GLOBAL NEWS

THE SWAP NEWSLETTER FOR THE WHOLE EARTH
Vol. 1, No. 2   April 5, 1976

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From the Editors Desk

First, we do not, despite what it may seem, plan to make the newsletter a semiannual operation. The delay has been mainly due to the fact that your editor has also been working on, among other things, the PDS and cassette software. I hope that the newsletter will become a monthly feature. With your help we should be able to make this newsletter a great help to you, the user. In the next issues, we have all sorts of goodies other users have contributed, such as hardware fixes for the CRT and keyboard, games, and other gems of wisdom. In order to get the newsletter out faster, we plan to skip typesetting, which added 2 weeks to the last letter. We also plan to ship first class, unless we have manual updates to send out along with the newsletter. This should help speed things up slightly.

Next month, will bring you a set of users and Sphere generated hardware changes to fix any problem you may have such as the white static on the CRT, or implementing invisible refresh. Also included will be some programming examples and an explanation of interrupt handling. We will also attempt to publish more letters to the editor and have an expanded Q & A section. By becoming a full time editor and with good user input I think that we can make this newsletter live up to your expectations.

Sincerely,

Eric Jameson
Newsletter Editor

Dear Sphere Users:

May I take this opportunity to share some thoughts with you. At a recent board of Directors meeting, the comment was made that our real product is a satisfied customer. A satisfied customer is one who received his unit in a timely manner and with adequate documentation to make it work.

Our assembled - tested units leave here only after a week's burnin time. Once in a while a customer calls up and says his unit isn't working upon arrival. Upon inspection it is found that the bus cabling interconnections have come off in transit. Shipping damage appears excessive in some cases. Be sure to take the back cover off and inspect the plugs and CRT for damage before releasing your shipper. We have tried to improve the packing, but there is a limit to protection from the "Gorilla's feet".

We have contracted an outside company to redraw our schematics and are working on a trouble shooting manual that shows typical waveforms at selected points in the schematic. These endeavors take time, but we will improve the documentation. You first pioneers have had the toughest course and should be justly proud when you get a complete computer system running from kit form. That isn't a Heath Kit TV or a plastic model of the Starship Enterprise that you built. It was a REAL COMPUTER SYSTEM .

We extend our congratulations to Anthony Perry for his Mnemonic Assembler. It was selected as the winning software entry. He will be receiving a 4k Mem board for this entry to the SWAP users group. Runner up was Dick Mason's "Game of Life", for which he will receive a $25. gift certificate. All programs submitted will be listed in the next months issue, and are available for a small handling fee. Lets keep communicating!!

Monroe Tyler
President
Sphere Corporation

The Move is On !!!

In the beginning there was a living room with a telephone and desk then came the office which was adjoined by a small production area. Ranks of Sphere employees grew to a point where we had people sandwiched into the production area. We were out of Room !! So the next addition was an adjacent storage bay and now again the move is on ! Sphere Corporations national headquarters and state side manufacturing facility is located at 940 North 400 East in North Salt Lake, Utah . Less than two miles from the earlier location the new factory provides 8000 sq.feet of office and manufacturing space. Without exception all of our employees, (which now number more than twenty) are relieved and happily relocated, due to the increased elbow room made available.

The move (as usually happens) caused us to change stride in mid-stream and forced delays to some of you to whom we are sorry, but we are back into high volume production and pushing towards speedy delivery for your Sphere Computer. As a result of the move, the happiest person at Sphere has been our Production Manager, Dan Koford, who reports that he now has room to spread out his voluminous materials inventory and that the space allowed a bigger burn in area for assembled units. The kit pulling team finally has enough room to lay out entire modules of the computer and pull parts in a swift and efficient system recently set up by our resident gnome Newell Kimball. We have programmed the kit operation to avoid any potential part deficiency by packaging each computer module on a separate sheet of styrofoam. Every part that is included on the CRT Board for example is numbered on the background piece of paper and then the IC is inserted. The result is an accurate supply of components for your computer.

Increasing sales of Assembled Sphere Computers forced an increase in assembly and testing staff. Thanks to the new building, we had ample room to speed production. All in all, everyone is relieved and finally settled down into their working space.

Thanks to our users, sales continue at a steady pace on the uphill climb and before long, all of our new space will be filled and then we "Move On".

New Management

Sphere Corporation, manufacturer and distributor of fine Micro Computer Systems announces the resignation of Michael D. Wise as President, and as a member of the Board of Directors.

We are very proud and pleased to announce Monroe C. Tyler as the President of Sphere Corporation. He was one of the original incorporators. Mr. Tyler has an appropriate background receiving his Masters Degree in Computer Design from University of Southern California in 1968. He was privileged to attend USC under a Hughes fellowship. Monroe has been responsible for the design and development of the Sphere System 1,2,3 & 4.

Sphere Corporations product direction will be to continue refinement of the System 310 thru 340 (the former System 1-4).

With Mr. Tyler at the helm, Sphere Corporation is beginning the acquisition and development of Business applications starting with the new System 500 series (a larger version of the System 4 with a 80x25 character display), which will be marketed in the Small Business Environment.

Filling the position of Executive Vice President, Douglas S. Hancey will provide valuable management support Mr. Tyler. Doug has been responsible for Sphere Marketing and will be assisted by Randall L. Waters, recently named to the newly created position of Marketing Manager.

Under this amiable team, Sphere Corporation plans to aggressively market their products to the Non-professional user market and the Small Business Environment.

Douglas S. Hancey
Chairman, Board of Directors

SPHERE FEATURED

An article describing the joys and tribulations of building a Sphere computer is to be found in the current issue of the P.C.C. Newsletter. Another article of this type will also appear in the May issue of the SCCS Interface. The July issue of Better Homes & Gardens will have a feature story about a fully automated house. The computer used is, of course, a Sphere.

Keyboards

We have some good news about the keyboards. We are switching to a new, ultra reliable single moulded unit keyboard.

We received the new keyswitches from the old manufacturer and found them to be of no better quality (if not worse) in our systems than the existing keyswitches. Because of this, we decided to redesign the keyboard and switch to a different manufacture. The new keyboard comes as a moulded phenolic frame with the keyswitches as part of the frame. The optional cursor and numeric keypad are separate frames, with all frames fitting on a printed circuit board. The metal housing has also been changed to fit the different key layout so part of the base would also need to be changed to upgrade to the new system.

The new keyboard is much more reliable than the old, with a proven field record of nearly perfect operation. It is the same quality as those found on systems produced by the large mainframe computer companies. The keyboard supports both upper and lower case characters and control characters.

Because of long lead times on delivery of the cursor control and numeric keypads, the units shipped for the next 3 to 5 months will contain the keyboard only. To upgrade to the numeric and cursor control keypad will mean a switch to another new P.C. board and keyboard cabinet.

The 32 character CRT display will display all lower case characters as numeric and special characters instead of upper case, so an 'a' would display as an 'I'.

To eliminate this problem, an extra circuit was added so the keyboard can be strapped so that lower case characters will generate as upper case. The lower case option would be used mainly with the 80 character display, which handles both upper and lower case characters. It should be noted that the upper case only strap will cause the '@', ' $\wedge$ ', and '\' to shift so the shift key must be pressed to generate these characters.

Interconnection to the CPU board is now made by use of a single cable going to the PIA on the CPU instead of 4 cables going to a keyboard PIA as on the older keyboards. It uses the 'A' port on the CPU PIA. The CPU PIA will now be a standard feature. There will be a refund for those users who ordered the 16D option on the CPU board and who have the new keyboard. Please let us know if you want a cash refund or wish to use the money for the purchase of other equipment.

New EPROMs are needed to use the new keyboard. For details see the article on software changes. If a current keyboard user wishes to upgrade to a new keyboard, he may do so by buying a new keyboard and a new mounting rack at a discount. The cost for a new keyboard, metal keyboard cover, and sockets for mounting the PIA from the KBD/1 on the CPU. If a user already has a 16D option, he may send in the extra PIA for a discount of $20.00, giving an upgrade price of $80.00. Remember, that the EPROMs must also be changed. On an EPROM upgrade, if a deposit of $75 is made and the old PROMs are not sent in within 30 days, the deposit will be treated as a purchase price for new PROMs This may be desirable if the user wishes to use the old keyboard in the future and have a PROM set for each keyboard.

We still have a few old switches left so if you have failing switches send in your bad switches with $5.00 handling fee and we will send out new switches. Do not send back every key on your keyboard, as the replacements are no better quality and we do not have enough keyswitches.

As the first of the new keyboards do not have the cursor control switches, the corresponding control characters must be used. The control characters are Cntl L for HOME; Cntl R to move the cursor to the right; Cntl S to move down; Cntl T to move to the left; Cntl Q to move it up one line and Cntl DELETE to move it to the left side of the screen.

Reset on the new keyboard has also been changed so that the reset keys are the upper right and lower left keys (depressed togeather).

Parts Replacement

We would like to again state our policy on replacing bad parts, as described in the last newsletter. All parts that are bad upon receipt, will be replaced when sent back accompanied by a $5.00 handling fee. This handling fee should be included in every parts transaction with the company except where an item (such as a text book or software listing) is listed as a separately priced item. This fee is merely to cover the overhead of picking and mailing parts, an item noted for wrecking regular production work. Your compliance with paying this charge is greatly appreciated. Also, please send the bad chips back, as in some cases we can get credit from the manufacturer for them.

New Software

Besides getting BASIC ready for delivery, we have developed new software to go on the EPROMs. The EPROM that goes with the SIM board has been finished and sent out. This PROM contains routines to read and dump named blocks to and from the cassette and to do error checking on each block. Blocks can be any length from 2 bytes to 65,000 bytes and each block has a 2 byte name for reference. The final PROM for the SIM board is labeled Sys 2N SIM E3. An earlier PROM, Sys 2A, or PDS Sys 2A, was also sent out.

Both proms are programmed the same way, except that the Sys 2N version records a slightly different trailer and has a NOPRINT flag. The Sys 2A PROM can be upgraded to a Sys 2N when the PROMs on the CPU are changed. Several PROMs with a label starting with FDS were sent out. These proms were improperly programmed and should be sent back (free of charge) for replacement.

A new set of PROMs have been made for the PDS using the new keyboard, labeled PDS-V3N. Besides running the new keyboard, it has changes in it to clear up the original design features that were found to be poor. Specifically, insert and delete are now done at the top of the screen. A new command, Ctrl R, has been added to the executive to allow for re-editing of source text. The debugger has been changed so that the break-point return address is calculated when a breakpoint is encountered instead of when a "E" command is used to exit back to the users program from a breakpoint. The debugger commands (except change, '+' and '-') have been changed to work with the control key, so an 'R' command would now be a 'Ctrl R'. This is to keep the user from executing a command accidently. Two new commands, '↑J' to perform a JSR to a user subroutine, and '↑X' to exit back to the monitor, have also been added. The 'Change' command was changed so that the next location will open automatically when a byte is changed. The V3N proms will also work with the old keyboard if the V3D prom is used in E6.

A new set of CPU proms, known as Sys 2N, is being developed to accompany the SIM prom. The assembler is being deleted and put on cassette tape. This will allow commands such as ' LXX' (load block XX from cassette) and ' SXX' (save block XX) to be put on the EPROMs. These new commands will greatly ease using the cassettes. These proms will be ready for delivery around the end of April.

To update your proms to the new prom set, send back your old proms with the standard $5.00 handling fee, specifying which prom set you want. If you can't go without your proms for even a few days, send in $75 deposit and we will send out the new EPROMs. When the old proms are sent back in, $65 will be refunded. (the extra $5.00 is for finance handling) Please specify on your check or order that it is for deposit on updating to the new EPROMs.

WE NEED YOU!!

Everyday the telephone rings with people inquiring about the Sphere product line of computers. Most asked questions about the computer include whats inside the box, how does it operate, what do I get for $$$ and finally, I want to Buy a Sphere Computer, but would like to see it in operation. As a result, Sphere Distribution outlets emerged, retail outlets which carry the entire product line for over-the-counter purchase.

But alas, we can't open a distributor location in every city at least not overnight, so we need Sphere users, regardless of where you live, who can demonstrate their Sphere Computer to prospective users.

If you wouldn't mind someone calling you up to make an appointment to meet with you and see your computer, WE WANT YOU !!!

Please drop us a note and make it attention of Doug Hancey and we will place you on a list, then you'll be able to start showing off your system.

Also, if you would like your name published in the newsletter so other users can contact you, drop a note to Eric Jameson.

Thanks

SOFTWARE SUBMISSIONS

Any submissions to the SWAP users group should be made using the program submittal form found in the back of the manual and should contain both a Motorola Assembly Language source listing (so we can put it on our S340) and an object listing – preferabily both mini-assembler and an absolute hex listing.

SIM Boards Shipped

After a long wait during which the SIM (formerly the COM/CAS) board underwent a complete redesign, the first boards were shipped in late February. We feel that it was well worth the wait. The new board is superior to the old, in that it conforms to the Byte/Kansas City standard for cassette recording and has 2 ACIAs, allowing for 2 devices (one of which is a cassette) to be operated at the same time. It also has an EPROM containing drivers for the ACIAs.

The drivers load and dump named blocks of data to the cassettes. The routines initialize an ACIA for cassette I/0 and then call the read block or write block routine. A cassette block consists of a header containing the block name and block length, the data taken from a buffer area in memory and the trailer, which contains the checksum. The routines can be used with any of the PROM sets, though only the Sys 2N (or Sys 2D) PROM set was specifically designed to work with the cassettes. If the V3A PROMS are used instead of the V3N then a 6 byte bootstrap routine must be used to access the driver subroutines, as the V3A debugger does not have a J (JSR) command. Data from the cassette is normally loaded in starting at 200 (hex). Reset on the Sys 2N PROMS will automatically set BFRPTR to this value.

The character I/0 routines can also be used for a TTY or modem as well as a cassette. The only difference is that the ACIA initialization value must be changed. The ACIA is normally initialized to transmit 8 data bits followed by 2 stop bits. If the TTY to be used has a different format, the initialization code must be looked up in the tables given with the ACIA chip discription (part of the manual updates to go out with the next newsletter).

There have been several E.O.'s on the SIM board. Users who received some of the first boards may wish to change their boards to improve the reliability. The changes are as follows:

Change R2 & R49 from 120K to 33K. Any value between 120K and 33K will work.

Change R22 & R65 from 22K to 33K. This change improves sine wave synthesis.

Change R34 & R81 from 10K to 20K and change R20 & R63 from 50K trimmers to 20K trimmers. This allows for easier adjustment of the potentiometer for use in tuning in the proper cassette signal.

Sim boards will normally be sent out with the 2 cassette configuration unless otherwise specified. Assembled boards with multiple options will also be assembled strapped for the cassette unless otherwise specified.

Software Listings

Every person who bought the PDS V3A listings should have received them by now except for the 2 whose names we can't decipher. If you have not received yours yet, contact Eric Jameson for the listings.

We apologize for the delay in shipping them out. This was caused by the fact that the original coding sheets would not copy so everything had to be reentered onto the disk system during spare moments.

Software listings will be included free of charge on all future shipments. Current users can receive free copies of software listings by sending in a written request for specific listings.

BASIC Loader Update

Because BASIC is on tape as 16 consecutively named blocks, you must read in a bootstrap loader program to read in BASIC. Descriptions of how to use the loader are sent out with the cassette tapes. However, these instructions assume the use of cassette drive #1. To use drive #2, the loader program should be loaded (thats the block named $M) into memory and then the contents of location 4C2D should be changed from FE to CE. You can then jump to the loader at location 4E00.

Q? & A

Q. What is the status on the light pen and the plastic cabinet with the acoustic coupler?

A. Because of a backlog in R&D, these two products have been officially dropped. All effort is going into work on the new 80 char/line display and graphics units. The plastic cabinet/acoustic coupler are completely gone. There are no plans to make an acoustic coupler anytime this year. The light pen has been put on indefinite hold, meaning there is a slight possibility that it will eventually be completed. Anyone who has ordered one of these products can write in and get a total refund on these parts. We are sorry that we have kept you hanging on this for so long, but it was only after the change in management that it was decided to drop these projects and concentrate on more immediate tasks.

Q. What is the cost of upgrading the one-card computer?

A. Those who have received their One Card Computer (shipments of which started in December) may do so by buying other components of the system, such as the cabinet, cabinet base, keyboard, interconnect cables etc. The only difference between the One-Card computer and the CPU 2 card is that the One-Card computer uses port B of the PIA for a teletype and that it lacks 2 PROMs. The PROMs may be upgraded by sending back the 2 old PROMs and $60.00 (to cover the cost of the 2 extra EPROMs and sockets). A set of V3N PROMs will then be sent out along with the sockets.

Q. When will I get my BASIC?

A. We have just received 75 tapes back from duplication which contain release 1 version 1 of BASIC and a bootstrap loader for loading in BASIC (it is on tape as 16 1K byte blocks). One side of the tape has BASIC for the new keyboard and the other side has BASIC for the old keyboard. One tape will be sent free upon request to all System 3 and System 4 users. System 2 users who have acquired extra memory can also get BASIC by paying the standard copying charge of $10.00/tape plus the standard handling charge of $5.00/order. System 3 users can also buy extra tapes for the copying fee of $10.00/tape.

The 1K EPROM based Micro-Basic has been dropped. Refunds will be made upon request. It is not possible to get enough into 1K to make a Micro-Basic worthwhile. In effect, your computer would have been turned into a programmable calculator that could add, subtract, multiply and divide and nothing else. We felt that it was not worth it when you can buy a 4 function calculator for $8.95 that will do nearly the same thing.

Now that Release 1 of BASIC is out, Software is developing an entirely new disk operating system which will offer many advantages over the current FDOS. Work is also being done to revise BASIC in order to improve its performance and to extend its features. A version of Extended BASIC should be ready sometime in July. While revising BASIC we will, if possible, attempt to create a 4K version of BASIC.

We are putting together another tape that will contain some games, and expanded assembler and possibly the next version of BASIC, if any bugs are found in the current version. There will be more on this tape in the next newsletter.
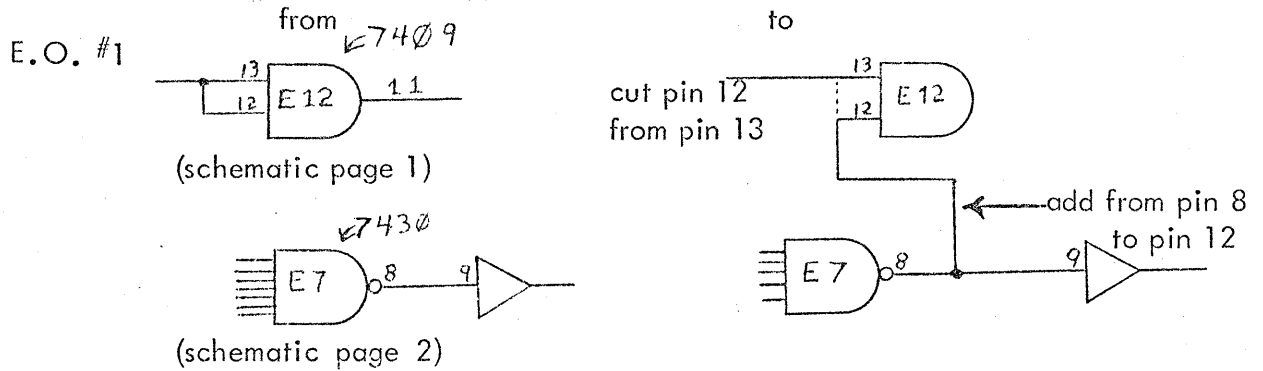
Because of the way the current release of BASIC was developed, we can not supply any source listings and therefore must cancel all orders for BASIC source listing. It is improbable that a source will become available in the future, at least for the larger systems.

We do hope to have higher level languages running on 4K systems sometime this year, but we can't say exactly when. Keep posted to the Newsletter for more details on future developments.
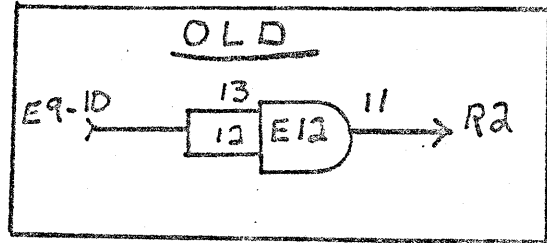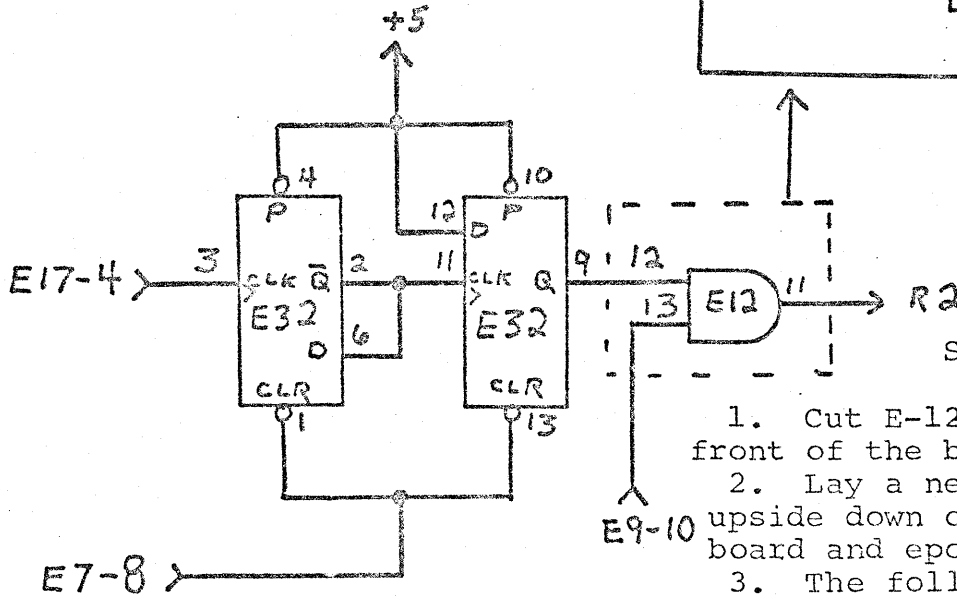
Q. What type of cassette recorder should I buy?

A. Any cheap audio cassette should work. The SIM board only requires that the tape recorder has an automatic volume control and is designed to work with a tape speed variation of $\pm 30\%$. The only requirement is that you use absolutely the highest quality tape you can find. Please note that you can buy a cassette recorder from Sphere for only $50.00. This recorder also includes the cables to interconnect the recorder and the SIM board. When ordering please specify whether you want the interconnect cable for Cas 1 or Cas 2.

Q. When will the editor and assembler that I ordered be sent?

A. The teletype based editor and the Motorola assembler have not yet been converted from the disk system. The editor and assembler are to be revised when the new disk operating system is out and at this time they will be converted to the SYS2 tape system.

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ENGINEERING ORDERS

CRT/1 (CRT MODULE) The following 2 fixes reduce the white lines that are displayed whenever the CPU accesses the buffer memory. The second fix requires the addition of a new chip to the CRT board. Another user submitted fix for the same problem will appear in the next newsletter.
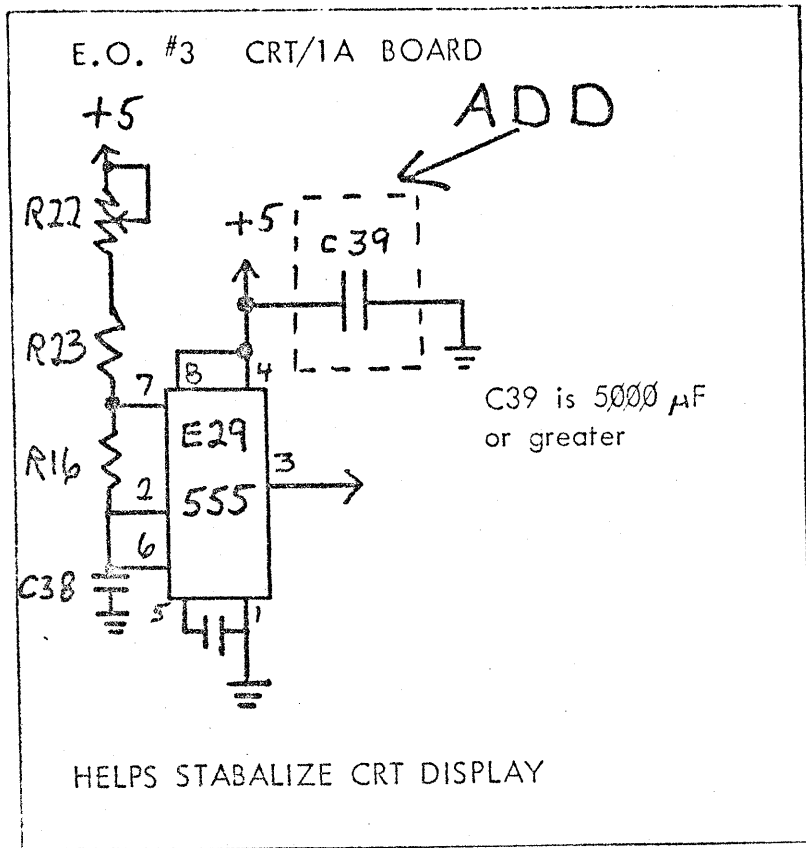
E.O. #1

from

(schematic page 1)

to

cut pin 12
from pin 13

add from pin 8
to pin 12

(schematic page 2)

or   E.O. #2

NEW

OLD

STEPS TO BE TAKEN

1. Cut E-12-12 from E-12-13 on the front of the board
2. Lay a new 14 pin IC part #7474 upside down on the front of the board and epoxy in place.
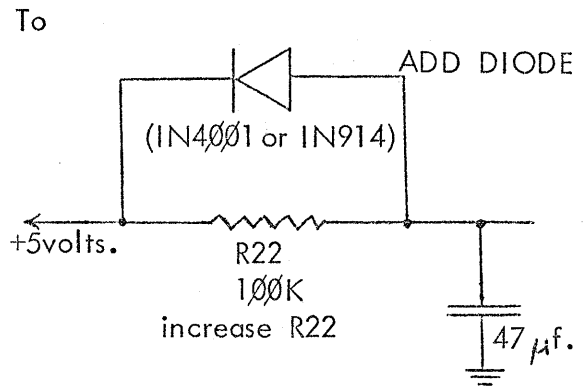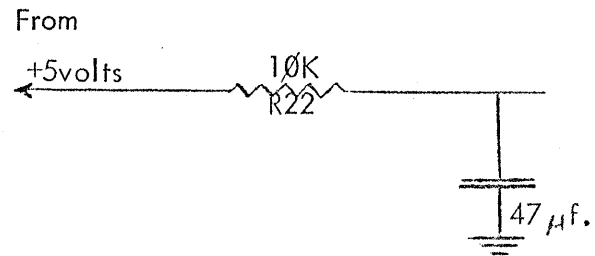3. The following instructions pertain to this new chip: pins 4,10,12, and 14 must be connected to a +5 volt line (pin 14 of E12 will do).   Pins 1 and 13 to E 7-8
Pin 3 to E 17-4
Pin6 to Pin 2
Pin 5 to Pin 11
Pin 9 to E 12-12

E32 = 7474

APPROVAL			DISTRIBUTION		REASON FOR CHANGE
APPROVED	BY	DATE	PERSON OR DEPT	QTY.	Documentation update only
Originator	DLB	31 MAR 76	Production Control		E.C.R. No.
Proj. Engr.	T.L.W	31 MAR 76	Field Service		This EO will cause white noise on CRT to disappear, but white letters will have black holes in places. The visual effect is more pleasing however.
Eng. Mgr.			Purchasing		
Manuf. Engr.			Mfg. Engineering		
Prod. Mgr			Std. Distribution		Either E.O. #1 or E.O. #2 can be used, but not both.
Field. Serv.					

E.O. #3   CRT/1A BOARD

+5

R22

+5

ADD

C 39

R23

7   B   4

C39 is 5000 µF
or greater

E29
555   3

R16   2

6

C38   5   1

HELPS STABALIZE CRT DISPLAY

E.O. #4   CPU/1 Module

From

+5volts   10K
R22

47 µf.

To

ADD DIODE

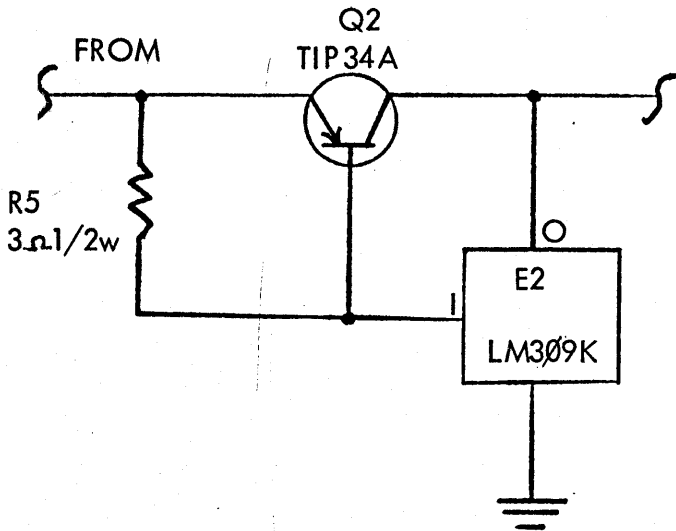(1N4001 or 1N914)

+5volts.   R22
100K
increase R22

47 µf.

Power on reset improvement.
Allows more power on resets without
use of keyswitch resets.

E.O. #5   CPU/1 Module   Change R7 from 6.8K to 15K.
Fixes SWI and REFRESH racing.

E.O. #6   MEM11 Board   Change R11–R15 from 3.3K to 510 ohm.
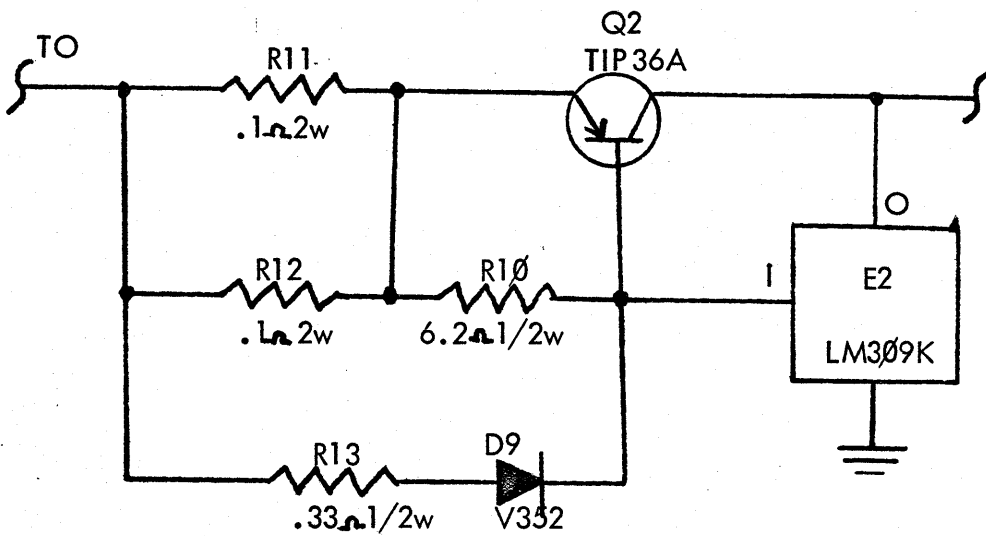Proper function of memory board.

E.O. #7 POWER SUPPLY
Improve reliability

E.O. #8 POWER SUPPLY
Improve reliability
Change R3 from .1Ω2w to .1Ω1Øw

E.O. #9 POWER SUPPLY
Improve reliability
Optionally delete R1, R2, & R3

E.O. #1Ø POWER SUPPLY
Improve reliability
Change R9 from 27Ω3w to 2ØΩ5w

FROM

Q2
TIP34A

R5
3Ω1/2w

E2
LM3Ø9K

TO

R11
.1Ω2w

Q2
TIP36A

R12
.1Ω2w

R1Ø
6.2Ω1/2w

E2
LM3Ø9K

R13
.33Ω1/2w

D9
V352

NOTE: Leads on Q1 & Q2 must be properly seated in socket.

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cut here
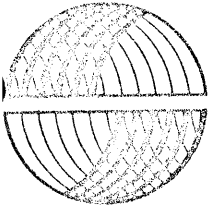
SPHERE

corporation

PROGRAM SUBMITTAL FORM

Program Title

Date

Author

Author Address

Type of Program: _____ ; 1 – Games, 2 – Utilities, 3 – Demo,
4 – Business, 5 – I/O handlers, 6 – Other _____

Program Abstract:

Program Length (bytes) _____   Source Language _____

Use other side for flowchart. Use standard Sphere coding forms for source and object
listings.