This guide is written to help our customers bring up their I.C.M CPU board and the Disk operating system using CP/M 2.2. It is recommended that you read this document first so that the user will understand what the software and hardware interface is about.

TABLE of CONTENTS

Page	Description
1.	Starting up the I.C.M CPU board.
2.	Making system disk backup disks
3.	Operational Notes
4.	TURBO.ASM file Equate explanation.
5.	BOOT.ASM file Equate explanation.
6.	Changing your CP/M operating system.

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Starting up the I.C.M. CPU Board

1. Remove power from your mainframe.

2. Place your I.C.M. CPU board into an S-100 mainframe.

3. Remove any other S-100 cards in your mainframe until you have successfully run the I.C.M. CPU board.

4. Mount all paddle boards supplied with the CPU board on the back panel of your mainframe. Read any caution notes that may have been provided with regard to your paddle boards.

5. Connect an RS-232 cable between your terminal and the RS-232 paddle board mounted on the rear of your mainframe.

6. Connect your disk drive cable to the floppy paddle board.

7. Turn on your mainframe power and push the reset button.

8. Push the CARRIAGE RETURN key on your terminal until the sign-on message is seem on your screen. **** NOTE **** The I.C.M CPU will seek the baud rate of your terminal until it finds the baud rate which matches, or will default to 300 baud if it can not find the baud rate of your terminal in it's internal table. If you do not see any sign-on message after striking the CARRIAGE RETURN key for a while, consult the manual for standard baud rates for which the system monitor will use.

9. A list of monitor commands is contained in your CPZ 48000 manual.

10. Place your system disk into drive A and type the B command, followed by a carriage return. You should then see the CP/M disk operating system sign-on message. If you get a BOOT ERROR message from the monitor, you may have a problem with your disk drive option jumpers. Consult your disk drive manual for information concerning jumper options.

11. If you have the CP/M 2.2 operating system up and running, read the section in this user's guide about making backup diskettes.

12. The SYSTEM Monitor Prom contains a feature where it can sense if you have placed your diskette into drive A and close the door. If your disk is in place, then after you type your carriage returns to set the baud rate, instead of signing on in the monitor prom, it will BOOT your system disk.

B>a

1. Place either a single sided or double sided diskette into drive B. If you are using double sided diskettes, you should use certified diskettes, as the back side of single sided diskettes are not usually certified.

2. Type FMT512<cr> to load the double density format program.

3. The questions asked by the format are straight forward and should not need explaining here.

4. After you have answered these questions, the format program will format the entire diskette with 16 sectors of 512 bytes per track.

5. After the format program has stopped, type a Q to quit and return to CP/M again.

6. Now type DSKT512<cr> to check the diskette for any sector errors.

7. Next, enter the Starting track number (usually 0), the Ending track number (usually 76), whether the disk is single sided or double sided, if double sided, which side you wish to check, and finally a <cr> when you are ready.

8. If you find a lot of errors, you may try to reformat the disk again. Sometimes it is necessary to reformat a disk a couple of times before errors completely stop. Also, the quality of the diskette will have a lot to do with errors.

9. Now you are ready to backup your system disk. The program called COPY512 is the disk copy utility which you will use. The program is self prompting and should not require any explanations. After you have backed up your system disk, besure to mark it with the Copyright notice as shown on the front of your system disk.

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This page will explain the equates for your bios file and what they are used for. Please NOTE,,, This page as well as the TURBO.ASM file will change from time to time as needed to provide our customers with the best possible software that we can.

******** This Explanation is for TURBO.ASM dated 9-10-82 or greater ********

Equate	Explanation
TRUE	This equate tells the assembler what the word TRUE means.
FALSE	This equate tells the assembler what the word FALSE means.
CPMSIZ	This equate determines the CP/M memory size in Kbytes.
IOBASE	This equate determines the base I/O address of the CPZ 48000. (a harware change is necessary to change the physical I/O address of the board. Please consult the factory for details)
BELERR	This equate when set TRUE will ring the console bell for each disk READ or WRITE error that may occur.
KEYINT	This equate when set TRUE will allow you to use the Keyboard interrupts.
BUFLEN	This determines the number of characters that may be entered into the Keyboard type-ahead buffer for interrupts.
MTOM	This equate if set TRUE will cause the bios file to use the DMA controller for memory to memory transfers in place of the Z80 block move instruction.
TURBO	This equate if set TRUE allows you to define additional memory as the TURBO-DISK memory drive. Extended address memory boards such as Intercontinental Micro Systems 256 Kbyte dynamic may be combined in any number up to 1 Megabyte and used as TURBO-DISK.
MEMBNK	This equate defines the number of 64K banks of memory for use with TURBO-DISK. e.g. 256 Kbytes of memory = 4, 64K banks.
MDIRS	This equate sets the number of directory entries that TURBO-DISK will use. Consult your CP/M 2.2 Alteration Guide for more information.
NFLOPS	This equate sets the number of physical drives you have on your system. < note > This number should not be larger than the number of drives you actually have.
PERSCI	This equate must be set TRUE if you are using a PERSCI drive. Do not set this equate true if you are not using PERSCI drives.
AUTDRV	This equate if set TRUE allows the CP/M operating system to search Drive A for files which are not on the current logged in

drive.

SERPNT — This equate if set TRUE uses the serial Port A as the List Device for CP/M. If this equate is false, then the Parallel port will be used as the List Device.

TIMER — This equate allows the REAL TIME CLOCK option to be used. This is a real time clock based on the system interrupt from channel 2 of the timer chip. The time is always stored in Memory as follows:

Addr	0008h	0009h	000Ah	000Bh	000Ch	000Dh	000Eh
Type	Year	Month	Day	Hours	Mins	Secs	20ms time

These addresses and byte locations will not change, so that people will be able to write the necessary routines and use them in their Programs. The time and date values stored above are in HEX and will require conversion to decimal in your programs. (note: Year and Month are not used in the interrupt routine. They DO NOT advance.)

AUTOTIM — This equate if set TRUE causes the auto load of the SETTIME program when you first boot up your system disk. This program asks you to set the real time clock values.

SLORST — This equate controls the RESTORE STEP RATE for the drive. Some drives will not restore at speeds like 3 msecs, so by setting SLORST to 1, the effective step rate is slowed by 1. As all drives do not have this problem, some testing may be neccessary. Warmboots will be your first good indication.

HLABSK — This equate controls head loads during seek operations. If set equal to 8, you will have quieter drive operation than if you set it equal to 0, which unloads the head at the beggining of each new seek. This equate does not keep the head loaded onto a diskette forever while power is applied. The head will still unload as normal after an operation is completed.

ERRCNT — This equate determines the number of retries that will be used in the event of a error. This number should not be set to high, or else you will be spending a lot of time waiting for recovery.

BOOT.ASM file equates

This page will explain the equates for your boot file and what they are used for. Please NOTE,,, This page as well as the BOOT.ASM file will change from time to time as needed to provide our customers with the best possible software that we can.

******** This Explanation is for BOOT.ASM dated 4-29-82 ********

Equate	Explanation
TRUE	This equate tells the assembler what the word TRUE means.
FALSE	This equate tells the assembler what the word FALSE means.
CPMSIZ	This equate determines the CP/M memory size in Kbytes, and this equate must match the CPMSIZ equate in TURBO.ASM for proper operating system bootup.
CLRCSR	This equate defines the clear screen code for your terminal. If you do not want this feature, just set it to a carriage return (0D Hex).
STPRAT	This equate determines the step rate of your drives and is used by the bios file TURBO.ASM when the system is brought up. This byte determines your system step rate.
DBLSID	This equate determines whether you are using a single sided, or a double sided system disk. If this equate is set to FALSE, you can only place an operating system on a single sided disk. If this equate is set TRUE, you can place an operating system onto a double sided diskette.
SPT	This equate determines the number of single density sectors on track 0, and should not be changed from 26.
SDD	This equate determines the number of remaining system sectors to read in during system boot up. This equate can take on the values of 8 to 16, and should only be changed when you add each additional 512 bytes of code to TURBO.ASM. As normally supplied the boot program will read in the TURBO.ASM file with the value set in SDD = 9. You may read in a larger bios file by changing adding a count of 1 for each additional 512 bytes added to the TURBO.ASM file to the value of SDD. You will also have to move the operating system down in memory as you increase the size of the bios file. It is possible to read in a bios file which is 4 Kbytes larger than the one supplied on you diskette. Things like video drivers, modem control, or any really fancy software drivers could be added.

Changing you CP/M Operating System

This page decribes how to change your CP/M memory size and rebuild your system disk.

The following files are required, and should be placed on your work disk.

a.BOOT.ASM - boot file for system
b.TURBO.ASM - bios file for system
c.IOEQU.LIB - turbo.asm i/o equate file
d.Z80.LIB - Z80 equate macros
e.DISKDEF.LIB - disk defination library
f.TURBO.LIB - TURBO-DISK macro library
g.MOVCPM.COM - system image generator
h.DDT.COM - system debugger program
i.ED.COM - cpm editor program
j.MAC.COM - Digital Research Macro Assembler
K.SGEN512.COM - deblocked sysgen program

1. Using the editor, load in the TURBO.ASM file and change the CPMSIZ equate to the memory size you wish to run your system at. Valid CP/M sizes are listed in Table 1 at the end of this guide. You may also make any other changes you wish at this time.

2. Exit from the editor, and assemble the TURBO.ASM file.

3. Using the editor, load in the BOOT.ASM file and change the CPMSIZ equate to the same size you used in the TURBO.ASM file. You should also change the DBLSID equate to match the diskette you plan to place the system onto.

4. Exit from the editor, and assemble the BOOT.ASM file.

5. Now you must create an image file of the CP/M system you wish to run. Type MOVCPM xx *<cr> where xx = the memory size you wish to run. Then type SAVE 34 CPMxx.COM<cr> where xx = memory size.

6. Now the system image just created must be overlayed with the new bios and boot files. Type DDT CPMxx.COM<cr>
This loads in the image file into memory. Now type ITURBO.HEX<cr>, then Rbias<cr>. The bias is given in the chart in Table 1 for the memory size you have chosen. This completes the loading of the bios file.

7. Next, overlay the boot file as follows:
Type IBOOT.HEX<cr>, then R900<cr>. You A L W A Y S use R900.
This completes the loading of the boot file.

8. Now type G0 or cntl-C to exit back to CP/M.

9. You are now ready to place your new system onto a new diskette. Type SGEN512<cr> to load in the deblock sysgen program. When it asks you for SOURCE drive, type a carriage return, as the new system is already in memory. When asked for the DESTINATION drive, answer with the drive letter and type return. At this point you will be asked if the disk is double sided. If it is, answer with a Y and type return. If it is not a a double sided disk, then answer with a N and type return. If you make a mistake about the drive being the wrong side, don't worry, the SGEN512 program will not let you write to the disk unless it is the correct sided diskette.

10. Type return to exit from the SGEN512 program.

11. Now your new system disk is ready to boot up on, and transfer files to.

Relocation factors for CP/M 2.2 verses CP/M size

64 K CP/M size = Relocation factor 2580
63 K CP/M size = Relocation factor 2380
62 K CP/M size = Relocation factor 2D80
61 K CP/M size = Relocation factor 3180
60 K CP/M size = Relocation factor 3580
59 K CP/M size = Relocation factor 3980
58 K CP/M size = Relocation factor 3D80
57 K CP/M size = Relocation factor 4180
56 K CP/M size = Relocation factor 4580
55 K CP/M size = Relocation factor 4980
54 K CP/M size = Relocation factor 4D80
53 K CP/M size = Relocation factor 5180
52 K CP/M size = Relocation factor 5580
51 K CP/M size = Relocation factor 5980
50 K CP/M size = Relocation factor 5D80
49 K CP/M size = Relocation factor 6180
48 K CP/M size = Relocation factor 6580
47 K CP/M size = Relocation factor 6980
46 K CP/M size = Relocation factor 6D80
45 K CP/M size = Relocation factor 7180
44 K CP/M size = Relocation factor 7580
43 K CP/M size = Relocation factor 7980
42 K CP/M size = Relocation factor 7D80
41 K CP/M size = Relocation factor 8180
40 K CP/M size = Relocation factor 8580
39 K CP/M size = Relocation factor 8980
38 K CP/M size = Relocation factor 8D80
37 K CP/M size = Relocation factor 9180
36 K CP/M size = Relocation factor 9580
35 K CP/M size = Relocation factor 9980
34 K CP/M size = Relocation factor 9D80
33 K CP/M size = Relocation factor A180
32 K CP/M size = Relocation factor A580
31 K CP/M size = Relocation factor A980
30 K CP/M size = Relocation factor AD80
29 K CP/M size = Relocation factor B180
28 K CP/M size = Relocation factor B580
27 K CP/M size = Relocation factor B980
26 K CP/M size = Relocation factor BD80
25 K CP/M size = Relocation factor C180
24 K CP/M size = Relocation factor C580
23 K CP/M size = Relocation factor C980
22 K CP/M size = Relocation factor CD80
21 K CP/M size = Relocation factor D180
20 K CP/M size = Relocation factor D580
19 K CP/M size = Relocation factor D980
18 K CP/M size = Relocation factor DD80
17 K CP/M size = Relocation factor E180
16 K CP/M size = Relocation factor E580

Table 1