

Central Data 2650 Newsletter

Volume 1, Issue 2

July 1978

Price: \$1.00

Welcome to the second issue of Central Data's 2650 Newsletter. This issue is really packed with letters, programs, and circuits that you sent in, which goes to show you how great the interest is in our 2650 system. I sure hope that you keep sending things in to us so that other 2650 users can share in the knowledge that you have.

One note that I would like to clear up is that if you have any questions or problems with the programs or circuit diagrams published here, you should refer them all to the person responsible for the work. Because of the tremendous backlog on our current hardware and software products, we often do not have the time to fully go through each program and circuit to check it out. For this reason, we really cannot be of any help if you find a problem or have a question. Any programs or

other features which do not have author names are done by us, and in these cases we welcome your comments and suggestions.

Also, I must stress the fact that all input to the newsletter must be mailed to us (not called in). This makes it much easier to collect all of the information that we receive.

Finally, please send in a post card or letter if you wish to be put on a future list of people who want to talk about their system. The first such list is in this issue of the newsletter, and I hope that a lot more people send in their name, address and special interests for the next issue. Overall, the response is better than we had hoped for, and we hope that the enthusiasm grows even more in the future.

Letters

Dear Jeff,

Got the newsletter in the mail the other day. Great idea! I think it will work. Here is my subscription. Hated to cut the program up to get the coupon. I also love to talk about the system here so please publish my info. I am especially interested in Ham radio applications for the 2650. Am trying to form a 75 or 80 meter RTTY net to discuss the possibilities. The system so far is:

C.D.C. 2650 'Puter.
Radio Shack Keyboard (128 characters mod)
Admiral 12" T.V. (hot chassis with toroidal video input)
24K of static RAM (1 Ithica audio and 2 WMC boards)
Kleinschmidt TT100 baudot printed (60 wpm)
Hope to try out your floppy in the near future!!

software

Editor assembler (with my baudot driver)
Editor alone (with my baudot driver)
Basic (with a baudot list option)
Ham RTTY send/receive with canned message routines (originated by Dave Marshall up there near you)

Ham C.W. send from the keyboard.

Hope to get into Multi processing with a 2650 on the S-100 bus in the near future. Have modified your board ot plug directly into the S-100 bus.

Thanks for your time, Jeff.

Jerry Johnson
1707A Forrest Ave.
Fort Meade, MD 20755
301-672-2033

Dear Jerry:

Thanks for your time in sending us the letter. I'm sure that lots of people out there will be interested in talking to you about your system.

About a month later we received another letter from Jerry, and it follows below. The BASIC program that he talks about is listed near the back of the newsletter.
JR

Dear Jeff,

Enclosed is a BASIC program which I have written for the 2650. It will execute in very little RAM and has provided many hours of fun for my family. If you want to put it in the newsletter, please feel free to do so. I am just beginning to get familiar with the software aspect of this hobby so please bear with me.

The listing I have enclosed is dumped to the baudot printer, hence, the oddball codes for some of the characters. I have had very good luck with getting the machine interfaced. The BASIC baudot conversion is courtesy of Dave Marshall up there near you. I have highly modified it. If you are interested in the drivers for the assembler or BASIC just let me know and I will zip off a copy to you.

I now have 24K of RAM on line and have been doing some experimenting with putting the supervisor in RAM. I have got the supervisor on tape at H2000 and I load it in then switch the board to H0000. It is for a short time co-resident with the ROM. I have added a switch which allows me to disable the ROM by taking pin 9 of IC70 high. It works very well. Am now working on writing the baudot conversion/driver in location 0600 so that I can burn it into ROM.

I am also working on a saturation recording 8 track peripheral that I hope to run at 2400 to 4800 baud. It is about 50 percent complete now. I will let you know how it works.

Keep up the good work. I am very interested in the floppy that you are offering, but have to scrape up the cash before I order it.

Thank you,

Jerry J. Johnson

Dear Editor:

I would like to hear about an easy way to interface a NO 35 teletype to the 2650.

Also like to hear from someone that might have done some interfacing for the Friden Flexowriter, or the Friden 2301.

Thank you very much, and best regards.

Paul Meunier

Dear Paul:

Thanks for the letter. Let's see if anyone out there has had any experience interfacing to terminals of this type. JR

Dear Jeff,

Congratulations on a good first-issue of your 2650 Newsletter. Keep up the good work.

First, I wish to commend you on your decision to provide source listings of the software that you have available. It not only helps us, the users, to understand its innerworkings and allow us to customize it, but you get the side benefit of lots of help isolating the always-present software bugs. I hope you maintain this policy with all future software offerings.

So, along those lines I want to bring to your attention a couple of minor, but aggravating, bugs I isolated: two in the Supervisor (the version listed in the Central Data 2650 Computer System Manual) and one in the Editor/Assembler Version 1.1.

The first bug in the Supervisor is in the method used to save registers when returning to the Supervisor either from a breakpoint (enter at BPSV H'00AC') or from a user program (enter at RETU H'0083'). At each point a Branch-to-Subroutine instruction is used to save the registers (routine SAVR). The problem is that a Branch-to-Subroutine increments the STACK POINTER in the LOWER PROCESSOR STATUS WORD (PSL) so that an incorrect status word is stored away. Attempting to return to the user program at the point of the breakpoint will reload the wrong status word causing very strange things to happen.

The second bug in the Supervisor is in the method used to load the LOWER PROCESSOR STATUS WORD (PSL) when executing a program from the supervisor (routine STRR H'014C'). You first load the PSL, then load R0 which modifies the Condition Code. This can cause grief in a user program during debug.

Subscription Information

The Central Data 2650 Newsletter is published every 8 weeks by Central Data Corporation. Any comments should be sent to Central Data Corp., PO Box 2484, Station A, Champaign, IL 61820. The subscription rate is \$4.00 per year.

Editor: Jeff Roloff.

The fix for both of these bugs is best illustrated in the SIGNETICS publication "Designing With Microcomputers." Please find a copy of the program listing from that publication attached with the areas I referred to circled in red. I have not bothered to modify the Supervisor in my system. As long as I am aware of the limitations of the software, I can interpret the conditions I find as I debug a new program.

The bug in the Editor/Assembler only shows up when a) you have your program source stored in several blocks because it won't all fit in RAM at once, and b) there is an error in the last block. The problem is that the assembler does not check the number-of-errors variable (ERRS at H'2E3A') before branching to PASS2 as is done before loading a new block during each pass (at routine NBI H'2DA5').

So, the patch to fix the problem is:

change 2C2F to IF 33 27	
then add: ADRS DATA	MNEMONICS
3327 E5 50	COMI.R1 ENDP
3329 9C 2C 34	BCFA,EQ 2C34
332C 0C 0E 3A	LODA,RO ERRS
332F 9C 20 D7	BCFA,EQ
	EDITOR
3332 1F 2F 04	BCTA,UN PASS2

And, Jeff, I have one question for you. Your latest product brochure introduces your Floppy Disk System. What is the interface to the main computer board — via an S-100 compatible controller card or by some other means?? Also, is a manual available yet and will you be offering a kit???

Happy computing!!!!

Dave MacIorowski

Dear Dave:

Thank you for your input to the newsletter! Our company will keep the policy of sending program listings with all software that we sell.

Concerning the first bug in the supervisor, the fact that returning from a breakpoint creams the stack pointer actually doesn't cause that much of a problem. If the supervisor were to keep the SP intact, chances are that the supervisor would have wiped out most of the actual stack before you returned to the program. This is one of the major problems with the 2650's on-chip stack system.

As far as the second bug, you are right in saying that the condition code bits won't always return to a program the way they left it. Since it is too late to change the supervisor (since many programs rely on certain

routines being in certain locations), the user must remember not to set a breakpoint at a conditional branch instruction.

Finally, thanks for the change for the editor/assembler. The DOS controller board does plug into the S-100 bus, and the manual is available for it separately. There will not be a kit offered for the DOS.
JR

Dear Jeff,

Enclosed please find a set of modification instructions for the Radio-Shack keyboard. With these modifications the keyboard will produce the full ASCII code set. Control codes are produced by pushing the control key and any other key at the same time. With the upper case lock switch in the upper case position, the letter keys output upper case codes whether the shift key is pushed or not. In the upper/lower position the keyboard produces both lower and upper case codes, depending on the shift key usage. All numbers and character keys work normally. A back arrow (code 5F) is produced with the left blank. The lower right corner blank key produces the carriage return code (OD) and the break key is used for the Central Data Computer's system reset button.

I'd like to clear up a possible point of confusion if I may. Since several people have been contacting me at Signetics with questions or comments about our home Central Data systems, I feel it important to state that nothing I say about the Central Data system is to be taken as the word of Signetics. As a matter of fact I am an analog interface product engineer and have no business contact with the microprocessor group at all. I prefer to be contacted at home but will take calls at work if time and my work load at the moment permits.

I am happy to help anyone who is willing to listen to my tales and am interested in knowing what others are doing, but like others I got into the home computer activities to learn and was totally ignorant of computer lore before I got my system from you. I do have the advantage of a full staff of 2650 applications people at the end of my phone but have used that only a few times.

I'm not trying to discourage anyone from contacting me. I just want everyone to know where I'm coming from.

Mike Herbach

Mike:

As usual, we got some more great input from you! The readers will be able to find your keyboard modifications and programs in the newsletter. Also, I hope your second paragraph clears up any confusion people may have had.

Thanks again for all the information. JR

Dear Jeff,

I sure am glad to see somebody come out with a good newsletter to help stir some activity for the Signetics 2650 microprocessor and your machine. Enclosed please find \$4.00 for a subscription and a program that I have written to be used with your assembler.

The only thing that I have found at fault with the assembler that you have available is the fact that there is no symbol table. I have added to my assembler the included program that prints on the vdt, the symbol table when prompted with a 'T' command. Usually I run a program through the assembler with only the print option and then call out the symbol table to check the location of 'tags' and equates that I have used. This is helpful in setting breakpoints should the program fail to operate properly. The listing is alphabetical and should the screen fill up, the remainder of the table can be examined by pressing any key. Also pressing any key will return the assembler to the command mode. Please feel free to include this in your version of Assembler.

When using BASIC, I found that there was much snow on the VDT whenever a key was depressed. I got rid of this snow by changing the connection to IC 61 pin 11 from +5 volts to A₁₁. There is still a little snow when BASIC is running but not as objectionable as before.

I noticed in your latest brochure that you now have a disc drive available. My question is; will the software in minidisc be made available for us poor souls that jumped the gun and started to set up a disc system already?

Hoping to hear from you soon and thank you for a decent and much needed newsletter.

Raymond N. Rouillard
Communication Systems & Equipment
4 Granger Drive
Framingham Hills, Mass. 01030

Dear Raymond:

Thanks for the letter and program. (The program can be found later in the newsletter.) The DOS software will be available on minidisk without having to buy our hardware, but you must realize that your hardware will probably have to conform pretty closely to ours.

Thanks again for your letter. JR

Dear Jeff,

This letter is to let you know that my 2650 is indeed up and running, to ask a few questions and to present you with a program for the newsletter.

First of all my unit is running with 16K of memory and your 8K BASIC. One of the difficulties I am having with the BASIC is that it will not create an array using the statement DIM(9,9). I'm trying to modify the game othello to run in Central Data BASIC and it, as well as any other board games, need an I,J array. How can I deal with this? Does the 12K BASIC allow such an array?

I hope the program gives as much fun as I and my daughter have had playing it.

Is there someone out there who is into multi-processing, that is using a Z80 board within the Central Data system? If there is, could they drop me a line and tell me how they did it?

Very truly yours,

Bruce E. Blakeslee

Dear Bruce:

Thanks a lot for your letter and BASIC program. Readers can find this Hamurabi program later in the newsletter. As far as having multi-subscripted arrays, the 8K BASIC does not allow them, but the 12K BASIC will. If you have the 8K BASIC and need such a feature, you can calculate a value for a single dimensioned array so that it will act like a multi-dimensioned array. For instance, if you want an array with 9 X 9 elements, you would do a DIM A(81), to allow for the 81 elements needed in a 9 X 9 array. Then to reference one element in the array, you would use the following two statements:

```
INDEX=(ROW-1)*9+COLUMN
VALUE=A(INDEX)
```

This will do the calculation required, but will not check for ROW or COLUMN values that are too big. These two statements are equivalent to the 12K BASIC statement: VALUE=A(ROW,COLUMN).

Central Data Corporation
 PO Box 2484, Station A
 Champaign, IL 61820
 (217) 359-8010

Hopefully there is someone out there who can get together with you to discuss multi-processing. It is a very interesting application for this computer! JR

Radio-Shack Keyboard Modification by Mike Herbach

Procedure:

- A) Remove any existing mods except 1K ohm from Z11-5 to V+
- B) Cuts on board:
 - 1) Line from Z7-6 to Z5-3
 - 2) Line from Z6-6 to Z5-6
 - 3) Line to Z7-1
 - 4) Pin 5 of Z16 (cut pin, not line)
 - 5) Line from ESC to Z12-16
 - 6) Line from L Blank to clear
 - 7) Line from R Blank to repeat
 - 8) Line from R Blank to Here-is
 - 9) Line from break to Z10-13
 - 10) Line from break to R11
 - 11) Line from break to Here-is
 - 12) Line from L Blank to Ctrl.

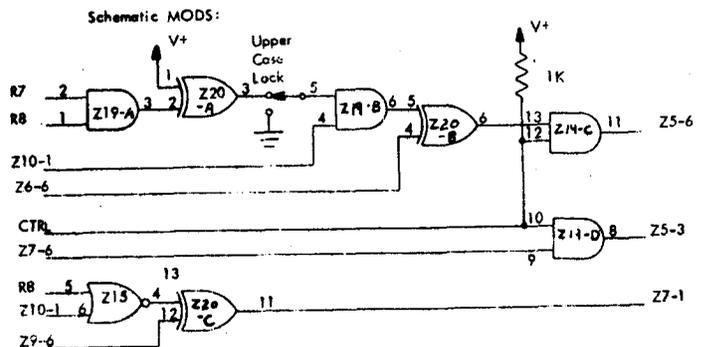
- E) Drill holes for two 14-pin IC's or SOCKETS.
 (Just above = and * is a good spot)

- F) Mount ICs and make connections using schematic pin numbers, above. Z19 is a 7408 or 74LS08, Z20 is a 7486 or 74LS86. The 1K resistor can mount wherever convenient. Same for the SPDT switch. The diodes can be almost any type.

- G) Connect 2650 system reset line (socket 81-15) to pin 3 of keyboard edge connector.

RADIO SHACK KB MODIFICATIONS

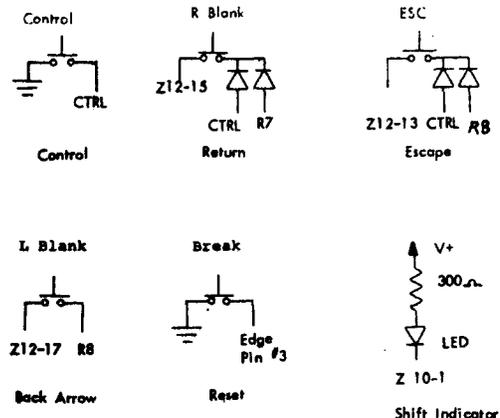
MIKE HERBACH 5-12-78



- C) Connect traces above and below cuts at break key.
- D) Using a small drill bit, drill through the board at the following locations until the listed connection no longer is connected.

(check the lines on the pictorial in the R-S manual first)

- 1) Below word "is" of Here-is to cut connection from R Blank; to "U".
- 2) Across word "BACK" of back space to cut connection from break to "P".
- 3) Left of word "ESC;" to cut connection from ESC to > and connection from ESC to DELETE.
- 4) Down & left of CTRL to cut connection from CTRL to SHIFT LOCK.
- 5) Down & left of last cut to cut connection from L Blank to "D".



Below is a list of the people who sent in the coupon wanting to talk to other 2650 users about their system. The name, address, and city are all separated by a semicolon, and if they gave a telephone number it is preceded by a '#'. Any special interests are preceded by a colon. I hope that people keep sending their names in to us for this purpose, since I believe it is one of the best ways to get a lot more out of your system.

Gregg Ahumada; PO Box 2773; San Rafael, CA 94901 #415-479-6139
W. Allen; 3756 Bagley #203; West L.A., CA 90034 #213-839-6703
:Graphics, Floppy Interface for 2650 System
Gerhard Beil; 2802 E. 28 St.; Indep., MO 64057 #816-373-5913
:Art, Drafting, Electronics Mainly
Don Bledsoe; 9225 McNerney Ave.; South Gate, CA 90280
:Business applications/acctg for freight/truck business
Gordon Brandly; RR#2; Fort Sask., Alberta, Canada T8L 2N8
Frankie Chan; Nation Wide Elect.; 3W. 30 St.; N.Y., N.Y. 10001 #212-239-4520
:All about 2650
John E. Dunn; 7 Yorkshire Drive; Cheshire, MA 01225
Robert C. Dunn; 35 S. Prospect St.; Lee, MA 01238 #413-243-1078
:Ham Radio (W1KSD) and Computers
Donald Duval; 165 Monroe St. #15; Santa Clara, CA 94050 #408-246-6193
:Electronic Music
Craig Forman; 3045 Bavarian Dr. W., Apt. 413; Indianapolis, IN 46236 #317-352-2495
Theodore Gagliano; 8930E N. 95th St.; Milwaukee, WI 53224
:Cheap memory and graphics for 2650
Dulles Greenridge; 639 Alabama Avenue; Brooklyn, NY 11207
:Developing my programming skills in machine language and BASIC
Mike Herbach; 5392 Great Oaks Dr.; San Jose, CA 95111 #408-227-1231
:Learning
Mike Kelley; 9951 Delco Avenue; Chatsworth, CA 91311 #213-349-8796
Dave Maciorowski, WA1JHK; 173 Oakland Road; E. Pepperell, MA 01437
:Developing interrupt based real-time operating system
Eric Martinot; 2206 B Jefferson; Berkeley, CA 94703 #415-849-2663
:Data communication using computers-Robotics
Cliff McDonald; 6279 B. Tress Dr.; Norcross, GA 30071 #447-8798
Gary McFall; 10326 Plum Tree Lane; Cupertino, CA 95014 #408-733-2600 Ext. 452
:Ham Radio: CW decoding, RTTY, Oscar Tracking
Don McKeeby; 690 Owego Rd., RD#2; Candor, NY 13743 #607-659-7057
:AD, DA, and control
J.P. Meunier; 299 St-Andre Street; Granby, Que., CANADA
Joe Merrill; PO Box 5380; N. Long Beach, CA 90805 #213-830-2607
Richard M(Peterson; Box 43; Davenport, IA 52805 #319-326-7236
:Compilers, Operating Systems, Text Processing
Von D. Soule, Bank Services; 221 N. Hudson St.; Coldwater, MI 49036 #279-7085
:Locks and security devices
Vince Staffo, WB2FYZ; 11 Monroe Street; Ilion, NY 13357 #315-894-3265
:Ham Radio, RTTY, and multiprocessing
James R. Thompson; 9910 Leawood Blvd.; Houston, TX 77099 #713-495-1328
:Software
Henk Vrieling; Stoelenmatterwei 3; 5551 SP Vallrenswaard; The Netherlands
Donald E. Wood; 1563 Cornish Dr.; Troy, OH 45373 #513-335-8623
:Game Programs and 8080 emulator for 2650