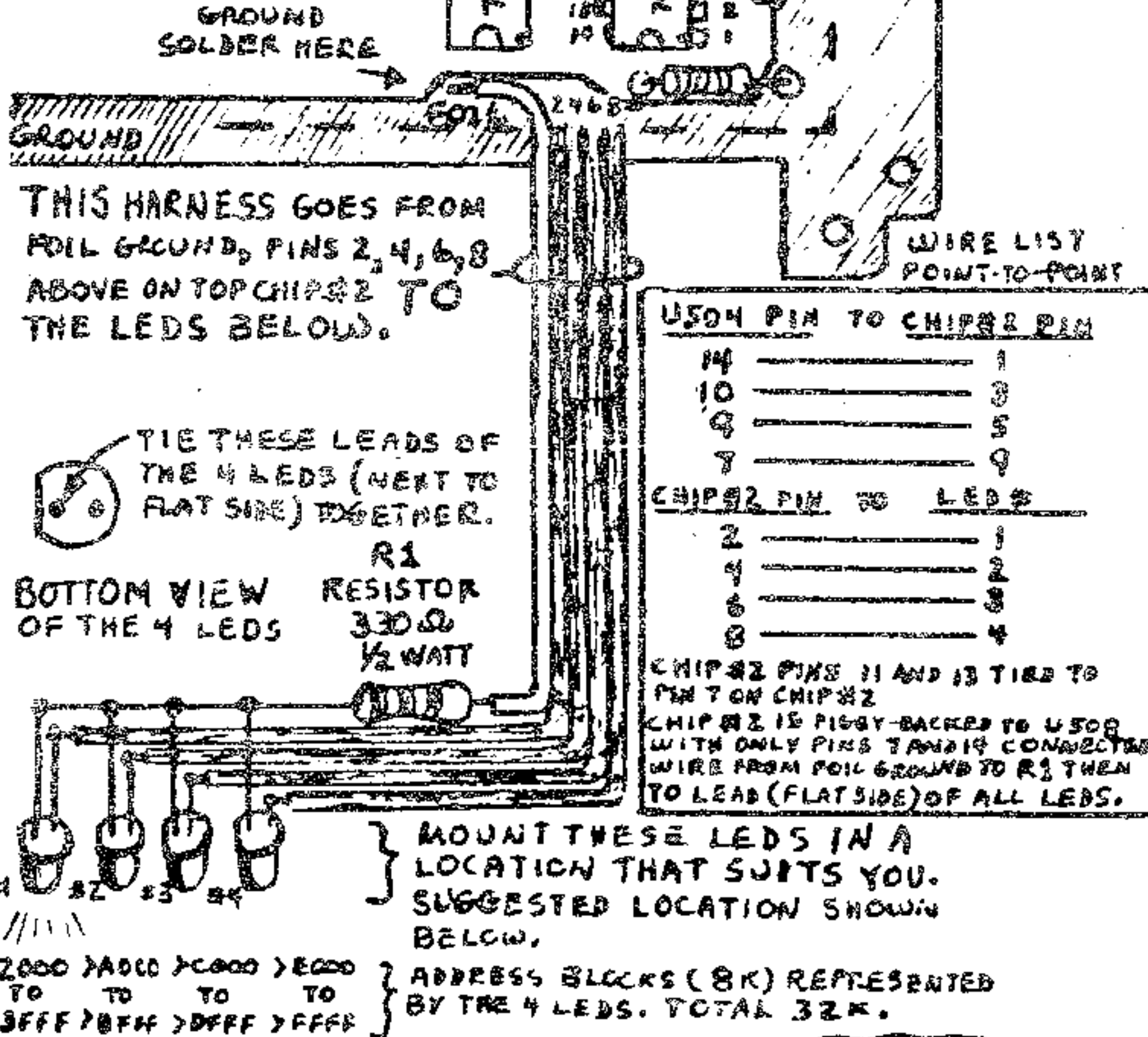
you should run a wire from pin 1 on the console connector to pin 1 on the output end of that unit, where the 2nd unit from the console might be plugged in, and do the same for pins 2, 43, and 44. This will enable you to put the very small speech synthesizer out on the end, instead of between the 2 much larger units (console and Disk Controller). There is only one lead that is involved here that is a must, and that is the pin 1, since I have stayed with using the +5 VDC from the console, rather than tapping it from the +5 Volt source in the unit where this is installed.

If you have the documentation on the RAM chip, you may be confused by the reverse order of the address lines. DON'T WORRY, just wire the chip up as I have indicated, and if you do your part correctly, it will work. I've done nearly 20 of these installations in the console and the speech synthesizer, and in a stand alone disk controller, and as far as I know, they are all working. If you want the more simple instructions, on how to install this same memory into your console, (which is what I prefer) just contact me, by sending a stamped , self-addressed envelop, and I will send the instructions. Have fun! JOHN WILLFORTH RD#1 BOX 73A JEANNETTE, PA 15644 , or call after 9:00 PM, (412) 527-6656

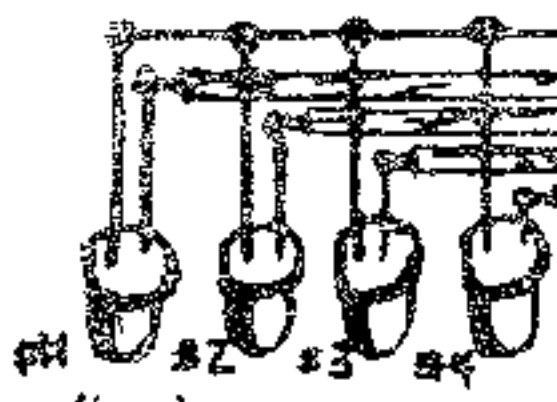


GROM CONNECTOR

RATHER THAN FIND AND USE THE UNUSED INVERTERS ON THE CONSOLE BOARD, I PUT ANOTHER LOW POWER SHOTTKY PIGGY-BACK ON AN ALREADY EXISTING CHIP (TO GET ONLY +5V AND GROUND) THEN TAKING THE 4 CHIP SELECT SIGNALS FROM CHIP #1 AND FEEDING THEM INTO 4 OF THE 6 INVERTERS IN A 74LS04 CHIP, I THEN TAKE THE 4 OUTPUTS DOWN TO THE 4 LEADS SHOWN BELOW SEE POINT-TO-POINT WIRING CHART RIGHT.

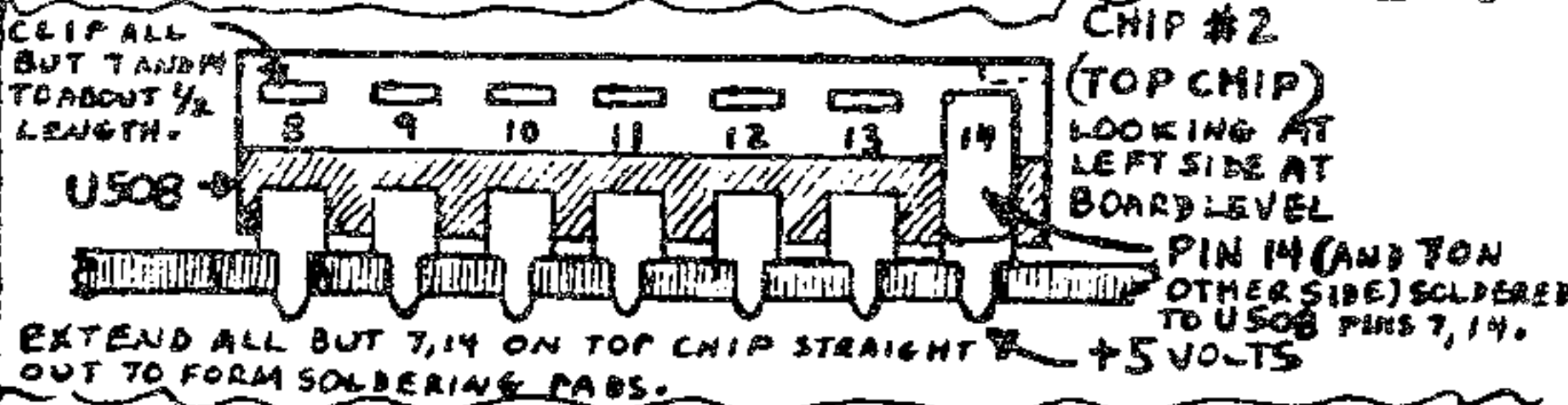


TIE THESE LEADS OF THE 4 LEDS (NEXT TO FLAT SIDE) TOGETHER. R1 RESISTOR 330Ω 1/2 WATT



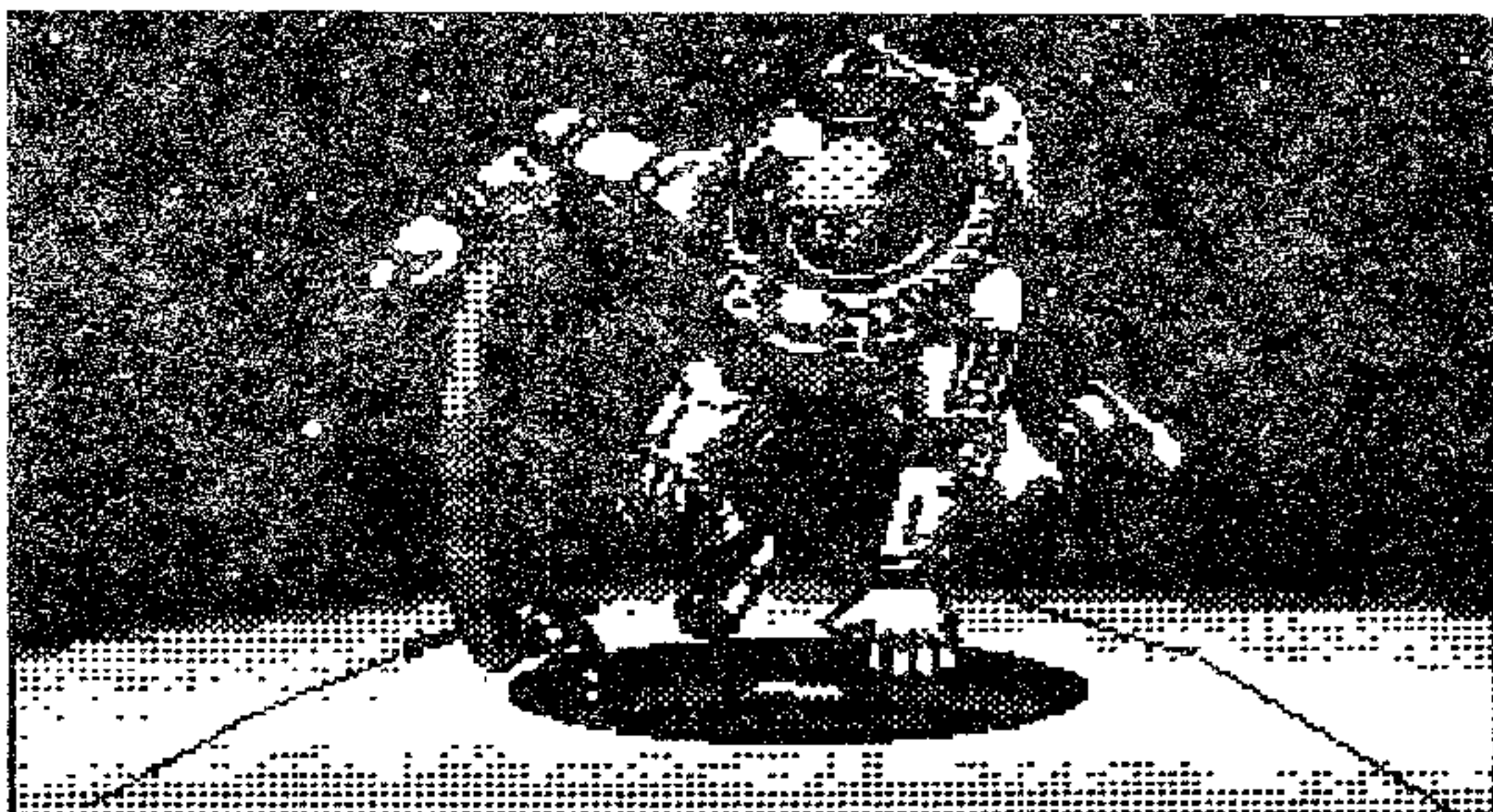
MOUNT THESE LEDS IN A LOCATION THAT SUITS YOU. SUGGESTED LOCATION SHOWN BELOW.

ADDRESS BLOCKS (8K) REPRESENTED BY THE 4 LEDS. TOTAL 32K.



SUGGESTED MOUNTING LOCATIONS

LOCATION A IS FOR SOME OLDER CONSOLES WHERE NOT ENOUGH AREA (AT B) WAS ALLOWED. LOOKS BETTER AND IS MORE FUNCTIONAL AT B LOCATION



WHISTLES AND BELLS ARE NICE BUT LIGHTS?

I've been putting memory in consoles and speech synthesizers for nearly a year now and can account for about 70 such units out there, some of them being in very distant and far away places. Well, ONE person (ED MENASIAN) said he'd like to know when his memory was functioning, since with the PEB unit now removed, there is no flashing LED to indicate that the memory is in operation. I've come up with and refined a pretty "FLASHY" upgrade to the console or speech, which will display not only the fact that the memory is functioning, but exactly which 8K block you are in at that instant.

The drawings to the left of this text, will, if you take a few moments to study, explain how to install the unit inside of ANY console, except the very few QI consoles that I produced. (These consoles are identified by the CPU chip being mounted vertically on the main board, rather than horizontal-ly.)

I have not included, because of space, drawings for the speech, but the same procedures apply conceptually.

PARTS LIST:

- About 10" ribbon cable. (at least 5 conductor)
- 1' of single conductor, 26 or 28 guage insulated wire.
- (1) 74LS04 chip.
- (4) standard size LEDs or what ever size suits you.
- (1) 330 ohm 1/4 watt resistor (or approximate).
- Phillips screw driver (#2 tip size), 15 to 25 watt grounded soldering iron, thin resin core solder, wire cutters/strippers, patience.

After you have gathered the above items, remove the console board, and taking the 74LS04 chip in hand, bend the pins, 1 thru 6, and 8 thru 13 out so they are on a flat plane 180 DEG. in reference to each other. Now snip the smaller extensions of ALL pins off.

Set the chip down on the U508 chip as shown in the drawings to the left, and solder pins 7 and 14 to the corresponding two pins on the U508 chip. You may desire to put a drop of super glue on the top of the bottom chip, and hold the new chip (TOP CHIP) on in the correct position for awhile. This makes the two chips a very firm pair.

Now just wire as shown in the wire list on the left and mount your LEDs.

BY THE WAY you don't need memory in your console or speech for this modification to work, it will work for any 32K even if in the PEB!!!!

YOU DO ACCEPT FULL RESPONSIBILITY IF YOU DESTROY YOUR CONSOLE!!!

HAVE FUN

JOHN F> WILLFORTH
THE WEST PENN 99'ERS

INSTALLATION OF GROM CHIPS INSIDE THE TI CONSOLE

by Patrick Ugorsak
OH-MI-TI

The cartridge grom chips for most of the TI modules can be installed inside the console so that it is no longer necessary to plug the cartridges into the grom port. The programs can be selected by way of a switch attached to the grom chip. This not only saves time in not having to search for a particular cartridge but it also saves wear and tear on the grom port.

Like all articles of this type I must first warn everyone that any modification to your console will void any warranty and also the risk you take is your own. If you plan on doing this modification on your only console I strongly recommend against it. There is always a chance, although slim, that a disaster might occur.

The parts you will need for this project are:

- 1) Program grom chips (either purchased from TI for around \$4 each or taken from a cartridge.
- 2) Ribbon cable (6 inches long, 15 wires).
- 3) Thin wire to connect the switch.
- 4) Switch (The type of switch used depends on the application. More on this later.)
- 5) Low wattage solder iron (25 watt or less), solder, solder bulb to remove grom chips from module if used, etc.

This project requires the removal of the grom extender, the part the cartridges plug into, from the console and attach 16 wires to it. The other end of the 16 wires are attached to the grom chips which are being installed. A switch is attached between one of the wires so that the program can be turned on and off.

What limits the number of programs which can be installed is the type of switch that is used. I have installed two programs into a console (E/A and DMII) using a SPDT type switch and see no reason why more cannot be used. One

criterion for the switch is that it must have an off position so that the program attached to the grom port can be turned off when cartridges are used (extended basic for example). If you are installing only one program then any SPST switch will work as long as it is small enough to mount in the console. If more than one program is being added then a switch with an off position is needed. I used a SPDT on-off-on type switch for my two program installation. I have seen miniature rotary switches at ham meets with as many as 12 positions. Imagine 11 programs available at the flick of a switch. A mini DIP switch could also be used but may not be as convenient to operate.

Procedure

Disassembling the Console

- 1) Remove the on/off switch piece on the black and silver consoles.
- 2) Remove the 7 screws from the bottom of the console.
- 3) Lift the bottom part of the console from the top portion.
- 4) Remove the 2 screws holding the power supply to the console and remove the power supply.
- 5) Disconnect the power cable from the power supply.
- 6) Remove the 3 screws holding the motherboard to the console and lift the motherboard up slightly so that the keyboard connector can be removed.
- 7) Disconnect the keyboard and lift the motherboard out.
- 8) Remove the grom extender from the motherboard.

Preparing the Grom Chips

The grom chips will be piggy-backed together to form a grom stack. Pin 14 on each program grom chip group is attached to the switch position so that the different programs can be selected. Some of the programs use as many as 5 grom chips. For example Editor/Assembler uses 1, Multiplan uses 5 and Disk Manager II uses 2. In the case where more than one chip is used, care must be taken to

make sure that the chips are piggy-backed in the right order or the program will not function properly. This is not too difficult because the chips are numbered in the proper order (DMII-C02234NL and C02235, for example). Just make sure the chips are stacked in ascending order and everything will work fine. (See figure 2 for more detail.)

To prepare the grom chips for installation do the following:

- 1) Carefully bend pin 14 on all the grom chips with a needlenose pliers. Refer to figure 1 for location of pin 14.
- 2) Piggy-back all of the chips used making sure the notches on the chips face the same direction and are arranged in the proper order as described above. If more than one program is being installed keep the grom chip groups together.
- 3) Solder all of the pins except for the pin 14's. Make sure that there are no solder bridges between the pins.
- 4) Solder the pin 14's for each program group together. Solder a thin, 6 inches long, to each program group at pin 14. (See figure 2 for detail.)

Installation of the Program Grom Chips

- 1) Separate the ribbon cable into two pieces, one with 8 wires and the other with 7 wires.
- 2) Attach the ribbon cable to the remaining 15 pins on the grom stack. The 8 wire piece is attached to pins 1-8 and the 7 wire piece to pins 9-13, 15 and 16.
- 3) The wires attached to pin 14 are then connected to the switch.
- 4) Attach a small piece of wire between the center of the switch and pin 29 of the grom extender. (Figure 3).
- 5) The wires from pins 1-13, 15 and 16 of the grom stack are attached to the grom extender positions indicated in Table A.
- 6) Recheck all of the connections.
- 7) Wrap the grom stack and wires

with electrical tape so that it will not short against the motherboard's metal shielding when installed in the console.

8) Install the switch in the console close to the grom port either on top or in the back.

Reassemble the Console

Before reassembling the console, test the programs installed. Reconnect the power supply, keyboard and monitor to the motherboard. Make sure the power supply and keyboard are on a non-conductive surface before applying any power to the console. Turn on the console and try each of the programs installed to make sure everything is working properly. Also check basic and the grom port for proper operation. It may be necessary to reset the console (fctn =) each time a different program is selected. Make sure that the grom stack switch is in the off position before inserting any cartridges into the grom port. If everything is working fine then the console can be reassembled. If a problem occurs recheck all your work.

When reassembling the console make sure that the ribbon cable is bent out of the way so that the grom port can be reinstalled into the top of the console and it does not interfere with the operation of the console. The grom stack should be placed to the left side of the console above the motherboard. Reassemble the console in the reverse order used to disassemble it.

After the console is assembled recheck it again to make sure everything is operating correctly.

If there are any questions about this project please feel free to ask. My address is: 7167 Luana, Allen Park, MI 48101.

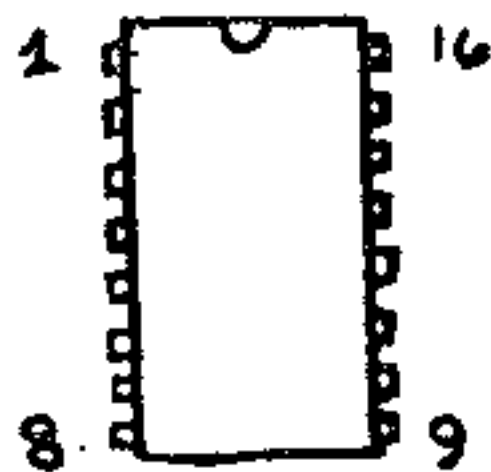
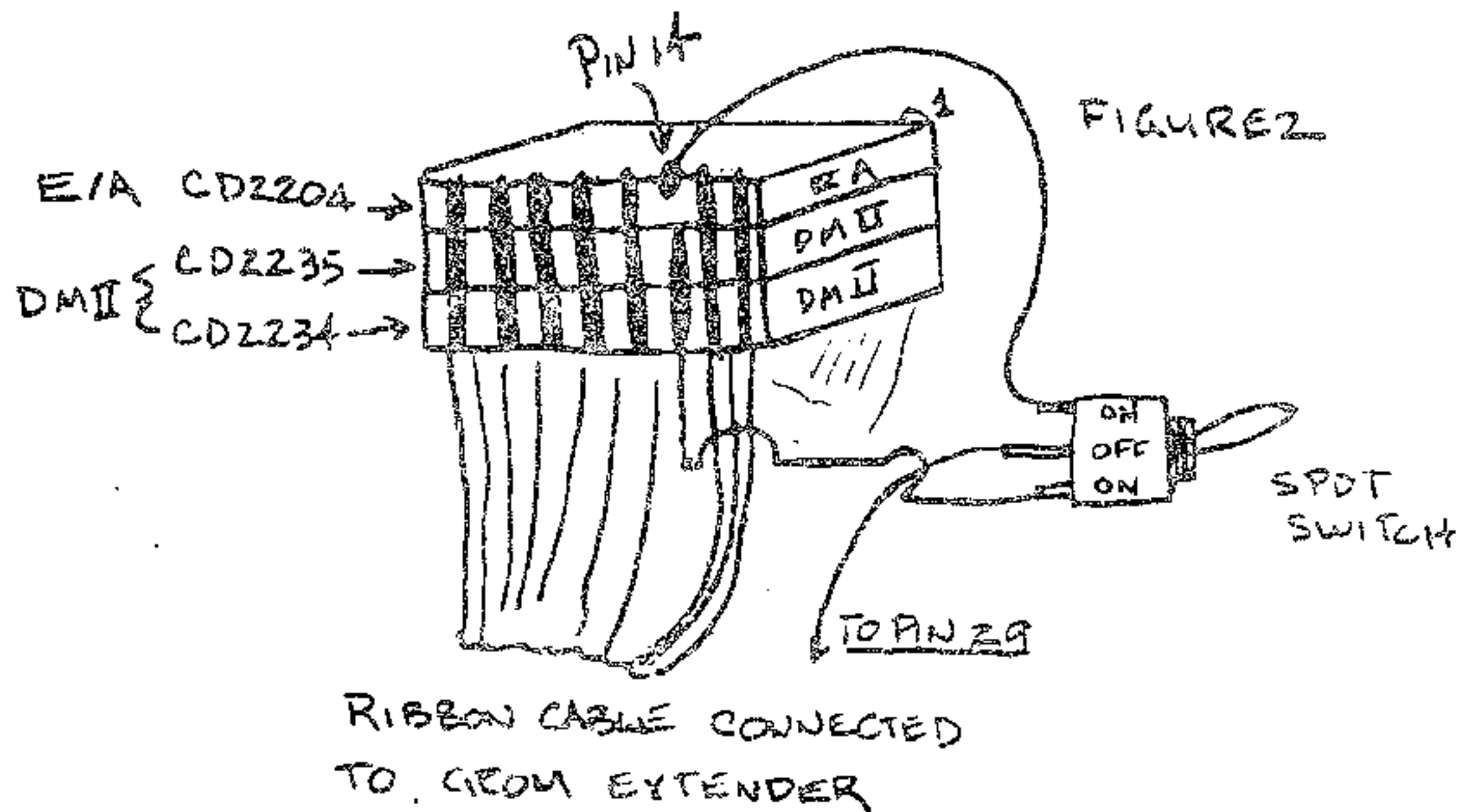


FIGURE 1
GROM CHIPPIN POSITIONS



13	6	134	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2
15	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1	

FIGURE 3
REAR VIEW OF GROM EXTENDER

Grom Extender	Grom Stack
3	1
5	2
7	3
9	4
11	5
13	6
15	7
17	8
19	9
21	10
23	11
25	12
27	13
29	14
31	15
33	16

Table A





TISHUG NEWS DIGEST

TECHNO TIME



Due to the enthusiastic response to the first 'Poormans Disk System' article in the September TND, all of the TI Disk Controller Cards have sold, and some Disk systems have already been constructed and are running. Some are still under construction and for these in particular I will supply further information on the improvements I have made to the design of the System which will now be referred to as the Mini-PE system.

If you do not have a disk controller card then there is no point starting this project until you can get one. Also the TISHUG Shop is still negotiating on the purchase of TI PE Boxes from the U.S. of A, and if that doesn't work perhaps I will eventually find enough time to complete design on my own controller card.

First here is the circuit of the Power supply used on the Mini-PE Board. It provides power to the 60 way sockets for the controller card and also a negative supply for cards that require it. The main board also uses +5 volt regulated for the pull-up resistors on some pins. These resistors are all 56 or 47 Ohm except one of 10K. There are 16 resistors all-up. This board has the 2 bridge rectifiers mounted flat on the PCB and even though these are rated at 6 amp they require heatsinking if used to supply more than one disk drive and this is not possible on this PCB unless the rectifiers are bolted to a heatsink or your box, with leads run from the PCB. Then you can run 2 drives. This is the limit of the regulators and transformer used. If you are making this system for a single disk drive (or 2 genuine half power drives) then construction is fairly simple with all parts mounting on the main PCB.

If you wish to run more than one drive then I recommend leaving out the power supply components altogether and constructing a separate power board. I have designed a Switch-mode Power Board which will supply up to 4 Amp with adequate cooling and this PCB is called the Power board MPE 3A, available from me. It uses a specially wound air-core inductor which I can supply, or you can make one yourself. The cost of parts for this is about \$20, however some parts are saved from the main PCB power components. If separate power is used then +5V must be connected to the

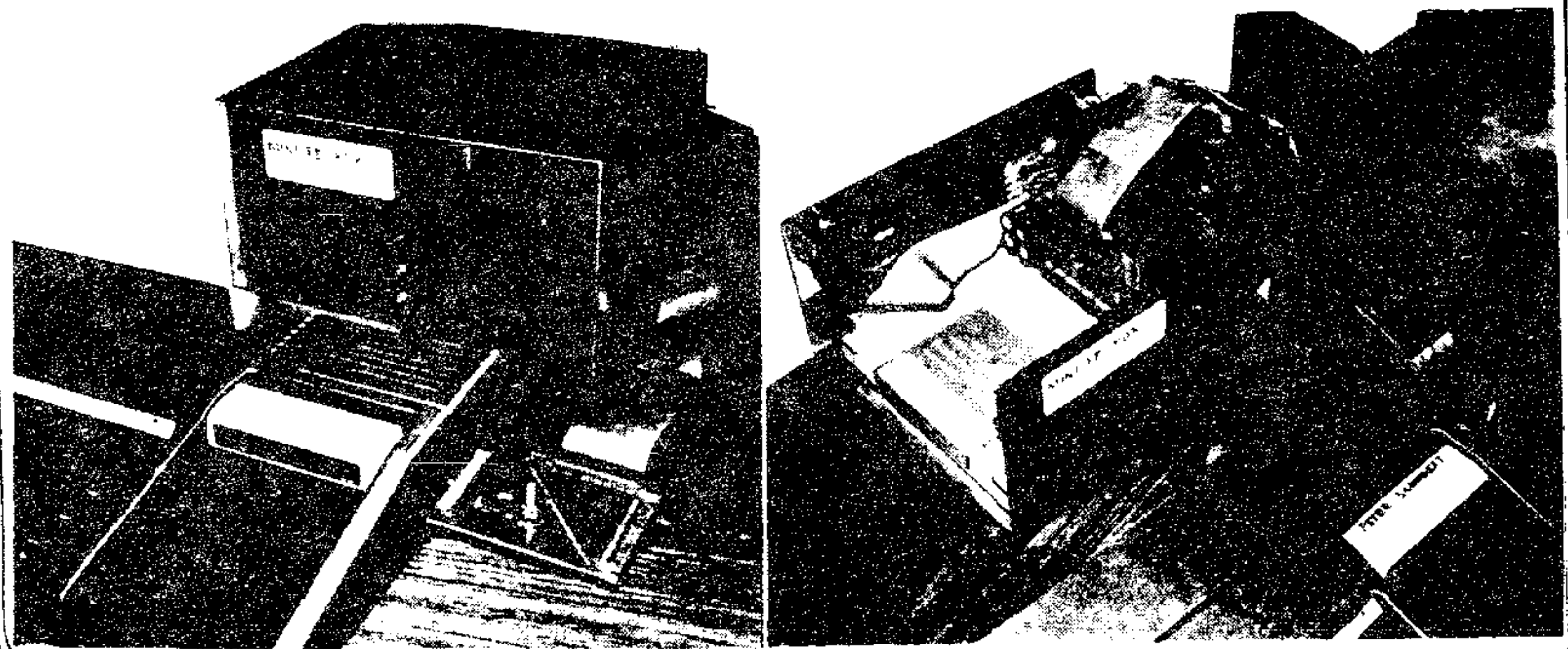
board for the pull-up resistors, and the unregulated voltages to supply the 60 way sockets.

The Mini-PE board mounts vertically so that the ribbon connector is at the top and the regulators at the bottom can bolt to the metal base or heatsink bracket. I used 12mm long brass spacers to mount the board to an aluminium plate which is bent at right angle to sit on the bottom of your box, and I mounted the regulators to this. The disk controller card sits flat almost on the bottom of the box when plugged into the bottom 60 way socket. I had to space mine up about 6mm so I used the screws that mount the rubber feet as they were just the right height to keep the card level. If a card is plugged into the second socket it will lay flat on top of the disk card.

A 40 way flex cable is used to connect to the console. On the PE box end it is plugged straight onto the edge connector. The console end can be connected to a 44 way connector by not using the end 4 pins (2 on each end) however pin 44 must be connected to the ribbon wire that would normally go to 39.

If you require a connection to other peripherals such as the speech or RS232/Modem box, etc, then you will need the special PC board I made titled MINI-PE BOARD/2. It has a 44 way to 44 way straight thru, and also a 40 way for the ribbon cable. If, however, any of you have a Parallax printer interface this too can be used to plug onto (see me for details).

The ribbon cable can be soldered to the boards at both ends if you wish, or you can use crimp-on 40 way connectors as I did, and plug onto the PC boards. Regarding the ribbon cable itself, it must be shielded in some way otherwise it will not work over a small length. I shielded it by wrapping in alfoil and then taping it with PVC tape to seal the foil on and protect it from damage. A short length of bare wire was inserted under the foil before taping it, and the end was connected to a ground pin (21,23,25 or 27 on console end. remember the 40 way starts from 3 and 4 and finishes on 41,42. Also the 40 way on the 3 way console PC board is inverted with odds on top and evens on bottom. This allows the same connectors on each end of ribbon both same way up. →





TISHUG NEWS DIGEST

The shielded ribbon will work to over 800 mm length although I advise to keep it as short as necessary for your layout. (I tested my cable successfully to just under one metre!!!)

PARTS SUPPLIES

- Power transformer 8V + 15V 2Amp
- MB1, MB2 bridge rectifier 6 Amps
- 2200 uF 25V x4 Electro. capacitor
- 470 uF 25V x2 Electro. cap.
- 1 uF 25V Tag x4 Tantalum cap.
- 7805 Regulator
- 7812 Regulator
- 40 way x0.1" connector x2
- 34 way x0.1" connector for disk drive
- 34 way IDC IDC connector for controller
- 300mm of 34 way ribbon cable
- 600mm of 40 way ribbon cable

These are all available from:
GEOFF WOOD ELECTRONICS
229 Burns Bay Rd
Lane Cove
(02) 427 1676

44 way x0.1" solder connector for Console I/O Port and the power plug for the disk drive (Utilux part 1-428424-1) is available from:

Connect Electronics
45 Dickson Ave
Artarmon.
437 6224

60 way connectors

These were made to size from readily available 100 way S100 type sockets by cutting them to fit, and cutting them the right length so that they just fit into the opening on the TI controller card so you won't have to worry about them sliding sideways. This can also be done with the 44 way if necessary.

The 3-WAY CONNECTOR BOARD

This board designated Mini PEB/2 is made with very fine spacing between conductors and about 130 thru-links that have to be soldered close to each other. As we don't have facilities for plated-thru holes this is a very difficult board to assemble, so I prefer to do these myself and supply them complete and tested for \$16, which includes all parts except the 44 way connector which must be supplied by you, unless you want the cut-to-size type connector for \$3. The parts for the Load-Interrupt switch are also included on this, but for easy postage I'll let you solder in the P.B. switch.

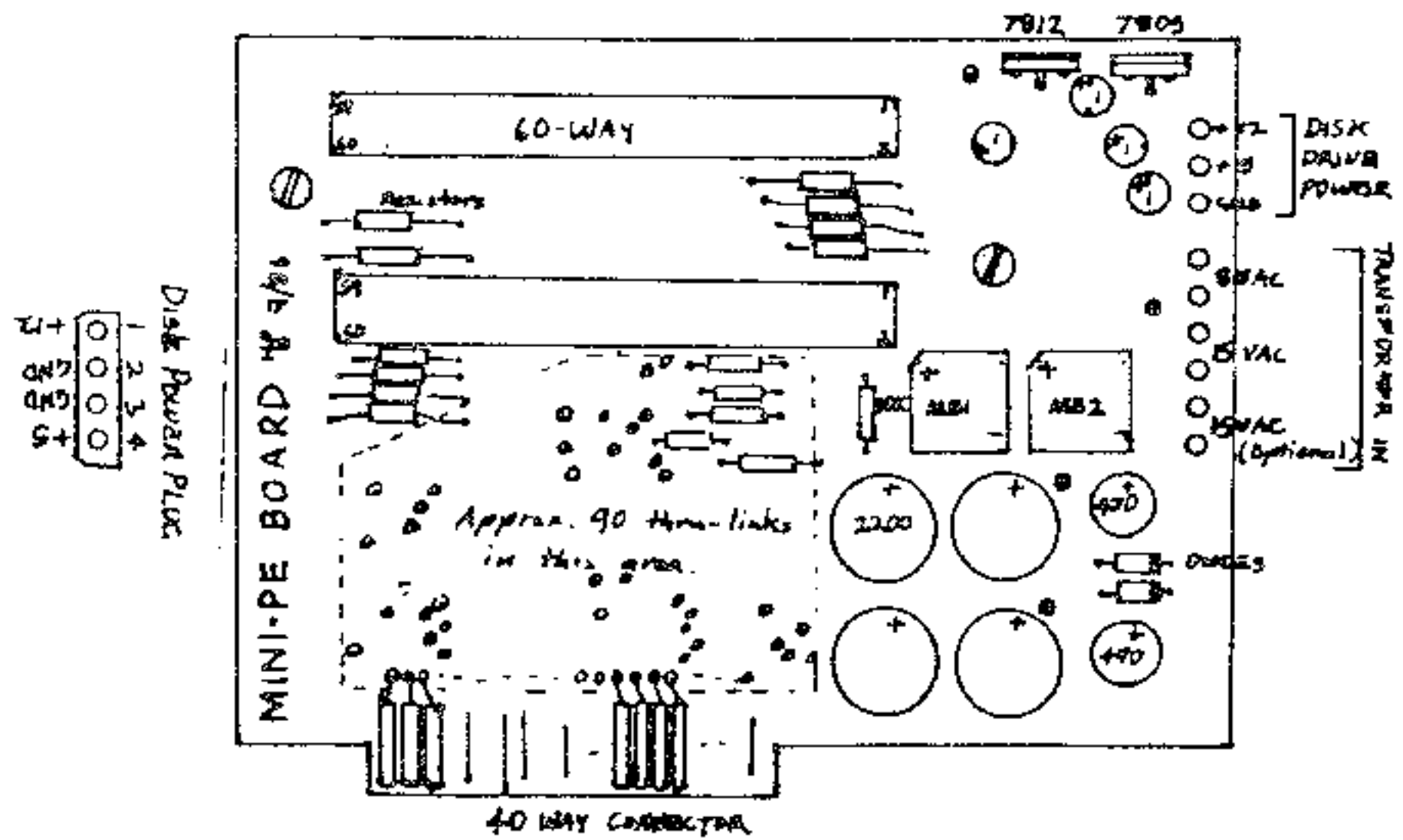
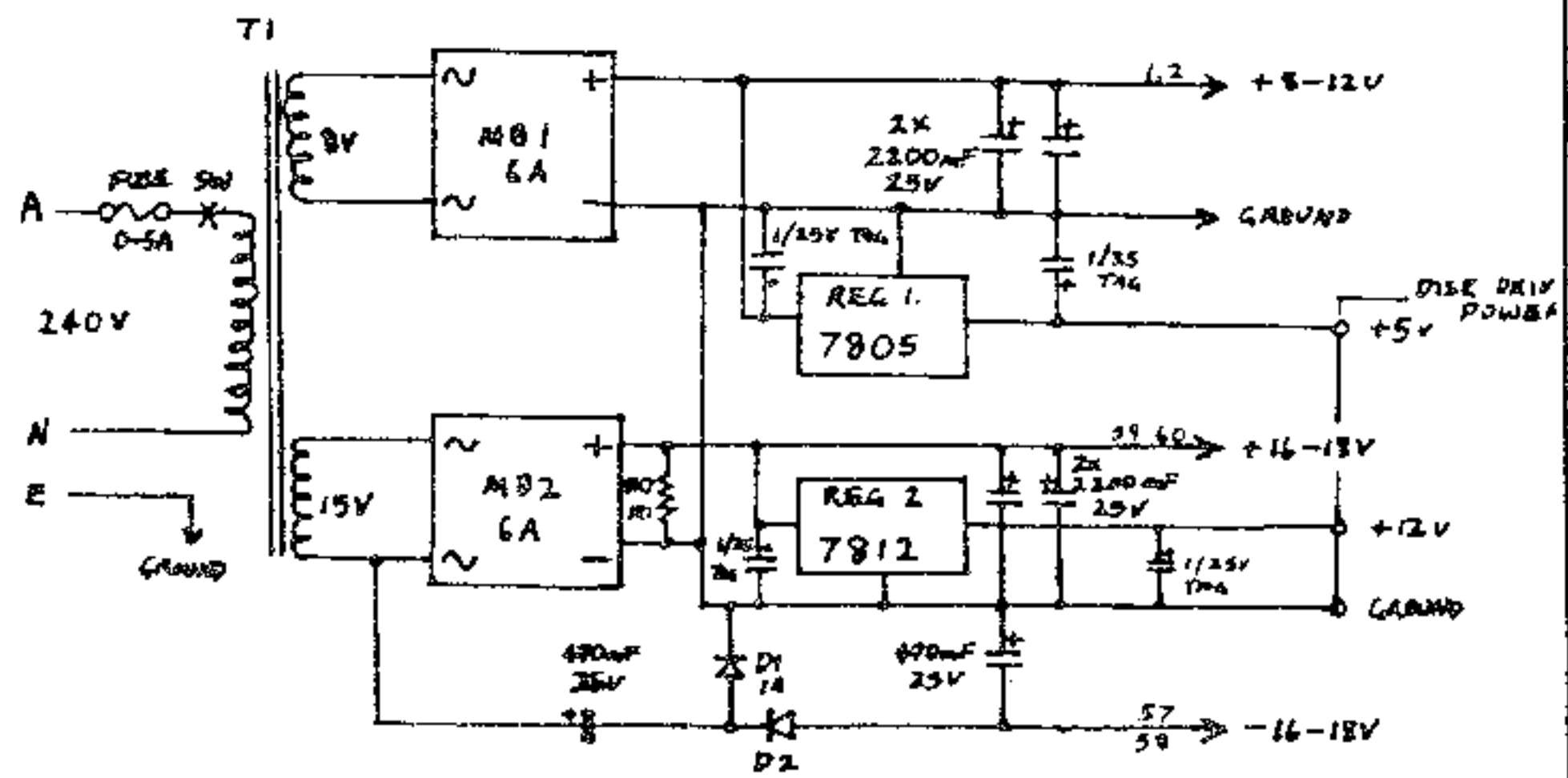
GENERAL CONSIDERATIONS

This constructional series of articles is intended for those with some experience in Electronic construction therefore I have omitted some of the basic details which apply to such projects. To include all the details would most likely fill this whole magazine, and that is not the purpose of the TND. If you do not have the experience then perhaps another member can assist you in their spare time, otherwise do not attempt this project. Also as this is 240V Mains powered, relevant safety codes must be followed such as a suitable 240V cord, plug, anchoring of cord, ON/OFF switch and Terminal Block with Earth connection, and most important of all the FUSE. This fuse is all the protection your disk controller card has so it is an important part.

The -16 volt supply will only deliver about 100mA and is intended for the RS232 card. If only disk cont. card is to be used the capacitors and diodes can be omitted. Note that the 4K7 resistor on the +16V output is necessary to protect the card from residual charge when it is plugged in. This was not provided for on the PCB so must be added by soldering across the 1uF TAG.

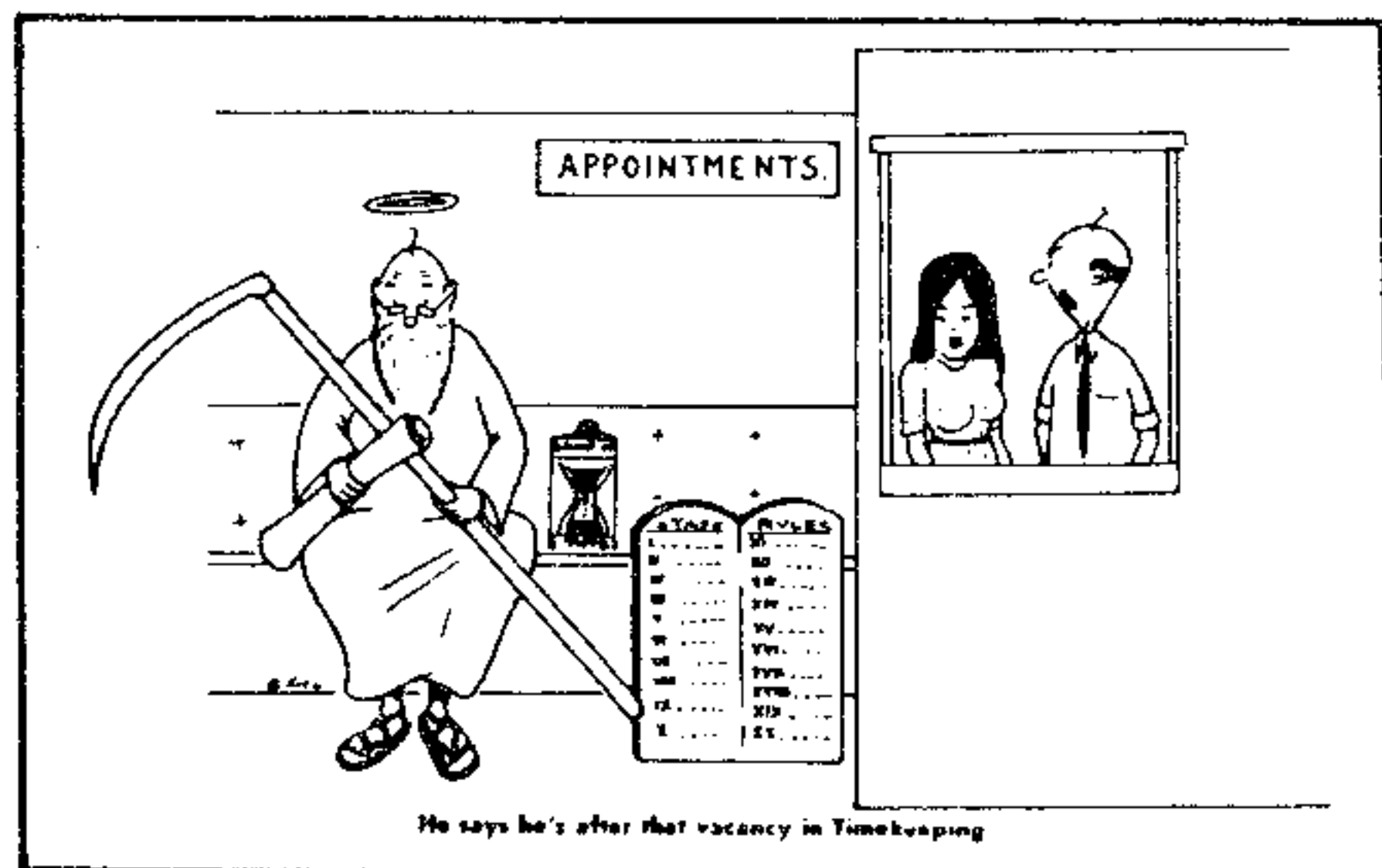
If you have a VHF modulator and your TV is close to the computer you will get a little interference to your screen unless you do as TI did and make your box in Iron sheet. Another important consideration is cooling and adequate ventilation is necessary otherwise the controller card will overheat. I left the back of my box open across the top about 25mm down from lid AND also drilled many holes in the bottom near the front to allow cross ventilation. Or you could install a small quiet fan in the back. DO NOT EVEN TEST THE UNIT IN A CLOSED BOX OR DAMAGE WILL RESULT. And on that dramatic note I conclude this article.

POWER SUPPLY MINI PE BOX

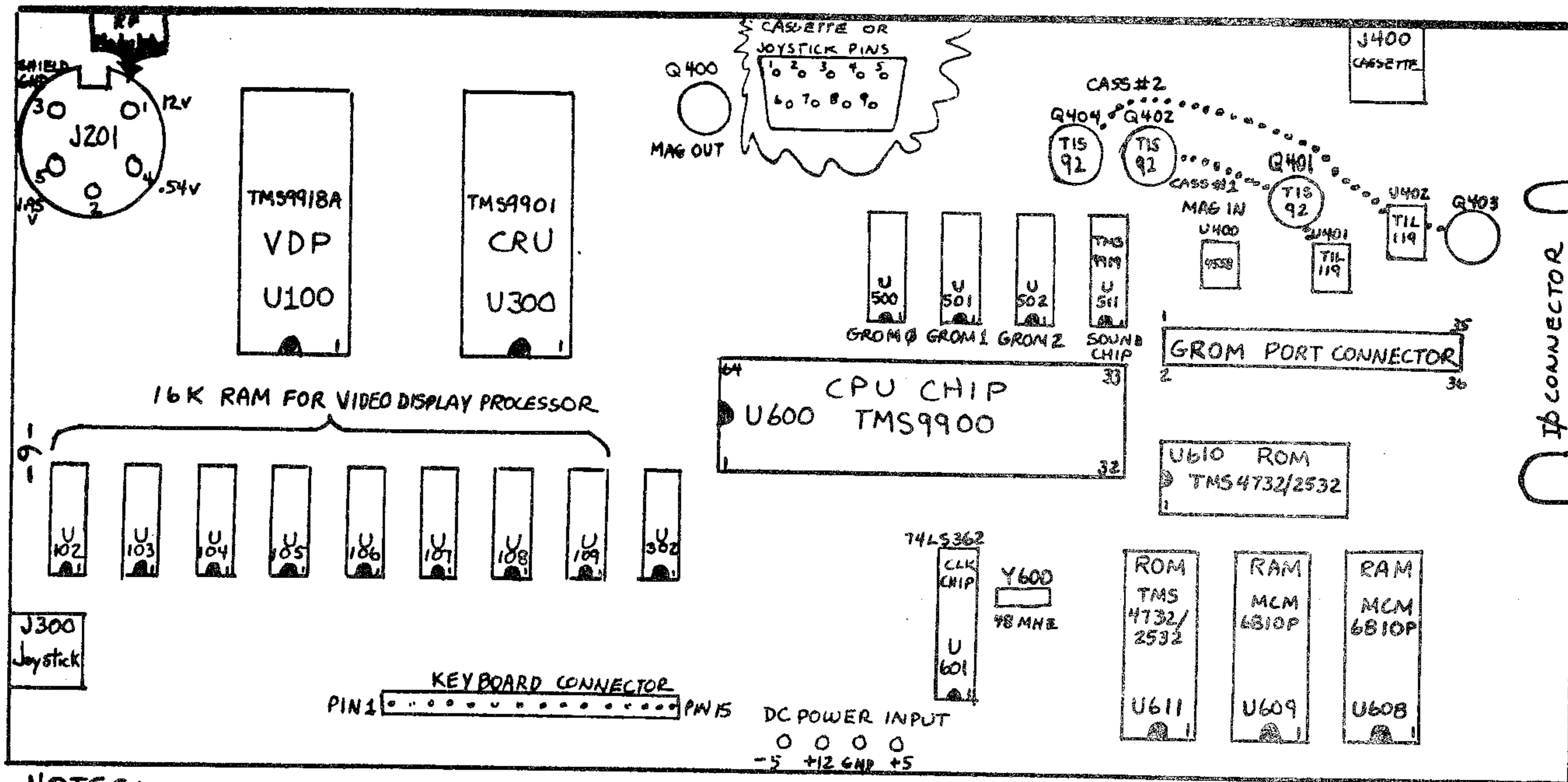


By Peter Schubert

FOOTNOTE: A late message comes to hand from Bernie Elsner in WA who says he still has 2 or 3 disk controller cards and will send them to me so if you need one give me a call.



GENERAL COMPONENT LAYOUT ON TI 99/4A



NOTES:

I'VE MADE THIS LAYOUT, USING BOTH SAM'S PHOTO-FACTS, AND THE SCHEMATICS THAT I BOUGHT FROM T.I.. THIS IS BY ALL MEANS NOT THE ENTIRE PICTURE OF THE 99/4A, BUT IF YOU HAVE A SLIGHT FAMILIARITY WITH ELECTRONICS, AND SOME EQUIPMENT, AS WELL AS ACCESS TO SOME OF THE CHIPS OR OTHER COMPONENTS, YOU JUST MIGHT BE ABLE TO TRACK DOWN A PROBLEM WITH YOUR CONSOLE, AND SAVE YOURSELF NEARLY \$40.. I HAVE FIXED 8 CONSOLES IN THE LAST 5 MONTHS, AND JUST AS A POSSIBLE AID, I'LL GIVE YOU THE COMPLAINT, AND THE FIX. NO VIDEO, OR A LOT OF SNOW WITH WEAK SIGNAL = DEFECTIVE RF MODULATOR (OR BROKEN WIRES). BLACK SCREEN WITH LOUD NOISE = ANY OF THE GROMS PARTICULARLY GROM 1, OR A DEFECTIVE CARTRIDGE. TITLE SCREEN BROKEN OR PROGRAM OPERATES STRANGELY = NEARLY ALL OF THE ABOVE CONDITIONS CAN BE CAUSED BY A DEFECTIVE VDP CHIP OR THE 8 RAM CHIPS. I'VE ALSO HAD THE CONSOLE WORK FINE, BUT WHEN HOOKED UP TO A PEB, PROBLEMS WITH SYSTEM HANGING OCCURRED BECAUSE OF A DEFECTIVE I/O PORT TRANSCEIVER CHIP. YES THERE IS A LOT TO TROUBLESHOOTING A CONSOLE, AND THIS IS MADE MORE DIFFICULT BY THE FACT THAT TI DID NOT SOCKET ALL OF THE MAJOR CHIPS. IF IT IS NOT THE VDP, THE 3 GROM CHIPS, THE SOUND CHIP, AND SOMETIMES THE CLOCK CHIP, WHICH ARE THE MOST COMMONLY SOCKETED CHIPS, YOU MAY WISH TO HAVE AN EXPERT FIX YOUR MACHINE.

GOOD LUCK! JOHN F. WILLFORTH

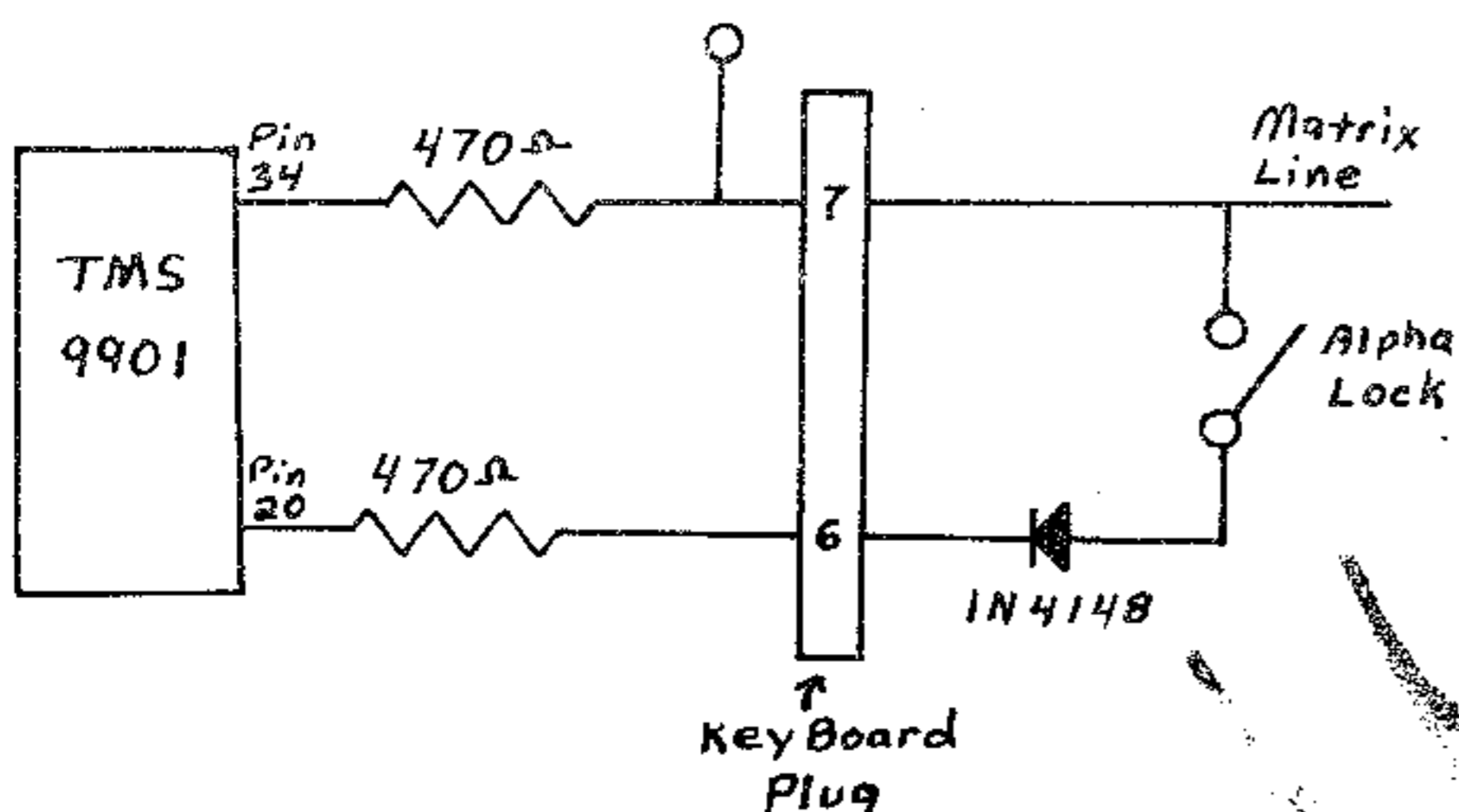
32K Memory.....cont. from page 8

If you are successful to this point then you are really flying. These chips give off almost no heat! At this point, you could use some double sided tape and put it under the memory unit or you can think up your own method of attachment.

Finally, re-assemble the console.

PARTS LIST:

- | | |
|--|---------------|
| Description: | Radio Shack # |
| 1 4-pos DIP switch | 275-1304A |
| 1 5 feet 25 ribbon cable | 278-772 |
| 1 Connector 6 pin male | 274-226 |
| 1 Connector 6 pin female | 274-236 |
| 1 Dual component perfboard | 276-148 |
| 1 IC socket (28 pin) | 276-1997 |
| 4 6264LP-15 (8K Static RAM | ----- |
| Electrical tape, solder (resin core), and tools. | |

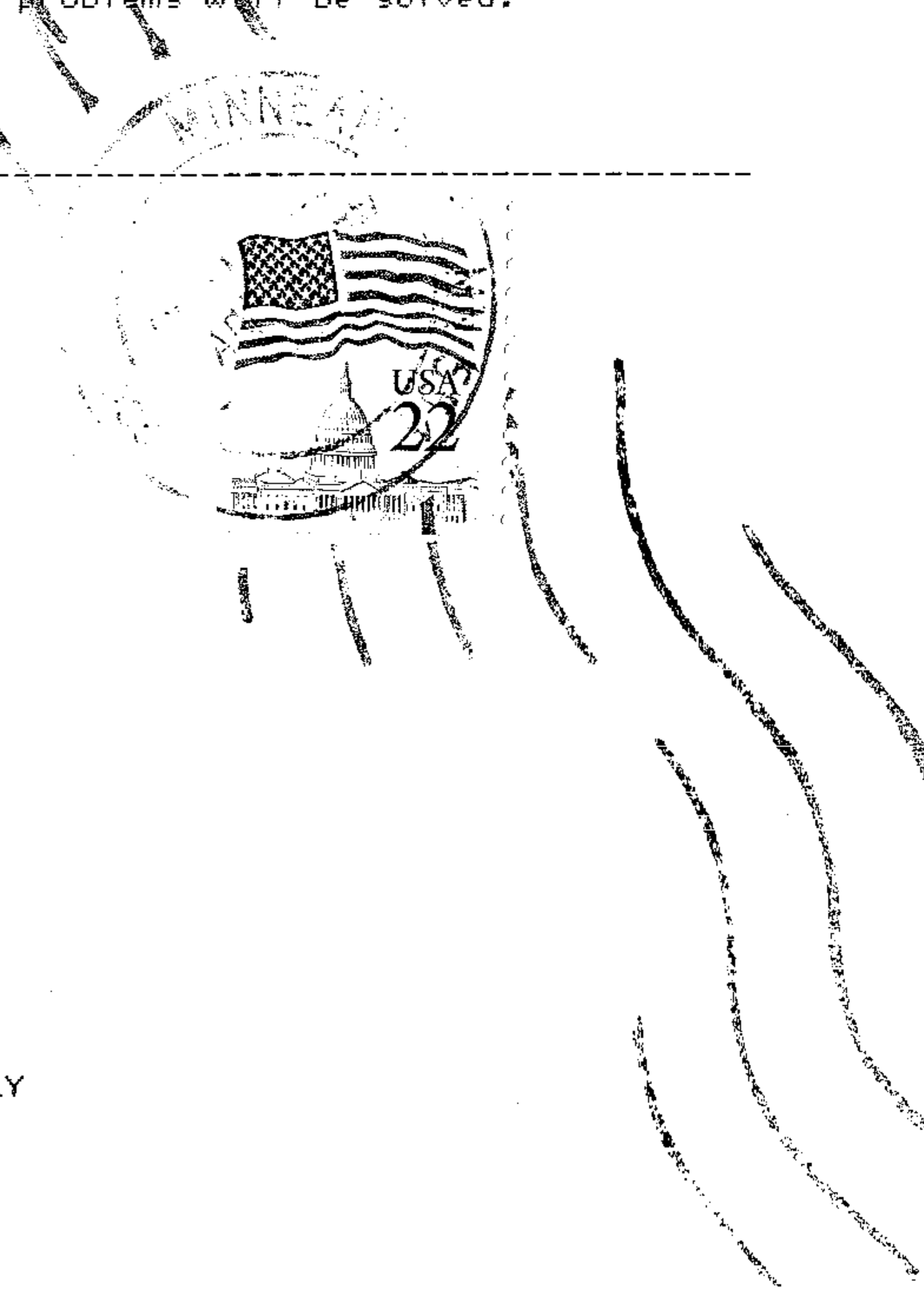


ALPHA LOCK FIX

Are you tired of switching over to the joysticks only to find that you cannot move upwards. How many times have you "died" at the start of a game because of it. The problem is of course that the Alpha Lock button is depressed. You must either release it or follow the steps outlined below and never be bothered by this again.

This fix requires the addition of a 1N4148 diode to the computers main PC board so all of the standard precautions apply. It requires that you break the trace (the foil line through which current flows) on the board and insert the diode across the break. If you have never worked with a diode before, let me warn you that you must take particular notice to the polarity of the device. A diode is designed to pass current only in one direction. This is towards the point of the triangle in the circuit schematic (called the anode). The line or cathode correspond to the line on the device itself so this should not be a problem for you. Simply insert the diode into the circuit and your problems will be solved.

MSP 99 Users Group
P.O.Box 12351
St. Paul, MN 55112



TIME SENSITIVE MATERIAL
POSTMASTER - PLEASE DELIVER PROMPTLY