**mul•ti us•er sys•tem** /,mul-ti`yüz-er sys-təm /*n*:
a system invented by TSC which will allow four
simultaneous users on one micro-computer.

## Specifications:

Board Size:  5″ x 9″
Mother Board Requirements:  1 Memory Board Slot
Memory Restrictions:  No memory from $0000 to $0FFF
Typical Current Consumption:  1 Amp
Voltage Requirements:  Unregulated 8 volts
Bus:  SS-50 (SWTPC 6800)

*Now — 4 Users On 1 Micro!!*

**TECHNICAL SYSTEMS**
**CONSULTANTS, INC.**
BOX 2574 W. LAFAYETTE, INDIANA  47906
317-742-7509

# *Presenting:  The TSC Multi-User System*

# *Presenting: The TSC*

## *Now — 4 Users On 1 Micro!!*

## What Does It Do??

In the past, the difference between a micro and a full size computer has been the lack of versatility in the micro, due to its inability to service more than one user at a time. This is no longer the case! With the TSC Multi-User System, you can give your 6800 the power of a large computer mainframe.

By simply plugging the TSC Multi-User Board into a memory board slot in an existing SS-50 Bus, 6800 computer system (Southwest Technical Products 6800 or similar), your computer now has the capability of supporting four simultaneous users! That's right! One to four users, all running BASIC, all at the same time! For most applications the speed difference between a single user system and the four user system is negligible. Absolutely no modifications are needed to the existing system.

## How Can It Be Used??

**1. Education:** The importance of computer education in today's world can not be underestimated. The low cost of micro-computers has made them a possibility for educational use, but requiring one system per student quickly raises the price. Now, with the TSC Multi-User System, four students can share one micro-computer, resulting in a very economical educational tool. Some applications include the following:

    *Teaching computer programming
    *Applications in CAI (Computer Aided Instruction)
    *Teaching computer use and fundamentals

Now a four user system will only cost what 2 terminals cost a few years ago!

**2. Small Business:** The decreasing cost of micro-computers is making them a very tempting purchase by many small businesses. With the ability to allow several simultaneous users, extreme power is suddenly available. Applications such as multi-station inventory systems, accounting systems, etc., can now be realized.

**3. Industry:** Computer power can be used in almost an infinite number of situations throughout the industrial world. Many applications don't require the higher computing speeds of large mainframes or even mini-computers which are quite costly. The addition of a TSC Multi-User Board to an existing 6800 micro-co mputer can now provide the power and versatility of most time share mini-computer systems at just a fraction of the cost!

**4. Personal Computing:** The home can also make good use of the TSC Multi-User System. Most personal computerists are finding their computer is suffering from "the over-crowded computer syndrome", in other words, everyone around wants to use it at the same time. Now this can be done, and inexpensively. The future will promote more and more home computer use. Now is the time to get prepared by getting the entire household using the resources of the micro-computer, all at the same time!

# C Multi-User System

## ONLY
## $129.95

### MUB-68
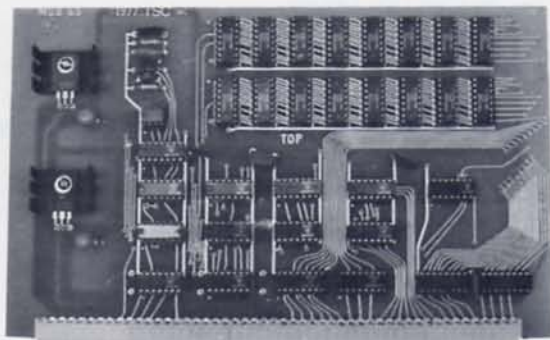


## The Basic's

### 1. Micro BASIC Plus:

This BASIC is included free with the TSC Multi-User System and is intended for simple application problems requiring only integer math, such as first courses in computer programming, games, etc. A 12K system will support 4 (four) users with this BASIC which means a minimal multi-user system with 12K of memory, 2 serial interface boards, and 2 terminals will cost less than $1,800.00.

*Included Free*

### 2. 8K Cassette BASIC

This BASIC has most of the feature of SWTPC 8K BASIC. A minimum of 24K of memory is recommended for its use, although less can be used with it, each user may have his own independent cassette mass storage system for file saving and retrieval. A SWTPC PR-40 Printer can also be used for hard copy program listing. A very complete and versatile BASIC, and now for 4 (four) users!!

MUC-8K
Optional Cassette     $49.95

### 3. 8K Disk BASIC

The Disk BASIC will run with SWTPC dual minifloppy disk system. All of the standard 8K BASIC features with the addition of disk program storage and retrieval. Files may be user pass-word protected as well. This software, a complete 4 (four) user disk BASIC with printer support, will turn your 6800 micro into a machine worth ten times its price.

MUC-8KD
Optional Disk     $49.95

## What Is Provided??

The TSC Multi-User System comes with a complete kit of parts, including a high quality, plated through hole printed circuit board, all components, IC sockets, complete assembly instructions, diagnostics programs, a cassette tape containing the four user Micro BASIC Plus, and a comprehensive user's manual.

## What Else Is Needed??

Besides the SS-50 based 6800 micro-computer and the TSC Multi-User System, you will also need one serial interface board for each user, at least 12K of memory, plus one terminal for each user. Optional items include cassette interfaces for each user, floppy disk system, 8K Multi-User Basic, SWTPC PR-40 printer, and additional memory.

## Assembly Instructions for the MUB-68 Multi-User Board

### Introduction

The MUB-68 Multi-User Board will give your SWTPC 6800 the capability of running special multi-user software. It is a 5½" x 9" double sided, plated thru hole board which is to be plugged into the system in place of the lower 4K of memory. The Multi-User board contains 2K of low power memory, one read/write register for user selection and RAM partitioning, as well as a software controlled interrupt timer. The user need not be concerned with the specifics of the board since the software performs all of the necessary control functions. There are no user selected options on the board and no special jumpers to be added. The Multi-User Board simply plugs onto the bus and no modifications are necessary to the rest of the system, except for the removal of the Ø thru 1000 hex (Ø-4K) memory as mentioned. The Multi-User board is powered from the unregulated +8 volts from the bus which is regulated to +5 volts by a regulator integrated circuit.

Before starting the construction of the board, you should completely read this manual. It is also important that all parts remain in their original package until they are called for in the instructions. This is especially true of the 4 memory chips which have been packed in black conductive foam. These are MOS integrated circuits which are very susceptible to static electricity damage. DO NOT REMOVE THESE UNTIL THE INSTRUCTIONS SPECIFICALLY TELL YOU TO DO SO!

Please read the rest of this manual before beginning the construction.

### Assembly Instructions

Before actually beginning, please take a few minutes to carefully examine the printed circuit board. Using a magnifying glass, check the board on both sides for incomplete etching and foil "bridges" or "breaks". Careful attention should be paid to the top side of the board since much of it will be covered by integrated circuits and this would make it very hard to find such problems after the board has been assembled.

Also note that since the board has plated thru holes it is only necessary to solder the components from the BOTTOM side of the board. Be sure to use a LOW WATTAGE soldering iron (not a gun) with a small tip. Use only the solder provided with this kit. DO NOT USE ACID CORE SOLDER OR ANY TYPE OF PASTE FLUX! We will not guarantee or repair any kit on which either product has been used. Remember to solder from the bottom side of the board ONLY.

( ) Read this entire manual from cover to cover and perform all inspections as mentioned in the above paragraph. Being familiar with the contents of this manual will make the kit construction go more smoothly. Be sure to check off each step as it has been completed.

( ) Put the Parts Placement Diagram in front of you so it can be easily seen while constructing the kit.

( ) Locate the 5 white edge connectors. These are to be installed along the bottom edge of the board and should be inserted from the TOP side. THESE CONNECTORS MUST BE PRESSED FIRMLY AGAINST THE BOARD. Make sure the connector seats firmly against the TOP of the circuit board and that each pin extends COMPLETELY into the holes. If you are not careful here, the board may not stand straight or may wobble. It is best that you solder only the 2 end pins of each of the 5 connectors until all have been installed and you are sure they are straight and rigid. Finish soldering the remaining pins.

( ) Insert the small nylon indexing plug into the connector pin indicated by the arrow on the bottom side of the board.

( ) Locate the 4 resistors. These are identified by the color bands around them. The following four steps are for installing the resistors. There is no special orientation for these parts.

( ) Find resistor R1 (33K—orange, orange, orange). Bend the leads of the resistor and install as shown in the parts layout sheet. Do not solder.

( ) Install R2 (3.3K—orange, orange, red) as shown on parts layout. Do not solder.

( ) Install R3 (68K—blue, gray, orange) as shown. Do not solder.

( ) Install the last resistor, R4 (1K—brown, black, red) as shown. At this time solder all resistors in place and trim the excess leads.

( ) Locate the nine 0.1 mfd disc capacitors. These should be installed at locations marked C5-C13. Solder and trim all leads.

( ) Install the .05 mfd disk capacitor at location marked C2. Solder.

( ) Install the 0.01 mfd disk capacitor at location C3. Solder.

( ) Install the 100 pfd (may be marked 100M) capacitor at location C1. Solder.

( ) The remaining capacitor (C4) is special in that it MUST BE INSTALLED ON THE BOARD WITH SPECIFIC ORIENTATION. If you examine the capacitor, which should be 220 mfd, you will see a small plus sign ("+") by one of the leads. Also, on the component drawing you will see a plus sign by one of the leads. The capacitor should be installed with the "+" matching that shown on the component drawing. FAILURE TO INSTALL THE CAPACITOR CORRECTLY WILL CAUSE COMPONENT DAMAGE!

( ) After verifying the correct orientation of C4, solder and trim its leads.

( ) Locate the 7805 voltage regulator integrated circuit. Take one of the black finned heat sinks and place it on the TOP side of the board so that the hole in it lines up with the hole in the board at location marked IC34. The fins should be pointing upwards and the hole, which is off centered, should be towards the top edge of the PC board. Next, place the 7805 IC on top of the heat sink with its METAL SIDE DOWN. The three leads coming out the bottom of this IC should be bent down at a right angle so they will go through the three holes in the PC board. Take the 4-40 screw and place it through the hole of the IC, the heatsink, and the PC board, and fasten on the back side with the 4-40 nut. Do not be concerned if the nut touches the foil trace since it is ground. Make sure the nut has been securely fastened. Solder in place.

### Installing the ICs

NOTE: DO NOT REMOVE THE MOS RAM MEMORY CHIPS FROM THEIR CONTAINER UNTIL TOLD TO DO SO!

( ) All of the following steps involve the insertion and soldering of ICs into the circuit board. Special attention should be paid to the orientation of these chips. All ICs are to be installed with pin 1 (the pin by the dot or semicircle notch) towards the left side of the board (upper left for vertical ones, and lower left for horizontal placement—see parts layout diagram). Be very careful that none of the pins bend underneath the IC during insertion. After noting the orientation described, continue to the next step. When installing the ICs do not bend all of the pins flat on the bottom of the board. Doing so makes removal very difficult if ever necessary.

( ) Insert ICs 17 and 18 as shown on the parts layout. Solder.

( ) Insert ICs 19 through 23 as shown. Watch the orientation! Solder.

( ) Install ICs 24-27 as shown. Solder.

( ) Insert ICs 28-33 as shown on the parts layout. Solder.

### ***CAUTION***

Please read the following carefully. The remaining ICs are MOS devices and are very susceptible to static electricity damage. You should be wearing clothing which is not prone to static charge such as cotton. You should not open the package containing the ICs before you have grounded your body. To do this, run a wire from an "earth ground" such as cold water pipe, to one end of a 1 Meg ohm resistor. Connect

the other end of the resistor to your wrist either by wrapping several turns of the bare wire around it, or clipping the wire to a metal watch band. BE ABSOLUTELY SURE THE 1MEG RESISTOR IS CONNECTED, otherwise a dangerous shock hazard will exist. You should handle the ICs as little as possible and avoid touching the leads. As you work, it is a good idea to place the board on a sheet of aluminum foil which is also grounded. Once you have started inserting the MOS ICs, you should continue uninterrupted until finished.

( ) Ground your body as described in the above paragraph.

( ) Remove the MOS memory chips one at a time and insert them into the board at locations IC1-IC4. Be sure they are oriented correctly as shown in the parts layout diagram. Solder.

( ) All soldering is now complete. It is very important that you go back and check all of your work looking especially for missed solder connections or solder bridges.

( ) You may now unground yourself but handle the board as little as possible since it is now susceptible to damage from static electricity. Congratulations! You have just completed the construction. Now, on with the checkout.

## Board Installation

The board should only be plugged into the 6800 bus with power removed from the system. Failing to turn off power could result in severe damage to the entire system! DO NOT TAKE CHANCES. After plugging the board into the bus, it is necessary to remove the 4K memory board from locations 0000 to 0FFF hex (0-4K). The Multi-User Board will not function if memory exists at those locations. All TSC Multi-User software requires RAM starting at location 1000 hex (4K) so the first memory board in the system (4K MP-M) should be jumpered to begin at 1000 hex.

## Diagnostics

The following program will check about 99% of the circuitry on the board. After installing the board as described above, enter the program starting at address 1000 hex. The beginning address of each block of 16 bytes appears in the left hand column.

```
1000  20 02 CE 10 0E 7F 10 02 7F 10 03 CE 07 D0 09 26
1010  FD B6 10 02 26 32 B7 0C 00 F6 0C 00 C4 03 11 26
1020  2B 4C 81 04 26 F0 7F 0C 00 4F CE 00 00 5F A7 00
1030  08 5C 26 FA 4C A7 00 08 5C 26 FA 81 31 27 11 7C
1040  0C 00 84 F0 8B 10 20 E2 C6 30 20 30 C6 31 20 2C
1050  4F B7 0C 00 CE 00 00 5F A1 00 26 1A 08 5C 26 F8
1060  4C A1 00 26 11 08 5C 26 F8 81 31 27 11 7C 0C 00
1070  84 F0 8B 10 20 DE C6 32 20 3F C6 33 20 3B 7F 0C
1080  00 5F CE 00 00 E7 00 5C C1 EF 26 01 5F 08 8C 02
1090  00 26 F2 CE 00 00 5F E1 00 26 DF 5C C1 EF 26 01
10A0  5F 08 8C 02 00 26 F0 B6 0C 00 4C B7 0C 00 84 03
10B0  26 CF B6 10 02 26 6C 20 02 20 72 4F B7 0C 00 CE
10C0  00 00 A7 00 E6 00 11 26 19 08 8C 02 00 26 F3 F6
10D0  0C 00 C4 03 5C F7 0C 00 C1 04 26 E3 4D 26 04 4A
10E0  20 DD 3F 86 2A BD E1 D1 F6 10 03 5C F7 10 03 C1
10F0  0B 27 03 7E 10 11 C6 02 B6 08 00 7F 10 02 CE 00
1100  00 08 27 23 B6 10 02 27 F8 5A 26 EF F7 10 02 F7
1110  08 00 01 01 B6 10 02 27 12 0F CE 11 3C BD E0 7E
1120  7E E0 D0 C6 34 20 06 C6 36 20 02 C6 37 0F 37 CE
1130  11 49 BD E0 7E 32 BD E1 D1 7E E0 D0 2A 2A 20 41
1140  4C 4C 20 4F 4B 20 2A 2A 04 2A 2A 20 45 52 52 4F
1150  52 20 23 04 86 01 B7 10 02 3B
```

A000  11 54

After entry, go back and double check the code. The program should be started at 1000 hex (set MIK-BUG's or SWTBUG's A048-A049 to 1000 hex). **RESET SHOULD BE PRESSED EACH TIME PRIOR TO RUNNING THE DIAGNOSTICS!** If all goes well, the program will print out 12 stars (*) followed by "ALL OK**". If this is not printed one of two things may happen. First you may get a message, "**ERROR #n**" where n is a number from 0 to 7. If this is the case check the chart below which tells which ICs may be bad. You should also check all traces both to and from the ICs mentioned to make sure there are no bad connections, solder bridges, or foil breaks. Chances are that if there is a problem you will find it in the area specified in the table.

| ERROR # | THINGS TO CHECK |
|---------|-----------------|
| 0 | Try reset, IC19, 24 |
| 1 | IC20, 21, 23, 26, 31 |
| 2 | IC22, 23, 24, 27, 30, 31 |
| 3 | IC22, 27, 30, 31 |
| 4 | IC17 |
| 6 | IC17, 19, 24, 29 |
| 7 | IC19, 26, 29 |

The second failure will make the program exit with a register dump (the same as "R" in MIKBUG). If this occurs there is probably a bad memory chip. When this happens you should make note of the contents of the A, B, and X registers. A will contain the byte of data which was written to memory; B will contain what was read back from memory in error; and X will point to the bad memory address. Using this information, you should be able to determine which bit is bad in the byte. Knowing which bit is in error, use the following information to determine which memory chips may be defective.

| BIT 0 | IC1 or IC2 |
|-------|------------|
| BIT 1 | IC1 or IC2 |
| BIT 2 | IC1 or IC2 |
| BIT 3 | IC1 or IC2 |
| BIT 4 | IC3 or IC4 |
| BIT 5 | IC3 or IC4 |
| BIT 6 | IC3 or IC4 |
| BIT 7 | IC3 or IC4 |

Remember to press "RESET" before each running of the diagnostic. Failure to do this will cause an error #0.

## Theory of Operation

The TSC Multi-User Board is divided into three main sections. Each section will be discussed separately.

I.   The first part is the board buffering. There are 2 chips (IC32 and 33) which act as bidirectional data buffers to transmit and receive data from the bus. These are enabled by several gates which determine the direction of data transfer. Another set of buffers (IC22, 27, 28, 30, and 31) provide address line buffering to the board.

II.   The next section of the board contains memory and memory select circuitry. There are 4 blocks of memory each containing 512 bytes of 8 bits each. The individual blocks are selected by a read/write 2-bit register. This register can be set by software. IC23 is the heart of the block select circuit. Memory chips IC1-3 make up 2 of the 512 byte blocks while IC2-4 make up the remaining 2 blocks.

III.   The last section of the board is a special purpose variable time interrupt clock. IC17, a 555 timer is the main oscillator which is controlled through ICs 19 and 29. IC18 provides pulse shaping for the actual interrupt pulse sent out to the 6800.

## How to Use It

The Multi-User board was designed to operate with the supplied or optionally available Multi-User software; however, the board may be used with the user's own custom software if it has been written to be compatible with the Multi-User board. Understanding the operation of the board will also aid in debugging the board if a problem is indicated by the diagnostics.

The Multi-User board contains 2048 bytes of static RAM memory; however, only 512 bytes of that memory may be addressed at any one time. The 512 byte block selected is physically addressed from 0000 thru 01FF. The register that selects which 512 byte block to be accessed is located at address 0C00 and is called the page register. Bits zero and one of 0C00 actually determine which of the four pages is to be selected. Note that there are four possible combinations with the two bits. The remaining bits of the byte are ignored when writing but are best when set to ones. The page register is a read/write register and will respond with FC, FD, FE, or FF depending upon the contents of the register. Once the page has been set to some specific value, it will remain in that state until changed by software or power down. The idea behind using the register is that the program variables of any one of up to four users may be stored in spearate 512 byte partitions with each being activated in sequence by a hardware timer on the board which is connected to the computer system's interrupt line. Since 256 bytes of each partition are addressable by direct mode instructions, high system throughout can be achieved.

The memory location used to control this interrupt clock is at address location 0800. The interrupt clock is automatically turned off at power up and whenever the computer system's manual RESET button is depressed. To start the clock do a read to memory location 0800. No useful data will be output but the interrupt timer will be turned ON. The timer's period is fixed in length and is approximately five milliseconds long. In other words, a pulse will be output to the computer system's IRQ line every 5 milliseconds. Before you activate the timer be sure that you have code resident in memory to handle these five millisecond interrupts and have vectored the IRQ pointer in the scratchpad RAM to this code otherwise unpredictable things will happen. At anytime the timer is running, a new interrupt pulse may be generated and the timing sequence restarted by writing to memory location 0800. The data output is not important and is ignored by the Multi-User board. Once the interrupt clock is started, it can only be stopped by RESETing the computer system. Address location 0800 and 0C00 are not uniquely decoded and may be accessed from 0800 thru 0BFF or 0C00 thru 0FFF respectively.

## In Case of Problems

If the board does not function as it is supposed to, double check to make sure that the computer's memory is functioning properly. If there is a problem especially with the 1000 thru 1FFF (4K thru 8K) block of memory the supplied diagnostic may not even be functioning properly. If the problem does seem to be with the Multi-User board, remove power, unplug the board and check it over carefully for proper component installation and soldering. The information given in the "How to Use It" section of the manual may aid in isolating the problem. If you cannot repair the board yourself, it may be returned to SWTPC for repairs. The board will be repaired for a flat rate labor charge of $25.00 plus parts and postage. A confirmation will be sent upon receipt of the kit. Please do not ask for a detailed report on what was done in repairing your unit, we cannot provide this service.

## SHIPPING INSTRUCTIONS

Pack in a large carton with at least 3 inches of padding on all sides. Do not attempt to return the kit in the original box.

Include all relevant correspondence and a brief description of the difficulty.

Ship **prepaid** by UPS or insured Parcel Post. We cannot pick up repairs sent by bus.

Ship to:

Southwest Technical Products Corp.
Repair Department
219 W. Rhapsody
San Antonio, Texas 78216

# Parts List — MUB-68 Multi-User Board

## Resistors

——— R1    33K ohm   ¼ watt resistor
——— R2    3.3 K ohm  "    "    "
——— R3    68K ohm   "    "    "
——— R4    1K ohm    "    "    "

## Capacitors

——— C1    100 pfd capacitor
——— C2    0.05 mfd disk capacitor
——— C3    0.01 mfd disk capacitor
——— *C4   220 mfd @ 10 VDC (minimum) electrolytic capacitor
——— C5    0.1 mfd disk capacitor
——— C6    "    "    "    "
——— C7    "    "    "    "
——— C8    "    "    "    "
——— C9    "    "    "    "
——— C10   "    "    "    "
——— C11   "    "    "    "
——— C12   "    "    "    "
——— C13   "    "    "    "

## Integrated Circuits

——— * IC1    2114 or TMS-4045 1K x 4 static RAM memory (MOS)
——— * IC2    "    "    "    "    "    "    "    "
——— * IC3    "    "    "    "    "    "    "    "
——— * IC4    "    "    "    "    "    "    "    "
——— * IC17   555 timer
——— * IC18   74121  one shot
——— * IC19   7416  hex inverter/buffer
——— * IC20   74LS02 quad NOR gate
——— * IC21   74LS20 dual 4 input NAND gate
——— * IC22   74LS04  hex inverter
——— * IC23   74LS74  dual flip-flop
——— * IC24   74LS00 quad NAND gate
——— * IC25   74LS30 8 input NAND gate
——— * IC26   74LS20 dual 4 input NAND gate
——— * IC27   74LS04 hex inverter
——— * IC28   74LS04  "    "
——— * IC29   74LS20  dual 4 input NAND gate
——— * IC30   74367 / DM8097 hex buffer
——— * IC31   74367 / DM8097  "    "
——— * IC32   74LS242 quad transceiver
——— * IC33   74LS242  "    "
——— * IC34   7805  5-volt regulator

Note: IC5 thru IC16 are not used.
* All components flagged with a * must be oriented as shown in the component layout drawing.

# PARTS LIST for the TSC Multi-User Board

## GENERAL:

| | |
|---|---|
| 1 | P. C. Board |
| 1 | Cassette containing Multi-User Micro BASIC Plus |
| 1 | Users manual for Multi-User Micro BASIC Plus |
| 5 | 10 pin Molex Connectors |
| 20 | 16 pin I. C. Sockets |
| 12 | 14 pin I. C. Sockets |
| 1 | 8 pin I. C. Socket |
| 2 | Heat Sinks |
| 2 | 4-40 x 1/4" Screws and Nuts |
| | Solder |

## RESISTORS:

| | | |
|---|---|---|
| R1 | 33K ohm | (Orange, Orange, Orange) |
| R2 | 3.3K ohm | (Orange, Orange, Red) |
| R3 | 68K ohm | (Blue, Grey, Orange) |
| R4 | 1K ohm | (Brown, Black, Red) |

## CAPACITORS:

| | |
|---|---|
| C1 | 100 pF |
| C2 | .05 uF |
| C3 | .01 uF |
| C4, C5 | 100 uF |
| C6-C9 | .01 uF |

## INTEGRATED CIRCUITS:

| | | |
|---|---|---|
| IC1-16 | 2102 | Static RAM |
| IC17 | 555 | Timer |
| IC18 | 74121 | One-shot |
| IC19 | 7416 | Inverter |
| IC20 | 7402 | Nor Gate |
| IC21 | 7420 | 4-Input Nand Gate |
| IC22 | 7404 | Inverter |
| IC23 | 7474 | Flip-Flop |
| IC24 | 7400 | 2-Input Nand Gate |
| IC25 | 7430 | 8-Input Nand Gate |
| IC26 | 7420 | 4-Input Nand Gate |
| IC27, 28 | 7404 | Inverter |
| IC29 | 7420 | 4-Input Nand Gate |
| IC30, 31 | 74367 | Buffer |
| IC32, 33 | 8835 | Buffer |
| IC34, 35 | 7805 | Voltage Regulator |

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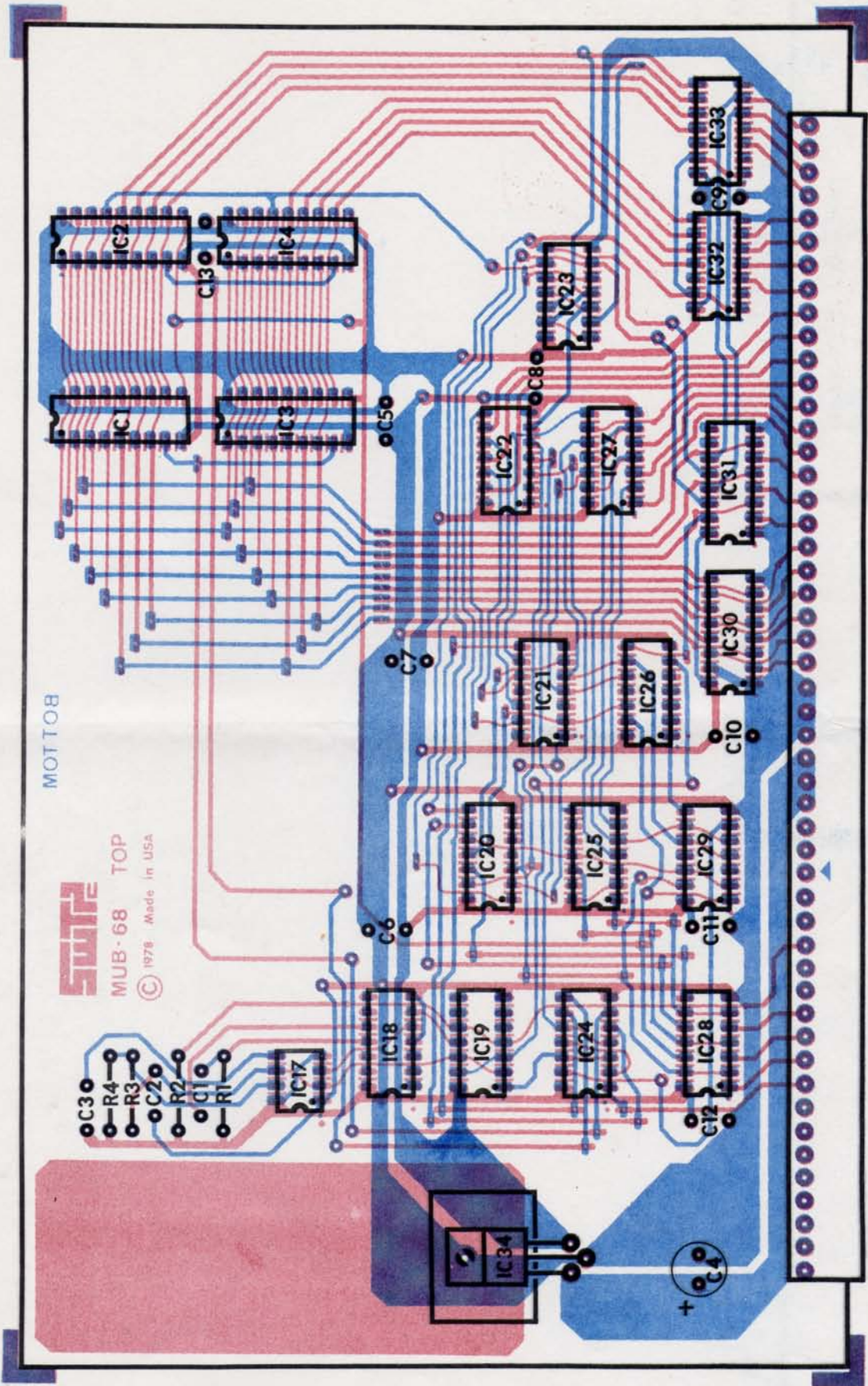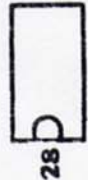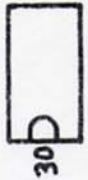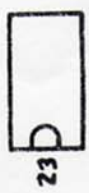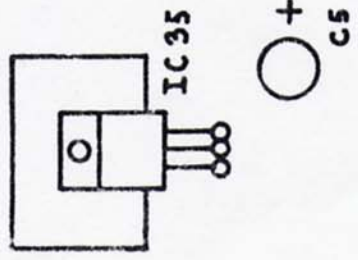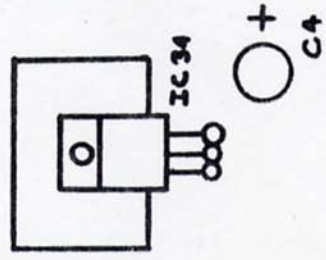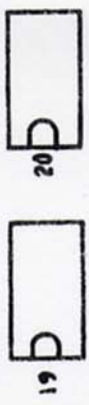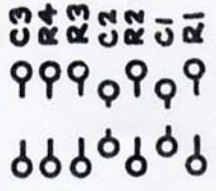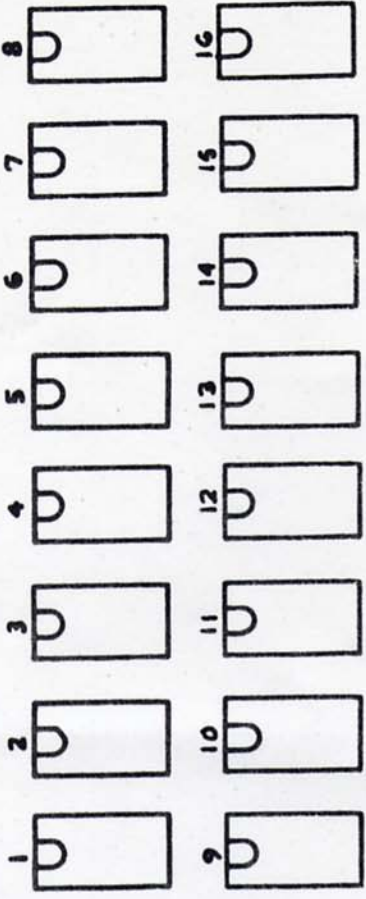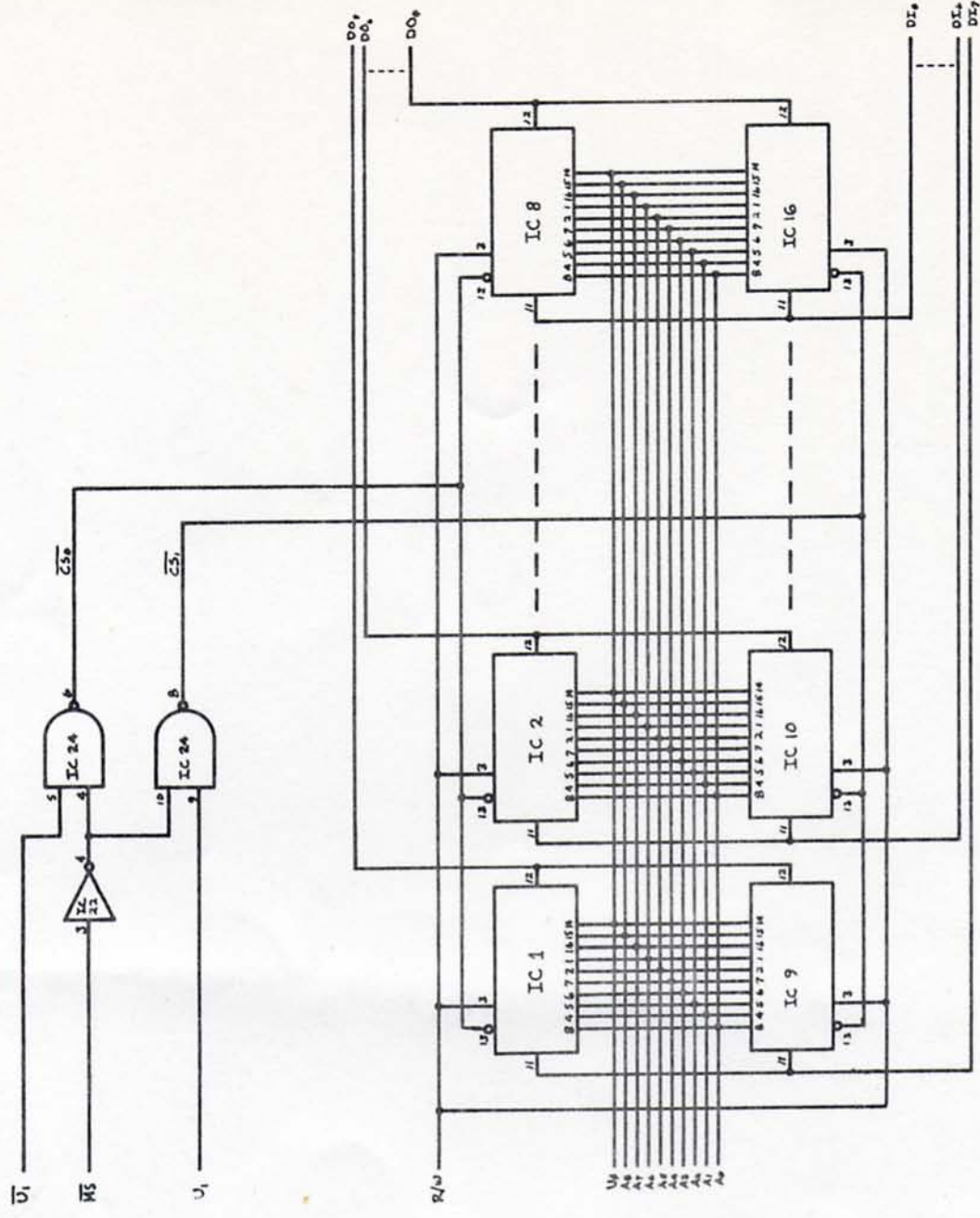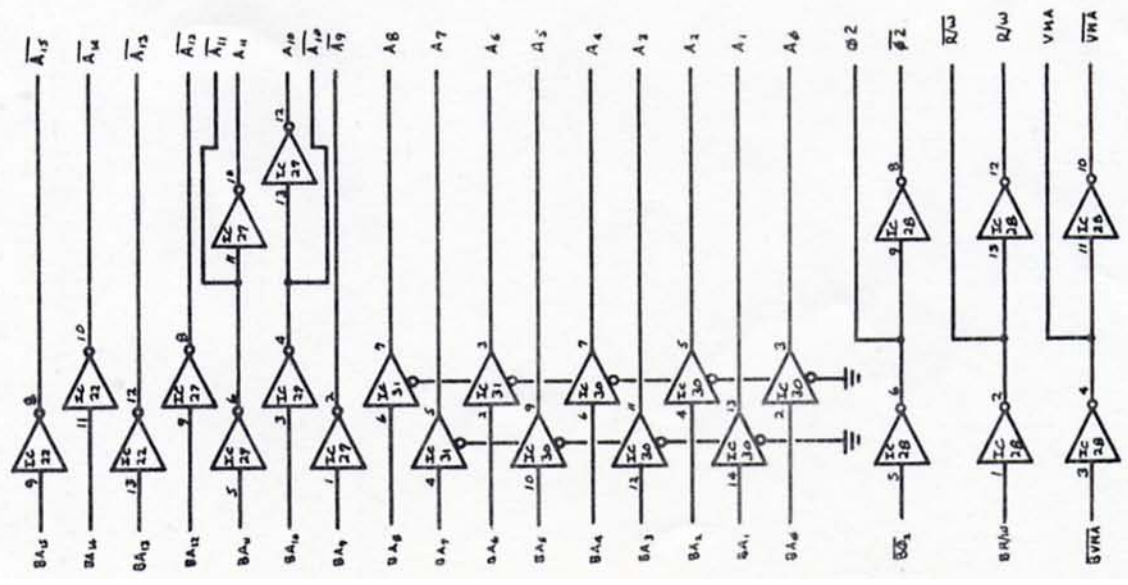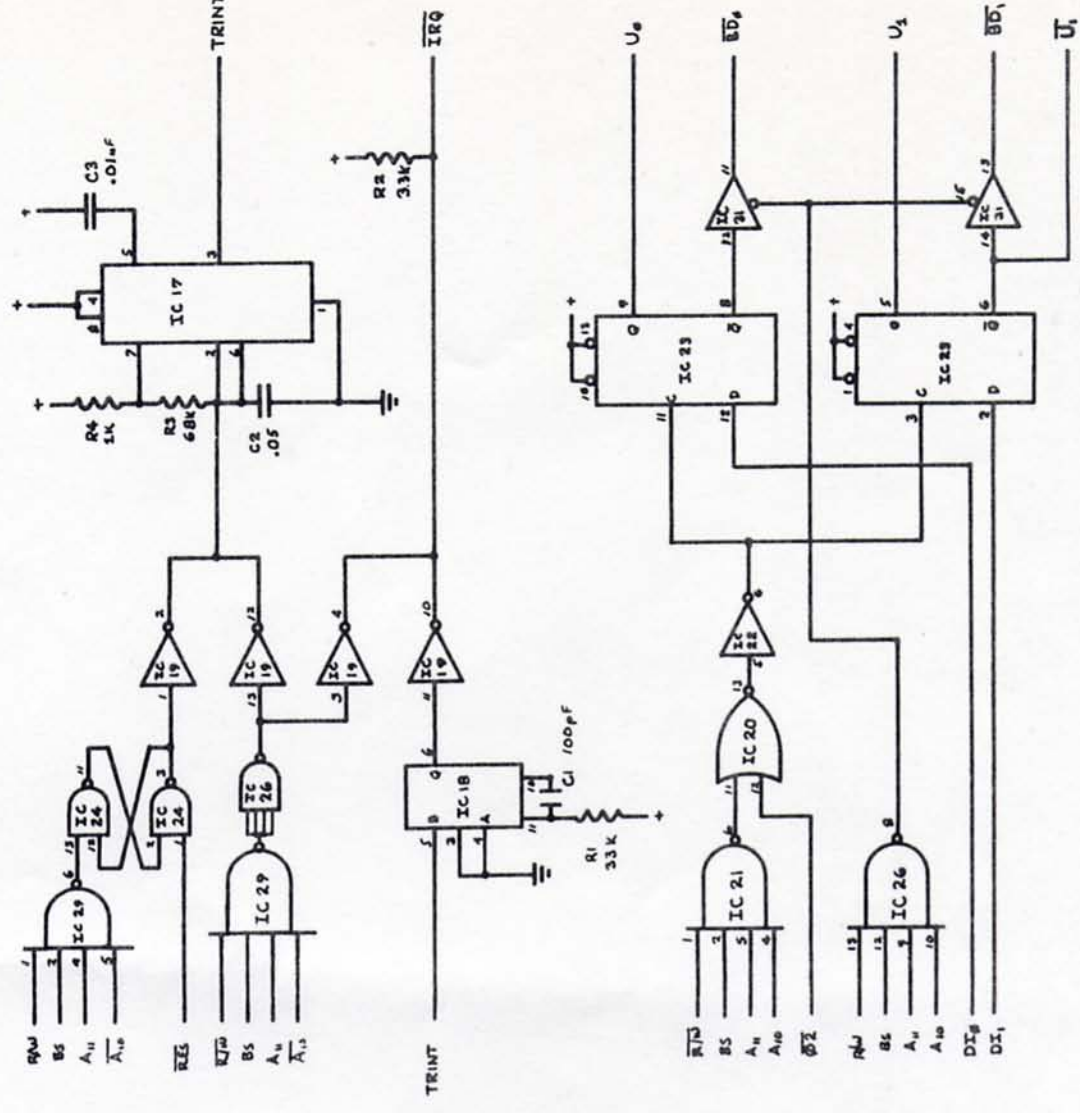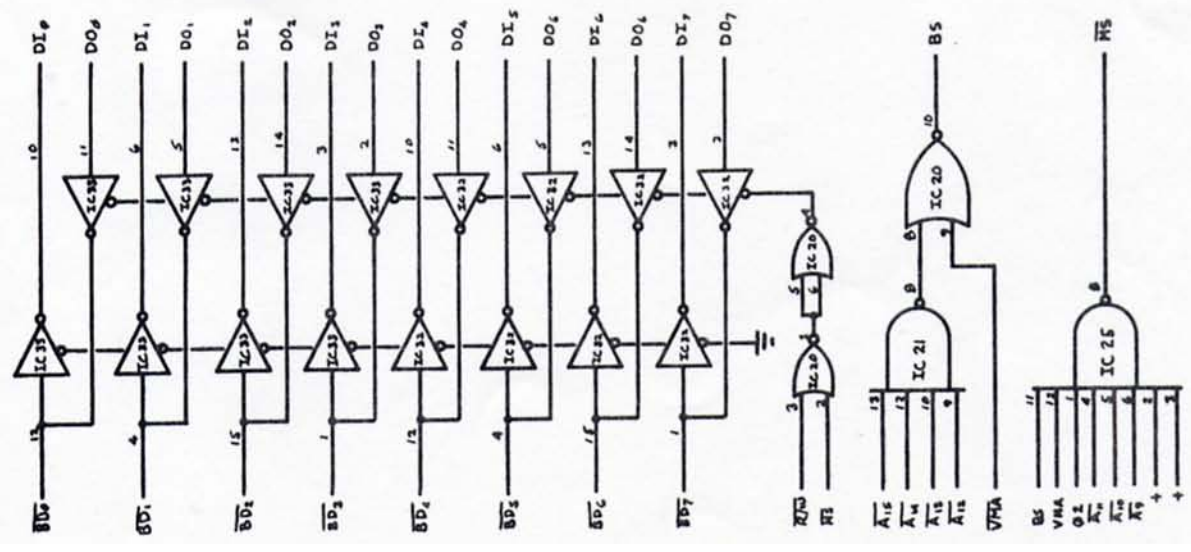
# MULTI-USER DISK BASIC VER. 1.0

Due to the fact that this disk Basic will be run in a multi-user environment, several limitations have been placed upon its command set. Most of these limitations affect the ability of one user to interfere with another user. The following is a list of the features of single user Disk Basic 3.0 that are not supported under Multi-User Basic Ver. 2.0.

1.) Control interfaces are not supported.

2.) The DOS command has been deleted.

3.) The MON command has been deleted.

4.) the PORT= function is no longer supported.

5.) The cassette commands TAPPEND, TLOAD, and TSAVE are no longer supported.

6.) The USER, PEEK, and POKE functions are no longer supported.

7.) Only PRINT or PRINT #7 are permitted. Port 7 is assumed to be a parallel output port, usually connected to a printer.

8.) The memory map of Disk Basic Ver 3.0 is no longer correct. In addition, I/O is not vectored in the same manner as on single-user disk basic.

9.) The PLIST directive is no longer supported.

Since the multi-user basic loads at location $1000 and extends to approximately $3200, and DOS begins at $7000, there is somewhat less than 16K available to partition among 4 users. If all four terminals are active, user space may be limited.

The Multi-User Basic looks at I/O ports 0 - 3 for an MP-S Serial Interface. The number of interfaces present determines the number of users assigned. For example, if interface cards are present in ports 1 and 3, two users are assigned.