

MICRO COMPLEX  
25651 MINOS STREET  
MISSION VIEJO, CA. 92691  
(714) 770-2168  
15 February 1981

Micro Complex DUAL PERSONALITY MODULE for SOL Computers

A new product from Micro Complex can greatly enhance the application and versatility of the Processor Technology, Corp. SOL Computer. A single switch on the DPM (Dual Personality Module) provides switched operation of the SOL at either 0C00H or 0F000H monitor addresses. Also the switch provides switching between either of two on-board PROM monitor programs. Operation in the SOL is really quite impressive. As an example, switching to the 0F000H mode the screen display is moved to 0FC00H, the jump start moves to 0F000H, SOL system memory moves to 0F800H, and if you are using a 64K memory board, you automatically get the memory back at 0C00H where your old SOLOS was addressed. This means that now you can run 60K of user memory space instead of 48K as in the originally configured SOL. This is very significant since many of the new application programs now available on the market require at least 56K of user memory space.

The DPM is fully compatible with North Star Computers, Inc. disk controller at OE800H and will support the Digital Research, Inc. CP/M system up to a size of 58K. Using the Micro Complex Disk Controller with address selection option, you can move the controller up to 0EC00H and run a 59K system with no modification of the Lifeboat Associates' 2.21A version of CP/M.

This example is probably the most desirable application of the DPM to most users. However, there are many more applications available to the systems programmer and those desiring to have more control, accessibility, and insight to the machine level of software intricacies of the SOL computer. To service this requirement, the DPM provides the primary function of supporting a 2716 PROM in socket "B" and in socket "A" either a 2716 or a standard SOLOS PROM. Jumper options are provided to support whichever of the three you choose for socket "B". In addition, options are provided to have the address of both PROMs to be at 0C00H or 0F000H or socket "A" at 0C00H and socket "B" switches to address 0F000H. These options provide considerable versatility in your selection of mode of operation depending upon your desired application.

The standard configuration for the DPM as shipped, includes two installed 2716 PROMs. These are programmed to provide all the significant SOLOS functions except the cassette routines. There are instead a total of 20 new commands, as documented in Appendix A. These commands occupy nearly half the PROM space and can be replaced with user modified code if so desired on a special order basis. Minor modifications cost about \$25.00, more extensive modifications are priced in accordance with the time required to program the requested modifications. If the user provides the code modifications, then the customization will cost between \$25.00 and \$50.00 for the initial PROM and \$15.00 for each additional copy (Includes the cost of 2716 PROM).

The standard configuration of the DPM is shipped with an auto-load jump to address OE800H which is initiated by pressing the "LOAD" key on the SOL. This will auto-load North Star Computer, Inc. compatible disk controllers. At the same price, you may request the DPM version which will auto-boot the Processor Technology, Corp. HELIOS II with either the standard "BO" command or by pressing the "LOAD" key on the SOL. If you are running both a North Star Computer, Inc. type disk controller and a Helios II disk system in your computer, then you might like to have the third version of the DPM which boots the Helios via the "BO" command and boots the North Star by pressing the "LOAD" key.

Instructions for the simple modification required to add two jumpers to the top of your SOL's circuit board are provided by Appendix B.

Instructions for a two cut modification of your existing SOLOS PM board to allow it to function normally after you add the two jumpers (as per Appendix B) are provided in Appendix C. This will allow you to use your old PM card to read cassette tapes, in the event that you might encounter that requirement.

It should be noted that it is necessary to modify your software programs, which interface with SOLOS, to reference the corresponding functional vectors in the 0F000H support PROM software. The normal entry points relative to the Monitor origin address have been maintained in order to make the required modifications as easy as possible, ie. a jump to the screen driver would have to be modified to jump to 0F054H vice 0C054H as in the normal SOLOS PROM. These vector are only maintained for the relative low address entries. If your programs require a more exact correspondence to SOLOS, then I refer you to the article on page #8 of the November/December issue of the "PROTEUS" newsletter as published by PROTEUS, 1690 Woodside Road, Suite 219, Redwood City, CA. 94061, USA.

Modifications of programs to run with the Monitor at 0F000H will normally be rather minor. However, some projects such as modifying the Helios PTDOS to be fully compatible at 0F000H will require significant work. I would be interested in participating in a project to achieve that goal. It would be worth the effort to have the extended contiguous memory for the various large programs under PTDOS, ie. FORTRAN, WORD WIZARD, and ALS-8 assemblies.

It might make the operation of a lot of your software more flexible if you put your customized Input/Out device code into the PROMS on the DPM. Then you could move the software to new ORG addresses without having to make additional USER I/O modifications. This would be very convenient when building different sized CP/M systems for special applications in your machine. Also, use of the new North Star Computer's System Disk Release 5.2 would be enhanced, in that, you could use the Mover program to reconfigure your system and not have to make modifications to the USER I/O area for each configuration.

\*\*\*\*\*

Other MICRO COMPLEX available products include;

1. Dual Density Phase Lock II hard sectored disk controller. Plug compatible with North Star Computer, Inc. disk controller.

2. While they last, Processor Technology 64nKRA memory boards. \$450 each, 90 day warranty.

3. TANDON MAGNETICS, Inc. disk drives. Both 48 and 96 Tracks/Inch types TM-100-2 and TM-100-4. We also have software available to support the 96 TPI drives to provide up to 819,200 bytes per 5 1/4 Inch Disk.

4. Cabinets and power supplies tailored to fit 5 1/4 inch disk drives.

5. Video memory mapped Word Processor, "STAR\*TYPIST" with exceptional features for SOL computers. A true "Character Proportional Spaced" print driver is also available for Photo-Copy quality printing on a Diablo printer is available.

\*\*\*\*\*

Now for the bottom line, the price for the standard versions of the DPM with two programmed PROMS is \$95.00 (Dealer discounts available). Plus \$3.00 for shipping and handling cost. California residents add 6% sales tax.

Easiest way to place order is by phone (714) 770-2168

When ordering standard versions, specify either:

- N\* - for 0E800H boot vector
- Helios - for Helios II boot
- N\*/Helios - combination "BO" & 0E800H boot

\*\*\*\*\*

If you desire additional information concerning the options available on the DPM, please call us.

Appendix "A" --- MICRO COMPLEX - DUAL PERSONALITY MODULE

INSTRUCTION SET

Group I --- Similar to SOLOS

EX - Execute Program at designated address  
SE - Set I/O assignments  
CU - Service Custom Command Vector Table  
BO = Boot Helios II (If Helios Version DPM)  
TE - Enter Terminal Mode (If not Helios Ver.)  
TB - TARBELL boot  
LOAD KEY - Boots disk system (N\*, TARBELL, HELIOS)

Group II --- New Commands

In this command description the following symbols are used;

SSSS = Starting Address for Memory Block  
EEEE = Ending Address for Memory Block  
HHHH = Hex Character Input  
CCCC = ASCII Character Input  
AAAA = Memory Address Input

Pressing the MODE key will Abort/Terminate most commands.

The available new commands and their format are;

- 1). Display ASCII memory dump.  
DA SSSS EEEE
- 2). Display HEX memory dump.  
DH SSSS EEEE
- 3). Enter ASCII Character String.  
EA SSSS  
Note: The UP/DOWN Arrow keys will allow forward and backward indexing of entry address during string entries.
- 4). Enter HEX Byte String  
EH SSSS  
Note: Same note as "EA" command applies.
- 5). Fill Memory with a HEX Value.  
FM SSSS EEEE HH
- 6). Lower Case Conversion.  
LC LL  
Note: Allows lower case until next RETURN.

- 7). Move Memory Block, Non Destructive in either direction.  
MM SSSS EEEE AAAA
- 8). Compare Memory Blocks.  
CM SSSS EEEE AAAA
- 9). Address Refernece locator within a block.  
AR SSSS EEEE AAAA
- 10). Find HEX Word occurances within a memory block  
FH SSSS EEEE HHHH
- 11). Find HEX Byte occurances within a memory block  
FB SSSS EEEE HH
- 12). Find ASCII Character pair within a memory block.  
FA SSSS EEEE CC  
Note: Lower Case Character can be entered in  
this command string by pressing the  
ESCAPE key imediately before the lower  
case character entry. Otherwise the  
characters are converted to uppercase.
- 13). Find ASCII Character (Single) within a memory block.  
FC SSSS EEEE C  
Same note as "FA" Command is applicable.
- 14). Test Memory using 00 & FF fills and walking bit test.  
TM SSSS EEEE HH  
Note: HH indicates the HEX # of passes to do  
before stopping.  
Addresses with problems will be displayed  
on the screen. This tested is based on  
techniques suggested in the article in  
Kilobuad Magazine issue July 1978.

Memory Test Error Flags are:

- A - Fails to set to 00
- B - Fails to hold 00 setting
- C - Fails walking bit test
- D - Fails to set to FF
- E - Fails test for tied bits

Group III -- Jump Vector Commands

These Vectors may be changed at purchase time as minor modifications.

- OS - Vector to Disk Operating System @ 2028H
- WB - Warm Boot Vector to 0000H for CP/M
- WP - Word Processor Vector to 2A00H
- BA - BAasic re-entry Vector to 2A04H
- BC - Basic re-entry with Clear to 2A00H
- BV - Basic re-entry, no resets, to 2A14H

## Appendix "B" --- MICRO COMPLEX - DUAL PERSONALITY MODULE

Instructions for making necessary modification to your SOL to enable the use of the DPM.

### Discussion:

In order for the SOL to function at 0F000H it is necessary to modify the address decoding section of the SOL. This turns out to be a most simple modification. It consists of disconnecting two pins on the Personality Module Connector and adding two short jumpers.

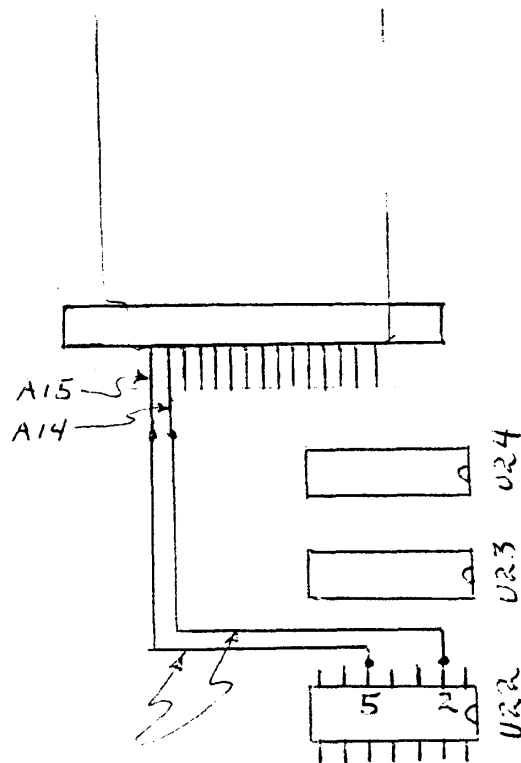
The two pins that we are interested in, are on the Personality Card Connector at the left rear side of your SOL. This is the green connector the the small removable Personality Module plugs into! You will note that there are two rows of gold plated pins in this connector, one row mates with the PM card top pads, the other mates with the PM card bottom pads. The Top Row Pins are numbered "A1" thru A15", the Bottom Row are numbered "B1" thru "B15". IT is most important that we identify the proper two pins before we try to go any further. WE ARE INTERESTED IN PINS "A14" AND "A15". If you are looking over the front of your SOL at these pins, they are the two nearest the left side panel of the SOL. Note that there is a second row of gold plated pins behind/under the row that is easily accessable, we will not be trying to do anything to any of the pins except the two "easy to get at" ones near the left side, "A14" and "A15" as pointed out before. Depending on your soldering ability, we need to either un-solder these two pins by heating them with a small soldering tool and then lift them up from the big main board. \*\*\*\*\* OR \*\*\*\*\* If you are not so good with a soldering tool and feel that it would not be safe for you to attempt, then don't dispare, there is a second method that will work just as well.

ALTERNATE METHOD: Instead of un-soldering the two pins you can use a small set of wire cutters to cut the two pins free of the big SOL circuit board. Note, make the cut as close to the SOL board as possible without damaging the SOL traces!



Which ever way you did it, once the two pins are free from the SOL board, bend them out straight and solder a small piece of insulated wire, about four inches long, to each of the two pins (Wire Wrap wire works nicely). Insulate the two soldered connections from each other with either heat shrink tubing or electrical tape. Now you must solder the wire from pin "A14" to the pin #2 on the IC at location U22 as indicated on the diagram, also solder the wire from pin "A15" to pin #5 on the same IC, at U22. This completes the simple SOL modification. You can now plug your new Dual Personality Module into the slot, power-up your SOL and try it out.

Don't forget to modify your old Personality Module as described in Appendix "C", before you try to use it in your modified SOL. The modification of your Personality Module will not affect its normal operation. It only makes it compatable with the modification that you now have in your SOL.



Add these two jumpers  
after you lift A14 + A15  
free from SOL board

Appendix "C" --- MICRO COMPLEX - DUAL PERSONALITY MODULE

Modification of the Old SOLOS Personality Module must be done before reverting back to using it in your modified SOL. The required modification consists of cutting the two traces at the pads "A14" and "A15" on the old Personality Module. These pins are redundant on the PM so not adverse operation will result from the modification, unless you cut the traces at the wrong place, or cut the wrong ones. Be careful and save yourself from other problems. Do not attempt any of the modifications unless you are sure you can properly handle the described details. MICRO COMPLEX does not accept any responsibility for any malfunctions of any of your equipment ,before or after, you have attempted to install modifications. If you have any concern about your ability to successful complete the described details of the modification, then have your local Computer Store technician do it. If that is not available, contact Micro Complex to arrange shipment/modification/repair of your SOL at your expense.

I do truly hope that this accessory for your SOL will extend it usefulness to you. The SOL is in my opinion, an excellent computer and should provide many more years of service to it lucky owners. It might be of interest to you that Micro Complex is presently designing an 80 Character by 24 Line screen display for the SOL. Also, an adaption to Zilog's code set will be available thru the use of a compatable National SemiConductor NSC800 chip modification to the SOL. There is now available a modification to "Ghost" the Micro Complex Dual Density Disk Controller behind the memory space which is used by the SOL's screen display. You also get an audio alarm "Bell" signal capablity with this modification. If there is significant interest in this modification, it can be provided in volume four weeks after receipt of order. A nice feature of the "Ghost" controller modification is that it automatically follows the display screen address when the Dual Personality Module is switched between 0C00H and 0F000H.

Our next major design is a Controller for Tandon's new 5 1/4 Inch Eleven Mega Byte Hard Disk Drive. We expect that Tandon will have the drive available about April 1981.

That's about it for now,  
Sincerely,  
Robert Lee Hogg

