

ICM

**TURBODOS
CONFIGURATION
MANUAL**

TurboDOS Configuration Manual

A Solution To The Integration Irritations
Encountered With I.C.M. Products.

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JUNE 1986

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TurboDOS SYSTEM OVERVIEW

1. TurboDOS SYSTEM OVERVIEW

The operating system you are about to install is one of the most advanced and flexible systems known to microcomputers. If you are at all familiar with assembly language programming and the use of relocatable .REL modules you will be right at home with TurboDOS. If not, the following sections will help you understand the basics of operation and allow you to "Think TurboDOS" while configuring your system. The overview section gives [background] information about TurboDOS and the remainder of the configuration manual will give you any step-by-step procedures that may be necessary for you to configure TurboDOS for your computer. Please use the references to your TurboDOS manuals, hardware manuals and appendixes for more in-depth information and examples.

TurboDOS is built around a core of standard program modules which are relocatable and "patchable". Using the GEN or TLINK commands which come with your TurboDOS distribution diskette, you will actually reconfigure the various software building blocks into an executable operating system which is designed to optimize your hardware and operational requirements.

TurboDOS is very similar in its outward appearance (operator interface) to CP/M 2.2 and CP/M-86 and will actually support most CP/M programs which you may be running now. There is also support for MP/M and MP/M-86 functions. Above all, TurboDOS is a networking operating system that allows multiple computers to be linked together. ICM supports tightly coupled links using the S-100 bus as a high speed communication medium. Loosely coupled links are made with ARCnet protocol over coaxial cable. These two techniques of coupling can be combined into a single LAN such as a group of IBM-PC's or diskless WorkStations which can share S-100 based mass storage devices and printers.

Your TurboDOS distribution diskette from ICM contains all the necessary operating system modules, hardware drivers, and utilities (tools) necessary to reconstruct and reconfigure your basic operating system in any number of possible configurations. Note - The distribution diskette as received will "Boot-up" single user with a minimum system configuration which is outlined in the manual. The added flexibility and power of TurboDOS also increases the configurability of the operating system and its versatility of installation.

TurboDOS SYSTEM OVERVIEW

The system start-up procedure is a stepping-stone-like affair whereby several processes occur to load an operational multi-user system. At power-on, the boot PROM located on the CPZ will execute and initialize the micro processor and its local support circuitry (RAMS, I/O, etc.). The boot PROM (loader) program will also open a path to the floppy disk (or optional hard disk) and search for a program called OSLOAD. Your distribution TurboDOS boot prom looks for up to four floppies to be connected (A, B, C, & D) to the system and the boot program will attempt to look sequentially through each drive directory seeking the OSLOAD program. If your hardware configuration is less than four floppies, the system will only look at those which are operative and the procedure will continue until the OSLOAD program is found. Assuming the file is found on the distribution diskette in one of the attached drives, the boot program will load it into the RAM of the CPZ and then execute.

The OSLOAD program is in itself a "mini-operating system". The function of OSLOAD is to load the real operating system which exists in a file called OSMaster.SYS on your distribution diskette. The make-up of OSLOAD must be such that it contains the proper program modules to support your hardware configuration. As supplied, the OSLOAD program only knows about the four floppy drives mentioned above.

Refer to Appendix C for sample listings of CPZLOAD.GEN and CPZLOAD.PAR, which are the ICM files that are used to construct OSLOAD.COM. You will note that the drivers listed in CPZLOAD.GEN are an accumulation of standard TurboDOS modules (STDLOADR, RTCNUL) and, ICM hardware drivers (i.e. CON96, NITCPZ, SPDCPZ, DSKCPZ1, DST58I), and other hardware related drivers (i.e. MD131DRV for hard disk drives etc.). These are the modules which will be loaded by the bootprom and executed to start initializing the computer to load your full TurboDOS operating system. The CPZLOAD.PAR files are the parameter files which must accompany the CPZLOAD.GEN files when you re-generate (GEN) the loader program (OSLOAD.COM) to meet your specific hardware requirements. We will cover this re-generation procedure at a later time. The OSLOAD.COM program you eventually construct will be dependent on your hardware and the way in which you want your system to initialize and boot up.

TurboDOS SYSTEM OVERVIEW

The distributed ICM standard configuration of OSLOAD.COM is capable of loading the system from floppy drives only. If you want your system to load your TurboDOS operating system from the system hard disk you will have to enable hard disk boot-up. Hard disk installation will be covered in the hard disk installation section. As supplied, the system will boot from floppies A: through D: only. Simply stated, your OSLOAD.COM file must initialize enough of your system to allow it to load the OSMMASTER.SYS file from a floppy or hard disk drive. The OSLOAD.COM does not control printers, clocks, slaves, etc. Its sole function is to load the OSMMASTER.SYS file, thus the overall size and complexity of OSLOAD.COM is small. Once this OSLOAD.COM file has been assembled according to your boot needs, it can remain fixed no matter what else you add to your eventual system.

Once OSLOAD is loaded into the CPZ SBC single board computer it will begin to execute. Its purpose is to load the operating system image file (OSMASTER.SYS) from one of the floppy drives attached to the system. Your distribution diskette OSMMASTER.SYS consists of the modules in CPZDOS.GEN which is listed in Appendix C. You will note that the files in this module relate not only to the basic system hardware and software functions, but also to features like printers, automatic clock calendar function, floppy hard and RAM disk drives. The same basic device drivers which were included in the OSLOAD.COM loader are also included on the OSMMASTER.SYS system image because they are still needed to operate the system terminal and disk devices. When the operating system is reconfigured through addition or subtraction of various driver modules, the entire operating system (OSMASTER.SYS file) must be re-generated. Each module used to construct the actual operating system (i.e. CON96, NITCPZ, SPDCPZ, DSKCPZ1 and DST58I), is a relocatable driver module used to generate the complete operating system. The re-generation is completed through the use of the GEN program provided on your distribution diskette. More on this procedure later in this document. Once the OSMMASTER.SYS is loaded, you are "up on TurboDOS".

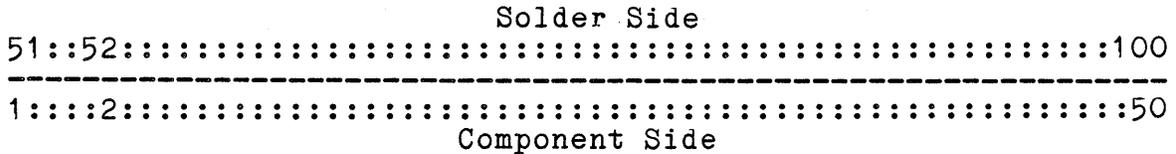
2. TurboDOS SYSTEM START UP PROCEDURES

ICM supplies 8", single-sided, double-density and several 5 1/4" floppy formatted TurboDOS diskettes configured to boot-up in a single-user mode. This procedure allows you to minimize areas of potential problems by running the least complicated hardware/software configuration possible during start-up. The following procedures are a step-by-step method designed to allow you to bring up your complete system, first as an optimized single-user, and finally as multi-user. The single-user procedures begin with basic motherboard voltage checks to insure proper supply voltages; proceed with configuration of floppy diskettes, CRT terminals, printers, battery backed-up clocks, RAM disks; and end with hard disks. Once the master CPZ SBC and these peripheral devices are operational, the multi-user capabilities are integrated. Each user (slave processor, 8 or 16 bit CPS-MX, CPS-BMX or CPS-16) is then brought up in an orderly process until all users are "alive and well." This procedure will save you much time and aggravation if strictly adhered to during start-up. Bear in mind that this procedure is elementary in its scope of the available capabilities of TurboDOS features.

2.1. S-100 Bus Voltage Verification

The first thing to check when setting up the system is the S-100 Bus voltages. *WARNING* Failure to insure proper voltages can void warranty on I.C.M. supplied cards.

S-100 Bus Pin out:



(Bus connector viewed from top)

Pins 50 and 100 are ground pins. With all boards removed from the chassis measure between pins 1 and 51 with reference to pin 50 and 100 respectively to confirm that the voltage is in the range of range of 8 to 9.5 VDC. Pin 2, with respect to 50/100, should be in the range of 16 to 18 VDC. Pin 52 should be in the range of -16 to -18 VDC. (Note: reversing your meter probes may be necessary on your voltmeter.) These open circuit voltage checks will determine any gross over/under voltage problems that may exist in your chassis. With CV (Ferroresonant) type supplies, the open circuit voltages may be somewhat higher than the ranges indicated. To determine if there is gross over/under voltage, it may be necessary to "load the bus" with the CPZ-186 or CPZ-4800X SBC. After inserting the single board, perform the checks again. Gross over/under voltages indicate chassis power supply problems which are beyond the scope of this document. Refer to your power supply/computer manual, or vendor BEFORE PROCEEDING.

TurboDOS SYSTEM START UP PROCEDURES

LEFT BLANK INTENTIONALLY!

TurboDOS SYSTEM START UP PROCEDURES

Now plug only the CPZ SBC board into the Bus, and measure the "loaded" voltages. Remember, pin 50 and pin 100 are the ground pins. Pin 1 and 51 should both be between 8 and 9.5 VDC. Pin 2 should be between +16 and +18 VDC. Pin 52 should be between -16 and -18 VDC (Note: reversing your meter probes may be necessary on your voltmeter.) If the voltages are too high or too low, refer to your chassis power supply manual and possibly adjust the transformer taps. High or low Bus voltages may result in thermal shutdown of the boards. **DO NOT proceed until proper bus voltages have been confirmed!** Once these voltages have been confirmed you can proceed. This is VERY IMPORTANT for proper system operation.

2.2. CRT Terminal Set Up

Connection to a CRT is achieved though the supplied RPB-200 WITH MODEM,CAPABILITY RS-232, personality card. For connecting the CRT terminal to RPB-200 personality card cable, use two male DB25 connectors and connect pins:

	2 to 2
	3 to 3
	7 to 7
Optional:	1 to 1
Optional:	20 to 20

Set your terminal for 8 data bits, 2 stop bits, parity disabled (no or space parity) and 9600 baud.

Refer to Appendix H for the personality card (RPB-200) set-up options. Plug the RPB-200 personality board cable into J3 on the CPZ SBC. Connections are keyed to prevent improper installation. Connect the CRT-to-RPB cable between the CRT communication port and the RPB-200 DB25 pin connector.

Common Problems with terminals:

1) The signon message appears correctly but after pressing the return key the cursor moves to the left margin of the terminal and hangs there. Solution: The number of stop bits need to be set.

TurboDOS SYSTEM START UP PROCEDURES

2) You can hear the floppy being accessed, but nothing appears on the CRT. Solutions:

- a) RPB-200 is in wrong serial port(should be in serial port furthest from floppy port).
- b) Faulty cable from RPB-200 to terminal.
- c) Bad RPB-200

3) The terminal loses characters when displaying screenfuls of information at fast baud rates. Solution: lower baud rate or enable DTR handshaking on pin 20 if supported by your terminal. The CPZ SBC manual describes the jumper options used to implement the clear-to-send hardware handshake under the RPB-200 setup instructions. The most common configuration with terminals is to use the terminals DTR signal on Pin 20 to signal that the terminal is busy. This handshake is accomplished by removing all the jumpers on the personality card attached to the printer RS-232 port, and installing the following jumpers:

RPB-100 COLD MODEL

RPB-200

JA = 2-3

REMOVE 2-11

JB = 1A-2A/2C-3C

JUMPER 3-10

JC = 1-2

The RPB-200 must be connected to the J3 (see CPZ SBC manual) connector of the CPZ SBC with the system powered down. The PAR file will need the patch 'CONBR = C?', where ? is the baud rate code defined in appendix H. Example: CONBR= 8E; this is the default value of 9600 baud rate with no handshake.

TurboDOS SYSTEM START UP PROCEDURES

2.3. Floppy Disk Drive Set Up

The CPZ SBC requires a floppy disk personality board (FPB-158) to be connected between J1 of the CPZ and the 8" or 5 1/4" floppy disk drives. The floppy disk personality board can be mounted to the back panel of your S-100 enclosure, or if you plan on laying it in the chassis, tear off the bottom of the antistatic package that the personality board was shipped in, slide it over the personality board, and tape it in place to protect the circuitry.

Plug the FPB-158 cable into J1 on the CPZ SBC and the FPB-158 personality card connector. The female connector (on the FPB-158 personality board) and J1 are keyed so you can't plug it in backwards.

It is now time to connect your floppy drive(s) with the FPB-158. Align pin 1 of the FPB-158 (red stripe from CPZ cable to FPB indicates the location of pin 1) with pin 1 of the floppy disk drive PCB (printed circuit board, check floppy PCB artwork for pin numbers to determine pin 1 location). Refer to the CPZ SBC manual for floppy disk drive jumper options.

Make sure the PROM in the CPZ SBC is a TurboDOS BOOT PROM.
NOTE: PROM will be labeled with one of the following titles, with the exception of the first three which are incompatible CP/M prompts:

PROM TYPES	DESCRIPTION

- - - CP/M single-user Bootproms - - -	
V2.1(CPZ-48000)	8" CP/M MONITOR PROM
V2.1M(CPZ-48000)	5 1/4" CP/M MONITOR PROM
8"-5" MONITOR V2.3(CPZ-4800x)	8" & 5 1/4" CP/M PROM
- - - 8" I.C.M. TurboDOS Bootproms - - -	
8" TurboDOS Boot Prom	8" FLOPPY BOOT PROM
1013/1016 + 8" Boot Prom	8" FLOPPY & MD1013/16
OMTI + 8" Boot Prom	8" FLOPPY & OMTI

Refer to Appendix B-8 for DRVTBLE Set Ups: When using DSKCPZ1 and DST58I, DRVTBL allows the mixing of drive type (8" and 5 1/4") within this single drive and also allows you to select different drive setup rates.

TurboDOS SYSTEM START UP PROCEDURES

- - - 5 1/4" I.C.M. TurboDOS Bootproms - - -

40 TRK BOOT PROM	5 1/4" FLOPPY 40 TRACK
80 TRK BOOT PROM	5 1/4" FLOPPY 80 TRACK
1010 + 40 TRK BOOT PROM	MD1010 & 5 1/4",40 TRK
1010 + 80 TRK BOOT PROM	MD1010 & 5 1/4",80 TRK
1013/16 + 40 TRK BOOT PROM	MD1013/16 & 5 1/4",40 TRK
1013/16 + 80 TRK BOOT PROM	MD1013/16 & 5 1/4",80 TRK
OMTI + 40 TRK BOOT PROM	OMTI & 5 1/4",40 TRK
OMTI + 80 TRK BOOT PROM	OMTI & 5 1/4",80 TRK

For other proms, look on latest ICM price sheet or call ICM.

Once the floppy drive is properly optioned and connected and the proper prom verified, you may proceed with booting your distributed single-user configuration.

Common Problems with Floppy Disk Drives:

- 1) Improper prom installed in CPZ SBC. Solution: Install correct prom or if that is not possible call I.C.M. or your local distributor and report the problem to Technical Sales.
- 2) The drive will not boot. Solution: You probably do not have all the drive options set. Return your drive to factory settings and follow the jumper changes outlined in the CPZ SBC manual. If you do not have a manual on your floppy, inquire first with the company from which you purchased the drive. They may have the stock factory settings for your drive. All floppy disk systems require a terminator resistor in the last drive of the chain. In the case of 8" and 5 1/4" combination, only one resistor pack is required. Of course you can call I.C.M. and ask for Technical Sales if you need further assistance integrating your floppy drives, but please try checking everything including the cables, one more time.

2.4. Format and Contents of the Distribution Diskette

ICM sends you a distribution diskette which is preconfigured to boot-up in a minimum single-user configuration. The hardware necessary to begin operation is as follows: ICM CPZ SBC, floppy disk drive, and a CRT. The floppy disk interface must be via the floppy disk port on the CPZ SBC in conjunction with the FPB-158 floppy disk personality board. The CRT terminal must be interfaced to the CPZ SBC via the Channel B serial port (J3) and through a RPB-200 with modem option personality board. The set-up, connection, and checkout of this configuration is fully documented in the following pages.

WARNING - I.C.M. distribution diskettes have a highly optimized format and will not be readable on any other computer. This is true on all 5 1/4" and most 8" formats. We currently are not "like" any other format, except we do support the industry standard 8" CP/M Single Sided Single Density format.

2.4.1. Procedures for Booting the Single User System

Power up the system and recheck the S-100 Bus voltages. You now have a minimum configuration capable of running TurboDOS, (and communicating between operator console (CRT terminal), CPZSBC master, and floppy disks.)

Place the distribution diskette from Intercontinental Micro Systems in drive A:, close the door, and press the system reset button.

The system should search the diskettes looking for the program OSLOAD.COM. If not found on floppy drive A, then drives B, C and D will be searched. This is the search list of the TurboDOS BOOT PROM. The OMTI + 8" Floppy prom or MD1013 + 8" Floppy PROM will look on the floppy drives connected first, then it will search the Hard Disk Drives to find OSLOAD.COM. If the hard disk is not ready, the floppies will keep being searched automatically.

Once found, the program OSLOAD.COM will be loaded into memory and executed. This will load the file OSMMASTER.SYS into memory (the operating system image) and "jump" to the system. The operating system will sign-on via the CRT terminal with the TurboDOS sign-on message.

This is an example of the TurboDOS sign-on message:

```
Copyright (C) 1984, Software 2000, Inc. (24/###)
A: OSMMASTER.SYS loading from ???? to FFFF, size ????
TurboDOS 1.4x, copyright (C) 1984, software 2000, Inc. (24/###)
OA}
```

TurboDOS SYSTEM START UP PROCEDURES

Type DIR <CR> to read the diskette directory

NOTE: (<CR> means to press the RETURN or ENTER key on your terminal)

If your system fails to boot-up, please review this procedure from the beginning where the S-100 bus voltages are first checked to insure you have properly followed the instructions. Suspect that the floppy drive might not be configured correctly if the disk drive does not light up or click. If another operational I.C.M. computer system is available, it is advisable to test each of the individual components of your new system on the operational system to confirm their proper working order integration.

2.4.2. Making Backup Copies Of Your System Disk

Before going on, please take the time to "backup" your master distribution disk. This is done by formatting a blank diskette and copying all of the master distribution files on to it. NOTE: use FORMAT5 for 5 1/4" disk drives.

To Format a single sided, double density diskette, type:

OA}FORMAT B:<CR>

Enter density (Single/Double) : D
Enter number of sides (1/2): 1
Enter format type (TurboDOS/CPM): T

Insert disk to be formatted in drive B
enter <CR> to begin formatting <CR>

.....
Starting verify pass

.....
Successful verify

OA}

You have successfully formatted a floppy disk that has the same specifications as your master distribution diskette from I.C.M. Verify that your master distribution diskette is in drive A: and the newly formatted disk in drive B:

Enter the command: OA}BACKUP A: B: <CR>

The master and new diskette are already in place, so type <CR> after each prompt on the screen to start copying. When the system prompt OA} reappears, the copy is complete.

Place your master distribution diskette in a safe place.

TurboDOS SYSTEM START UP PROCEDURES

Place your copy of the distribution diskette in the A: drive and press reset. You should again see the very same TurboDOS sign-on message as before. If the sign-on message appears, you have successfully copied your distribution diskette.

2.4.3. Formatting Double Sided Diskettes

If you have double sided drives, place a blank double sided diskette in B: and follow the example for double sided, double density formatting below. Double sided diskettes will give you ample space to perform the necessary editing and system generation that is necessary to bring up multi-user TurboDOS. It is preferable to use this DS/DD configuration if your drives can support it.

OA}FORMAT B:

Enter density (Single/Double) : D
Enter number of sides (1/2): 2
Enter format type (TurboDOS/CPM): T

Insert disk to be formatted in drive B
enter <CR> to begin formatting <CR>

.....
Starting verify pass
.....
Successful verify

The distribution diskette in drive A is single sided, double density and the diskette in drive B is double sided, double density. The disk specifications are different and the BACKUP program will not work. To copy A: to B: use the COPY command:

OA}COPY A: *.* B: ;N

NOTE: (1) *.* means all files on referenced drive A. (2) The ;n means copy all files from A: to B: without asking for confirmation on each file copied. After the system has returned to the prompt, remove the master distribution diskette from A and store it in a safe place. Move your copy of the distribution diskette from drive B: to drive A: and press system reset.

You should again see the TurboDOS sign-on message.

When the system prompt OA} returns to the screen, it indicates that you have successfully copied your TurboDOS Master Distribution Diskette.

SINGLE-USER PROCEDURES

3. SINGLE-USER PROCEDURES 3.1. TurboDOS Command Summary

The .COM (Z-80)8-bit and .CMD (8086)16-bit utility programs supplied with your TurboDOS system are very similar to CP/M 2.2 and MS-DOS 1.1 utilities. The following list is for easy reference. For complete descriptions, refer to the appropriate Z-80 or 8086 TurboDOS User's Guide.

- AUTOLOAD** The AUTOLOAD command lets you set up a command sequence to be executed automatically at each cold-start or warm-start.
- BACKUP** The BACKUP command performs a fast copy of an entire disk onto another disk of the same type and format.
- BANK** In a banked Z-80 system, the BANK command lets you change from bank-switched to non-bank-switched operation, and vice versa.
- BATCH** The BATCH command provides a convenient way of entering TurboDOS command strings into a dedicated batch processor in a networking system.
- BOOT** The BOOT command is unnecessary in the I.C.M. implementation as there are no Reserved Tracks for system bootup operations.
- BUFFERS** The BUFFERS command lets you change the number and size of the disk buffers maintained by TurboDOS.
- CHANGE** You must use the CHANGE command prior to removing a disk from any drive in a multi-user TurboDOS system. It is also used before power down.
- COPY** The COPY command lets you copy individual disk files or groups of files.
- DATE** The DATE command lets you set or display the system date and time.
- DELETE** The DELETE command lets you delete individual disk files or groups of files.
- DIR** The DIR command displays an alphabetized disk directory on the console or printer.
- DO** The DO command lets you execute a pre-defined sequence of TurboDOS commands which you have previously saved in a disk file.
- DRIVE** The DRIVE command displays information about the format of a disk.

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DUMP	The DUMP command displays a combined hexadecimal and ASCII file dump on the console or printer.
ERASEDIR	The ERASEDIR command lets you erase the entire directory of a disk.
FIFO	The FIFO command lets you create FIFO files which are used in conjunction with AUTOLOAD and BATCH commands.
FIXDIR	The FIXDIR command lets you reorganize the disk directory for maximum directory access speed.
FIXMAP	The FIXMAP command lets you reorganize the disk allocation map for maximum disk storage.
FORMAT	You must use the FORMAT or FORMAT5 command to pre-record format information on each disk before it is used for the first time.
LABEL	The LABEL command lets you put a volume label on a disk.
LOGOFF	In a multi-user system, the LOGOFF command lets you terminate your session.
LOGON	In a multi-user system, the LOGON command lets you start a new terminal session.
MASTER	The MASTER command lets you temporarily attach your console to the "master" processor in a network system.
PRINT	The PRINT command lets you control the routing of your print output.
PRINTER	The PRINTER command lets you control de-spooling on any selected printer.
QUEUE	The QUEUE command lets you manually queue print files (or any text file) for despoiled printing.
RECEIVE	The RECEIVE command reads one record from a FIFO and displays it on the console.
RENAME	The RENAME command lets you rename individual disk files or groups of files.
SEND	The SEND command lets you write a message to a FIFO.
SET	The SET command lets you set and clear file attributes.
SHOW	The SHOW command lets you display the settings of file attributes.

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- TYPE** The TYPE command displays the contents of a text file on the console or printer.
- USER** The USER command lets you change the current user number. NOTE: USER.COM does not exist under V1.4 TurboDOS. To change users, simply type 1: or 1A: as if you were changing drives.
- VERIFY** The VERIFY command scans a disk for bad blocks, and (optionally) marks them so that TurboDOS will avoid using them.

More complete descriptions can be found in the TurboDOS Users guide. Other programs that are on your disk and are not mentioned above are supplied by ICM and are covered in Appendix A

There are other useful programs that can be found with documentations on the utility disk and MEX disk.

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3.2. Peripheral Devices Supported with ICM Drivers

I.C.M. offers several different driver disks for various peripheral support. The basic network drivers include support for console (terminal), printers, floppies, clock/calendar personality board, and CPZ and CPS networking support circuits. The drivers for supporting hard disk drives include both a driver and format programs for the controllers.

PRODUCT -----	USE ---	DESCRIPTION -----
MUTD-U1		NETWORK DRIVERS FOR CPZ AND CPS TurboDOS 1.4x DRIVERS
REL-MUSYS		NETWORK DRIVERS FOR NET-82'S TurboDOS 1.4x Drivers
REL-SEMI		SPECIALIZED DRIVERS TurboDOS SEMI-DISK DRIVER
REL-MD13	(on distr. disk)	S-100 INTERFACE HARD DISK CONTROLLERS TurboDOS MD1013 DRIVER & FORMAT
REL-KON		TurboDOS KONAN SMC 200 DR. & FMT.
REL-9TK		TurboDOS 9-TRACK TAPE AND KONAN ENHANCER
REL-IOM		SASI/SCSI INTERFACE HARD DISK CONTROLLERS TurboDOS IOMEGA DRIVER & FMT.
REL-SYS		TurboDOS SYSGEN DRIVER & FMT.
REL-DTC		TurboDOS DTC520A DRIVER & FMT.
REL-PRI		PRIAM SMART HARD DISK INTERFACE TurboDOS PRIAM SMART DRIVER & FMT.
TURBOLAN		LOCAL AREA NETWORK DRIVERS COMPLETE ARCNET DRIVERS
TURBODOS/PC		LAN DRIVER FOR PC/MS-DOS COMPUTER
PC-CONFIG		T-DOS CONFIG PROGRAM FOR TURBO/PC
PC-START		T-DOS INSTALL FOR PC FILESERVER T-DOS INSTALL FOR WS80 FILESERVER

FORMATS AVAILABLE ON 8" OR 5-1/4"
FLOPPY DISKETTES

8"	CP/M SSSD
8"	TurboDOS, SSDD
8"	ICM CP/M 512 BYTE SECTOR, SSDD
5-1/4"	ICM TBDOS 40 TRK (48 TPI), DSDD
5-1/4"	ICM TBDOS 80 TRK (96 TPI), DSDD

3.3. Relationship of TurboDOS Files Necessary for System Configuration

- *.MAC: Z-80 source code. ASCII text file which is the assembly language version of the drivers that are used to configure a TurboDOS system. ICM writes and supports these drivers. These files can be typed, edited, and printed; but are usually edited by experienced system programmers.
- M-80 Z-80 ASSEMBLER: Assembles the MAC files into RELocatable object code modules. These modules are called REL files. The Microsoft M-80 assembler is not supplied by ICM because most customers will not be editing the MAC files. ICM uses M80 Ver. 3.44 of 09-12-81 for compiling the .MAC source code.
- *.REL: Relocatable object code modules that contain the peripheral drivers and standard modules necessary to configure a TurboDOS system. REL files CANNOT be displayed on the CRT, or printed. DRIVERS are the code that allows one to connect various peripherals to a TurboDOS system. They "DRIVE" the peripheral. As a peripheral is selected, added, or changed, a different driver (REL file) is LINKED and PATCHED in the re-generation process, utilizing the .GEN and .PAR files.
- *.A: 8086 source code. ASCII text file which is the assembly language version of the drivers that are used to configure a TurboDOS system. ICM writes and supports these drivers. These files can be typed, edited, and printed; but are usually edited by experienced system programmers.
- TASM.COM 8086 ASSEMBLER: Assembles the .A files into relocatable object code modules. These modules are called .O files.
- *.O: Relocatable object code modules that contain the peripheral drivers and standard modules necessary to configure a TurboDOS system. O files CANNOT be displayed on the CRT, or printed. DRIVERS are the code that allows one to connect various peripherals to a TurboDOS system, they "DRIVE" the peripheral. As a peripheral is selected, added, or changed, a different driver (O file) is LINKED and PATCHED in the re-generation process, utilizing the .GEN and .PAR files. The re-generation for 8086 products is accomplished with the TLINK.COM program.

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*.GEN: A list of Z-80 REL file names used by GEN, or a list of 8086 O files used by TLINK, from which selected driver modules are enabled to support your selection for boards and peripherals. Enabling or Disabling a driver can be accomplished in the appropriate GEN file. To enable a driver, remove the ";" at the beginning of the line on which the filename of the REL (or O) module appears. To disable a driver, place a ";" at the beginning of the line on which the filename of the REL module appears.

*.PAR: A PAR file is used to change the default values of various PARAMeters for the peripherals and the system itself. For example, the baud rate for a serial printer can be changed by entering the appropriate values into the the appropriate PAR file. The physical to logical translation of disk drives is done in the .PAR file by patching the DSKAST label. The use of the GEN program that reads .GEN and .PAR files to generate the operating system will be covered in the sections that follow. All REL files have built-in default parameters that can be changed by PATCHING in the PAR file.

GEN.COM and TLINK.COM: Are programs by Software 2000 that links and patches the selected GEN and PAR file into RAM memory, and then writes this executable file out to disk. The executable files are normally named OSMASER.SYS, OSSLAVER.SYS, or OSLOAD.COM. This is the system re-generation utility for the system, and can't be changed by the user.

*.COM: Z-80 (8-bit) executable programs that conform to CP/M 2.2 system call conventions. These are executed at the OA} prompt by entering the name of the program and pressing return. Example OA}DIR <CR>.

*.CMD: 8086 (16-bit) executable programs that conform to CP/M 86 system call conventions. These are executed at the OA} prompt by entering the name of the program and pressing return. Example OA}DIR <CR>.

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- OSMASTER.SYS: A file with all the previously linked drivers and standard modules necessary to allow the MASTER CPZ SBC to operate in a single user TurboDOS environment. You can regenerate this file to optimize TurboDOS for the peripherals and slaves that you have.
- OSSLAVE.SYS: A file with all the previously linked drivers and standard modules necessary to allow the SLAVE SBC (CPS-MX or CPS-BMX) to operate in the TurboDOS environment. This file is generated by the system integrator.
- OSSLAVEZ.SYS: A ICM pre-TLINKED file with all drivers and standard modules necessary to allow the CPS-16 SLAVE SBC to operate in the TurboDOS environment at 9600 baud.
- OSLOAD.COM: The common program to Single-user and Multi-user TurboDOS. It is the entry point for all system boot-up functions. As an example, when the system is first booted, the boot PROM tells the Master to find OSLOAD.COM, load it into memory, and execute it. OSLOAD.COM will then display the first line of the log-on, and then go back to the disk to find OSMMASTER.SYS. OSMMASTER.SYS is then loaded into memory, and executed. OSMMASTER.SYS will then display the last line of the sign-on and activate the system with the prompt OA}. This file can be re-generated by the system integrator.

3.4. Loading a Text Editor

Now that you have a working copy of your TurboDOS disk, you need to load a text editor to continue configuring the system. To optimize the system you will need a text editor that will not introduce any characters with the high order bit set in any ASCII characters in the PAR or GEN files that you will be editing. Reliable editors are:

CP/M's ED
Micro Pro's WORDMASTER
MicroPro's WORDSTAR (Non document mode, as document mode will introduce errors) See appendix for patches for WordStar Ver 3.0 and Ver 3.3.

Place a copy of your favorite editor on a CP/M single sided, single density diskette in drive B, (refer to Appendix G for SSSD drive characteristics) and by using the copy command, copy the editor files to A:

i.e. COPY B:ED.COM A:
or COPY B:WM.COM A:
or COPY B:WS*.* A;;N

Remove your single sided, single density disk from B:. (You may format and backup or copy your working diskette if you so desire.)

Now that you have made a working copy of your TurboDOS disk and have placed your favorite editor on the disk, you are ready to generate the TurboDOS operating system for your hardware configuration.

The first step is setting up all your peripherals under the default single-user TurboDOS. This offers simplicity and direct interface to your peripherals. This section will acquaint you with the setup procedures for hard disks, printers, terminals and TurboDISK.

3.5. Default Single User Configuration

The system is supplied in the following default configuration:

1. Single User
2. Console: 9600 BAUD, 2 Stop Bits, No Parity (CPZ connector J3)
3. Printer: 1 Printer, Serial, Clear to Send Protocol, 9600 Baud (CPZ connector J2)
4. Floppy Disk Drives: Four - 8" Floppy Drives, 6 Msec Step Rate (CPZ connector J1)
5. Hard Disk: No configuration selected.

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When setting up the operating system configuration, it is important to review the default configurations and optimize the peripheral parameters. Optimizing or changing the parameters can be accomplished by enabling and disabling the various peripheral drivers provided with your I.C.M. supplied TurboDOS.

Once the basic peripheral interfaces have been installed and tested, the second phase is to set up the hardware and software for Multi-User TurboDOS with the slave processors.

The TurboDOS USER'S GUIDE and IMPLEMENTER'S GUIDE gives additional information that may be vital to your particular configuration needs. Also, become familiar with Appendixes A, B and C of this document as they describe I.C.M. supplied drivers, global symbols and default system .GEN and .PAR files which are not covered in the standard TurboDOS documentation.

Enabling or Disabling peripheral drivers can be done in the appropriate .GEN files. To enable a driver, remove the ; (semicolon) at the beginning of the line where the filename of the module appears. To disable a driver module, place a ; (semicolon) at the beginning of the line on which the filename of the module appears.

To display a file, either:

1. OA}TYPE FILENAME<CR> example: OA}TYPE CPZDOS.GEN<CR>

or

2. Enter the editor program (WordStar, etc.) and call up the file.

example: OA}WS<CR>

N (For Non-Document editing)
CPZDOS.GEN<CR> (File to edit)

To EDIT a file, you must enter the editor program (WordStar, etc.) and edit the file in accordance with the edit program procedures.

NOTE: EDIT only a backup!, (working copy) of your files, never the original distribution diskette.

3.6. System Re-Configuration with GEN

The TurboDOS operating system consists of a series of relocatable modules which relate to the various hardware and software functions of a particular system environment. To successfully construct an operating system for any combination of features, you must build the operating system using the various building blocks provided on the distribution diskette.

First in this procedure is to enable (or add if necessary) the appropriate REL driver files to the appropriate .GEN file (i.e. STDLOADR in the CPZLOAD.GEN file or CON96 in the CPZLOAD.GEN file). Having accomplished that, determine if any parameters will be needed by that module to function properly, i.e. CON96 in the CRT driver needs to know what communications protocol (baud rate, stop bit, parity) to use to enable it to successfully communicate with the CRT. Reference the TurboDOS configuration Guide and the ICM REL file explanations (Appendixes A, B and C) to determine which parameter symbols, defaults, and options are required by the various .GEN file modules. For instance, the CON96 driver can be found in the ICM REL file documentation containing the parameters CONBR, SHFIN, and SHFOUT. Their default (ICM factory set) values are also indicated in Appendix B. They need not appear in the associated .PAR file if you are satisfied with the default values. If, however, you need to modify those values you must edit the associated .PAR file (i.e. CPZLOAD.PAR) to include the new value during the re-assembly via the GEN command. Once the proper .PAR files have been either enabled, added, or modified, you are ready to re-assemble the associated executable file (.COM or .SYS).

Use the following procedure to re-assemble the executable file:

```
OA}GEN (input .GEN/.PAR file) (output loaded .COM or  
System Image .SYS) <cr>
```

SINGLE-USER PROCEDURES

T A B L E 3-1: GEN and PAR file Relationship to Output File

Input .GEN/.PAR -----	Output Loader/ System Image -----	Multi-user -----	Single-user -----
CPZLOAD.GEN CPZLOAD.PAR	OSLOAD.COM	..... X	..... X(8-bit)
CPZLD16.GEN CPZLD16.PAR	OSLOAD.COM	..... X	..... X(16-bit)
CPZDOS.GEN CPZDOS.PAR	OSMASTER.SYS (1)	.....	..... X(8-bit)
CPZSGL16.GEN CPZSGL16.PAR	OSMASTER.SYS (1)	.....	..... X(16-bit)
CPZMASTR.GEN CPZMASTR.PAR	OSMASTER.SYS (1)	.. X	(8-bit)
CPZMST16.GEN CPZMST16.PAR	OSMASTER.SYS (1)	.. X	(16-bit)
CPSSLAVE.GEN CPSSLAVE.PAR	OSSLAVE?.SYS	..... X	(CPS-MX)
SLVBNK.GEN SLVBNK.PAR	OSSLAVE?.SYS	..... X	(CPS-BMX)
CPSSLV16.GEN CPSSLV16.PAR	OSSLAVE?.SYS	..... X	(CPS-16)
CPS186.GEN CPS186.PAR	OSSLAVE?.SYS	..... X	(CPS-186)

(1) OSLOAD.COM uses a default filename OSMMASTER.SYS to load the operating system image for both single & multi-user applications. If you need to change this, check SOFTWARE 2000's TurboDOS manual under the "SYSTEM GENERATION" section and look at parameter LOADFN.

3.7. Changing The Console (Terminal) Parameters

The console baud rate can be changed from 9600 baud to 19.2 kilobaud by editing the file CPZDOS.GEN and enabling the CON192 driver and disabling the CON96 driver (See Appendix C for sample .GEN and .PAR files and Appendix H for other baud rates). A .RELDriver called CON192 is included but disabled by the ";" character preceding it to indicate to the GEN operator that it is a "comment" only. To activate this driver, simply remove the ";" character from the front of the CON192 filename.

This is a subsection of the file listing for CPZDOS.GEN as supplied:

```

STDSINGL                ;standard single w/o spooler
                        ;configuration
;CON192                 ;Null 19.2 Kbaud console driver
CON96                   ;Null 9600 baud console driver

```

The baud rate as supplied is 9600. To change the baud rate to 19.2 Kbaud, make the file appear as below. (Only one baud rate may be active, disable the CON96 by placing a ; at the beginning of the line)

```

STDSINGL                ;standard single w/o spooler
                        ;configuration
CON192                 ;Null 19.2 Kbaud console driver
;CON96                 ;Null 9600 baud console driver

```

In order to update the operating system with these changes, it is necessary to re-GEN and reload the system via:

```
OA}GEN CPZDOS OSTEST.SYS <CR>
```

You can now selectively load your test system by typing:

```
OA}OSLOAD OSTEST.SYS <CR>
```

Make sure your CRT setup is changed accordingly. If you have to change switches on your terminal, it will be necessary to turn the terminal off and wait a few seconds before turning it back on. It is not usually necessary to perform a hardware reset via reset button on the chassis after changing the CRT setup.

You also have to change the baud rate in the CPZLOAD.GEN file in order to have the right console display. Once similar edits have been made to the files CPZLOAD.GEN and .PAR, the loader can be gen'ed into a test load by typing:
OA}GEN CPZLOAD TOSLOAD.COM <CR> and the system can be tested by simply typing OA}TOSLOAD OSTEST.SYS <CR>. Now the new TOSLOAD.COM and the new OSTEST.SYS are up to 19.2k baud operation. Once you have become satisfied with the operation, type:

```

OA}RENAME OSTEST.SYS OSMaster.SYS <CR>
OA}RENAME TOSLOAD.COM OSLOAD.COM <CR>

```

3.8. Serial Printer Installation

The CPZ SBC manual describes the jumper options to implement the clear-to-send hardware handshake under the RPB-200 setup instructions. The most common configuration when using the printer to signal that the printer's DTR signal on Pin 20 of the printer to signal that the printer's buffer is full. This handshake accomplished by removing all the jumpers on the RPB-200 personality card attached to the printer RS-232 port, and installing the following jumpers:

RPB-100	RPB-200
JA = 2-3	REMOVE 2-11
JB = 1A-2A/2C-3C	JUMPER 3-10
JC = 1-2	

The RPB-200 must be connected to the J2 (see CPZ SBC manual) connector of the CPZ SBC with the system powered down. The cable connecting the RPB-200 with the printer uses DB25 male connectors and it only requires pins 2-2, 3-3, 7-7, 20-20 to be connected. Be aware that non-standard printers may require special cables or modification to the RPB-200 card signals.

The distribution diskette MUTD-E is already set up for a Clear-To-Send printer on serial port 0 with 9600 baud known as printer A. Print the directory to test the printer. Type :

```
OA}DIR ;L <cr>
```

The printer should respond with the directory of the diskette.

(Printer must be ON-LINE) (80 column machines may be set for compressed print to prevent line wrap)

Changing The Printer Parameter

The drivers available are:

For serial printers...

```
LSTCTS ... Clear-to-send hardware handshake
LSTETX ... ETX software handshake
LSTXON ... XON/XOFF software handshake
LSTSER ... generic serial driver
```

For parallel printers...

```
LSTPAR ... Parallel driver
```

NOTE - In Multi-user, the LSTCTS, LSTXON, and LSTETX drivers can be placed on either serial port in any combination.

SINGLE-USER PROCEDURES

As supplied, the printer driver is serial at 9600 baud using the LSTCTS driver. Enable or add the patches to match your printer. Appendix A and B lists all the drivers and patch points available. Any driver change or patch point change will require the system to be rebuilt by using the GEN command.

The following is an example of changing the Clear to Send serial printer baud rate to 1200 from the default of 9600:

Edit CPZDOS.GEN using your non-document editor

```
it shows: LSTCTS          is enabled (default value = 9600 baud as
                               supplied)
```

To change to 1200 baud

Edit CPZDOS.PAR:

Add or enable CTSBR patch value.

(Refer Appendix H - Baud Rate Table, for the value you need)

```
CTSBR = 067          ; CTS ON, 1200 baud
```

The following is an example of using different baud-rates on different serial channels:

```
CTSBR = 067          ; CTS ON, 1200 baud on serial port 0
CTSBR+1 = 06E        ; CTS ON, 9600 baud on serial port 1
```

If using two LSTXON or two LSTETX printers on the master, only one baud rate can be specified since there is only one patch entry into the module:

```
XONBR = 067          ; XON ON, 1200 baud
  or
ETXBR = 067          ; ETX ON. 1200 baud
  or
SERBR = 067          ; SERIAL, 1200 baud
```

Rebuild the new operating system with the new .PAR file value:

```
OA}GEN CPZDOS OSTEST.SYS <CR>
```

Note: Use a different filename to prevent writing over the functional OSMMASTER.SYS file supplied.

Type: OA}OSLOAD OSTEST.SYS<cr> this allows OSLOAD to load OSTEST instead of OSMMASTER.SYS as the operating system image under testing.

3.9. Clock/Calendar Board Installation

The next driver you may wish to include is the MSTRCLK if you plan on using the CCB-100 personality board as a battery backed-up clock on the CPZ SBC. The CCB-100 personality board is designed to plug into the CPZ SBC Master connector J4. (see CPZ SBC manual) It can be used with the Master only if no other parallel port device is intended (i.e. SASI or PRIAM Disk I/O, parallel printer). The CCB-100 may be connected to any slave via the slave's parallel port as an alternative in multi-processor installation and this will be discussed further when you integrate slaves into the network. Now proceed with integrating a CCB-100 personality board on the CPZ SBC by powering off the system and placing the CCB-100 on J4 of the CPZ SBC.

To set the clock board, run the program CLKSETM and answer the prompts accordingly:

```
OA}CLKSETM <CR>
```

Note: Time is kept in military, 24 hour clock format, and 1984 is a leap year.

```
Edit CPZDOS.GEN.
```

A .REL driver called MSTRCLK is included but disabled by the ";" character preceding it to indicate that it is a comment. To activate this driver, simply remove the ";" character from the front of the MSTRCLK driver. Make sure that the LSTPAR file has a ";" in front of it, otherwise the clock will not update properly. Save the edited file and exit the editor program. Re-assemble the system master file by performing a GEN as follows:

```
OA}GEN CPZDOS OSTEST.SYS <CR>
```

The GEN program will make two passes reading the REL files from the disk and then will read the PAR file to set the system PARAMETERS and upon completion return with a TurboDOS system prompt, OA}.

To load the new operating system, type:

```
OA}OSLOAD OSTEST.SYS <CR>
```

To test the operation of the CCB-100 module enter the DATE program as follows:

```
OA}DATE <CR>.
```

The date and time will be displayed.

SINGLE-USER PROCEDURES

3.9.1. Clock/Calendar Board on CPZ-186

To enable the clock on the CPZ-186, LDCOLD should be set to 0xFF and COLDFN should be set to execute TDTIMEM.CMD. This command can be found on ICM's utilities diskette, which is part of Operating System Distribution set. The only changes will appear in the CPZSGL16 or CPZMST16 Par file:

```
SRHDRV = 0xFF ; Search Default System Drive
COMPAT = 0xF8 ; Compatability Flags
AUTUSR = 0x80 ; Auto Logon to User 0 Privileged
;
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial
;
PATCSA = 0x7F,0x7E,0x7D,0x7C ; Status port table for CPS-MX)
        0x7B,0x7A,0x79,0x78 ; (default values)
        0x3F,0x3E,0x3D,0x3C ; Status port table for CPS-16
        0x3B,0x3A,0x39,0x38 ; (default values)
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
PTRAST = 0x00,LSTDRA ; assign printer to port 00
QUEAST = 0x00,(0x0000)
;
LDCOLD = 0xFF ; Cold start autoloading flag
COLDFN = 0,"TDTIMEM CMD"; Init TurboDOS Date/Time function
LDWARM = 0x00 ; Warm start autoloading flag
;
OSMLEN = (1024) ; allow 16K for Dynamic expansion
;
NMBUFS = 128 ; Number of disk buffers
BUFBAS = (0x2000) ; 16K memory segment reserved
BUFLFN = (8192) ; paragraphs to reserve
MEMTBL+3 = (0x1FFF-0x0050) ; define how much memory for O/S
;
BFLDLY = (0x64) ; Flush buffers every 2 seconds
;
DRVTBL = 0x41,0x41,0x41,0x41 ; 6ms step rate, Tandon bit set
;
DSKAST = 0x01,DSKDRB,0x00,DSKDRA,0x01,DSKDRA,0x02,DSKDRA
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000)
```

Make sure that the TDTIMEM.CMD file is down on user 0 and set global.

The time and date may now be accessed by the DATE.CMD or DATE.COM files.

SINGLE-USER PROCEDURES

3.10. Turbo-DISK Installation

The next possibility is to enable the TurboDisk (RAM disk) drivers TURBO and TURDSK. TURDSK is supplied in source so you can set the number of 64K banks and the directory size to be used.

Please read the comments in TURDSK.MAC. Make any necessary alterations and if necessary re-assemble using the M80 assembler by Microsoft as follows:

```
OA}M80 =TURDSK <CR>
```

The memory card requires that the patch MPAGE = 05 in the CPZDOS.PAR file.

The base address is set by jumper position on the 256KMB card.

JN Configuration

256KMB Card #	Page	JN	Free space above CPZ memory space
1	5	11010	
2	6	11001	
3	7	11000	
4	8	10111	

1 = Jumper
0 = Open

NOTE: Turbo-disk will support a maximum 512KB address space (i.e. two 256KMB cards).

Use your editor to enable and disable the drivers you will need for the hardware you have by editing the file CPZDOS.GEN.

Note: if using ICM slaves you MUST move Turbo-Disk up to make room for slave memory. MPAGE = 05H

SINGLE-USER PROCEDURES

Use the editor to enable the following:

in CPZDOS.PAR set:

```
MPAGE = 05 ;enable page boundary above slaves
```

To construct a disk assignment table DSKAST allowing use of 2 floppies A: and B:, and Turbodisk as C: create the following using your editor:

```
DSKAST = 00,DSKDRA, 01,DSKDRA, 00,DSKDRB
```

<u>1st floppy</u>	<u>2nd floppy</u>	<u>1st Turbodisk (only 1 allowed)</u>
A:	B:	C:

Enable the Turbo-disk drivers TURDSK and TURBO accordingly in the .GEN files.

CPZDOS.GEN

```
TURBO ; Turbo-Disk driver module
TURDSK ; Turbo-Disk definition module
```

After editing the files the system must be re-GEN'ED:

```
OA}GEN CPZDOS OSTEST.SYS <CR>
```

Upon completion of the GEN, re-load the new system by:

```
OA}OSLOAD OSTEST.SYS <CR>
```

Once the new operating system is loaded, check the storage system by performing a DRIVE command OA}"DRIVE A;L<CR>" (;L only for echo to printer) on each drive A:, B:, C:.

The DRIVE command should respond as shown in Appendix G, depending on the number of 256KBM boards installed.

(Note: A formatted floppy must reside in both the A and B drives to perform this check.)

```
OA} ERASEDIR C: <CR> ; to format RAM disk.
```

To fully test the TURBO-DISK: Copy a number of files from A or B drive to the C and then get a DIR of C: OA}DIR C: <CR>

The files should be identical to the original files.

3.11. The Monitor Dynamics MD1013/1016

Monitor Dynamics (S-100) Hard Disk Controller

The drivers for the Monitor Dynamics MD1013 or MD1016 controllers are included in this section. Select the appropriate driver for the number of physical drives in the system. To run the Monitor Dynamics controller, you must enable the bus interrupt 6 on the CPZ-4800x SBC by jumpering JF 3B-3C. (see CPZ-4800X manual Ver 1.0 page 35). To operate the Monitor Dynamics controller under TurboDOS, you must set the base port address to 10 hex and enable the bus interrupt #6, P1-6 on the Monitor Dynamics controller card. The Monitor Dynamics controller works best under TurboDOS when the controller is set for 1024 byte sectors, 9 sectors/track, with buffered step.

See CPZ-4800X manual for Monitor Dynamics 1013 set up.

To include the proper drivers for the Monitor Dynamics disk you must select the proper configuration from the CPZDOS.GEN and PAR files.

Edit and disable any other DSKAST file presently in use by placing a ";" in front of it.

To construct a disk assignment table to include 2 floppies A: and B: and 1 Winchester C:, enter the following:

```
DSKAST = OO,DSKRA,01,DSKDRA,01,DSKDRB
```

The order of the names DSKDRA,DSKDRB etc. must match with the order of the drivers in the CPZDOS.GEN file.

For example: DSKCPZ is found first and becomes DSKDRA
MD131DRV is found next and becomes DSKDRB

This DSKAST patch will assign:

```
A: 1st floppy  
B: 2nd floppy  
C: 1st Hard Drive
```

The next section covers the DSKAST in a more technical manner.

Now re-GEN the system: OA}GEN CPZDOS OSTEST.SYS<CR>

Load the new operating system by OA}OSLOAD OSTEST.SYS<CR> and verify proper floppy disk operation.

If you are planning on using the Monitor Dynamics controller, you should use the program TESTMD1.COM to format and verify your hard disk. This program is available on 8" SSSD floppy diskette from Monitor Dynamics (or ICM when ordering your hardware).

3.12. Formatting the Hard Disk

Insert the Monitor Dynamics disk into drive B:

OA}B: <CR>

OB>TESTMD1<CR>

Enter the number of heads in decimal
Enter the number of cylinders in decimal

Refer to Appendix F for the number of heads and cylinders of the hard disk.

Once you have entered the proper number of heads and cylinders, the test program should display the controller settings. If you get an error, check the power supply for your drives, S-100 bus and cabling prior to calling.

There should appear on the screen a menu of commands. When installing a new drive, a recommended procedure is to run the destructive random test for 1/2 hour to warm up the drive by pressing T menu selection. With a new drive you will get record not found errors until the drive is formatted. Press any key to terminate random access testing.

The next step is to format the drive by pressing F. The program will ask you if you want to format all cylinders. If you say Yes, the whole drive will be formatted. If you say No, the program will prompt you to enter the head, cylinder and number of tracks to format.

These numbers should be given in DECIMAL on the same line separated by spaces ending with a <CR>.

The format program will show a capital F for every cylinder formatted. Be careful not to enter any characters on the CRT terminal during the format process since this will abort the process and you will be forced to start over. Some drives will show sectors being remapped, indicating sectors which will not format. If this happens on your drives, re-format the drive again to get rid of the stubborn sectors.

When some sectors refuse to format, they will be automatically mapped out of the directory. It is permissible to have as many as 5 or 6 remapped sectors on a hard disk drive. Once remapped, the defective media will never be used.

SINGLE-USER PROCEDURES

When the formatting is completed, enter SKEW <CR> and then 4 <CR> followed by a "V" to verify the drive.

The verify shows either a capital V for every successful cylinder, or the number of retries, or the head and cylinder numbers of a remapped sector.

Once you have completed the verify process, you must install a disk parameter block. This is done by using a PB command. The program will prompt you for allocation size. We commonly use a 4K allocation. The program will also prompt you for the number of 128 directory entry blocks. We use the maximum of 16 for CP/M but TurboDOS will allow as many as 255. Be aware that the larger the directory size, the longer the search time.

The parameters will be written to the disk.

Deselect the drive by pressing D <CR> for drive select and then O to deselect drive(s). This completes the hard disk set-up and format requirements.

To test the hard drive, copy some files from your system disk to the hard disk and compare the directory to confirm proper operation:

```
OA}DRIVE C: <CR>
```

```
OA}ERASEDIR C: <CR>
```

```
CREATE HASHED DIRECTORY (Y/N) ? Y
```

```
OK TO ERASE DIRECTORY OF C: (Y/N) Y
```

```
OA}COPY A:*. * C:<CR> ; N <CR>
```

```
OA}C:<CR>
```

```
OC}DIR<CR>
```

If you do not have a sequencing power supply, (where the +12 and +5 for the hard disk is turned off first, then a second later the S-100 power goes off), you should assemble the program HALT.MAC for your drives and run it prior to each power-down. To execute the program on a multi-user system, attach to the master using the MASTER command and then run HALT. This deselection sequence is necessary or the directory of the hard disk may be damaged.

SINGLE-USER PROCEDURES

For first time users of our implementation of TurboDOS, simply enable the disk assignment table in the .PAR file that matches your hardware. The most important consideration in the PAR file is the disk assignment table (DSKAST). The symbol DSKAST defines the logical to physical relationship of the logical disk drives (A: to P:) with the particular physical drives. The next section has more technical description of what is involved in the disk assignment table.

3.13. Technical Description of the Disk Assignment Table

All drivers for random access storage have an entry point DSKDR@::. The GEN command reads the file CPZDOS.GEN sequentially, and as drivers containing DSKDR@:: are found, the character @ is replaced with a letter starting at A and working towards P.

As an example:

The CPZDOS.GEN file, as supplied, has only one random access storage type driver containing the global entry point DSKDR@::. This is the floppy disk driver. The symbol DSKDR@:: is converted during the GEN process to DSKDRA::. The order of the drivers in the GEN file determines the character that will replace the @ character, thus floppy drivers are defined as DSKDRA.

The disk assignment table (DSKAST), located in the file CPZDOS.PAR, have three byte entries for each logical drive. The first byte is a number passed to the driver, the second and third bytes are the address of the driver, usually in symbolic form, eg.

```
DSKAST = 00,DSKDRA,01,DSKDRB,00,DSKDRC
```

The floppy driver DSKDRA can handle four floppy drives by being passed a 00, 01, 02, or 03. The Monitor Dynamics driver accepts the following control bytes: 00 is for deselect drives for single user system, 01 is for first hard disk, 02 is for second hard disk. The TurboDisk only accepts a 00.

The following describes the procedure necessary to construct a disk assignment table so that there will be two floppies A: and B:, Monitor Dynamics hard disk C:, and TurboDisk D:. In the GEN file, enable the floppy disk driver, the Monitor Dynamics driver and the TurboDisk driver. The GEN will associate the floppy driver with the symbolic address DSKDRA, the Monitor Dynamics driver with DSKDRB and the Turbo Disk driver with DSKDRC. Using the control bytes from the previous paragraph, build the disk assignment table as follows:

```
DSKAST = 00,DSKDRA,01,DSKDRA,01,DSKDRB,00,DSKDRC
```

```
A:           B:           C:           D:
```

Add this DSKAST file to the CPZDOS.PAR file via your editor. Make sure to disable any other DSKAST already in use.

3.14. Boot from Hard Disk

Hard Disk Boot-up is possible on the System, and as a result, this allows the computer to be turned on without the need of placing a system disk in the floppy drive every time. It will also cause the hard disk to be classified as the "system disk" and all non-specifically directed disk access will be to that drive. To accomplish this, you will need to have a special BOOT PROM on the CPZ-4800X SBC. The prom for this example will be labeled 1010 + 8" floppy or 1013 + 8" floppy. The 1010 and 1013 should be correlated with the model of Monitor Dynamics hard disk controller you are using. Once you have the proper BOOT PROM, you must create a new OSLOAD.COM program to provide the proper device drivers to boot from the hard disk. Enable the proper hard disk drivers in the CPZLOAD.GEN file by removing the semicolon (;) from that line. Edit the CPZLOAD.PAR file by disabling the active DSKAST and enabling the DSKAST which is identified in the comment field as being able to boot from the 1st MD hard disk, i.e.

```
DSKAST= 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA,03,DSKDRA
```

Edit the CPZDOS.GEN & .PAR files to duplicate the hard disk drivers and DSKAST table as you have enabled in the CPZLOAD.GEN & PAR files. Once these operations are complete, re-GEN both the OSLOAD.COM and OSTEST.SYS files through the use of the GEN command as follows:

```
OC}GEN CPZLOAD OSLOAD.COM <CR>
```

```
OC}GEN CPZDOS OSTEST.SYS <CR>
```

Remove any media from your floppy drives and power the system down. Restore power and the system should boot after a short delay while the hard disk comes up to speed and recalibrates.

Your disk assignments are now as follows: A: Hard disk

B: through E: floppy disk

If you are using the older MD1013 + 8" floppy(AM2716) boot prom and want to boot from floppy instead of your hard disk, simply start the system from power-up with the hard disk power disabled and place your system diskette in any of the floppy drives. The boot prom will search the drives in a round robin fashion looking for a "Ready" device and then a directory which lists OSLOAD.COM. If your hard disk's power is not separate, you can still "fool" the system by having a floppy inserted and then quickly closing the drive door to allow the boot from floppy while the hard disk is still spinning up to speed.

If you are using the newer MD1013/1016 + 8" floppy(AM2732) boot prom, it will search the floppy drives first after reset anyway.

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If your system did not boot from the hard disk, you can use your operating system on floppy to get back into your files and correct your configuration.

Once you have booted from the hard disk the drive must be deselected or the directory may become irreparably damaged. This deselection is accomplished by running the program HALT. Customize HALT1.MAC for for the number of heads and cylinders on your drives. Re-assemble and re-link HALT.COM from HALT1.MAC.

3.15. Hard Disk Drive Via Parallel Port

Note: if you intend to use any other parallel devices, you need to connect the hard disk via an S-100 hard disk controller, (see S-100 hard disk section).

The parallel port allows the use of various personality boards (PRI-100 or SAS-200) to interface to intelligent hard disk controllers from various manufacturers without utilizing another S-100 card slot. To see what your system can support refer to Appendix A where all ICM drivers available are listed.

3.15.1. PRIAM Personality Board

The following PRIAM Hard disk drives using a PRIAM SMART Interface ONLY are supported:

Model	Capacity	
-----	-----	
1070	10 Megabytes	(1 Logical Drive)
3450	35 Megabytes	(Split as 4 Equal Drives)
7050	70 Megabytes	(Split as 4 Equal Drives)
3350	33 Megabytes	(Split as 4 Equal Drives)
6650	66 Megabytes	(Split as 4 Equal Drives)

Please Consult the Factory for the 8 bit Software Drivers for TurboDOS, as these drivers are not shipped with the regular packages.

The Priam Personality Card (PRI-100) is connected to the parallel port on the CPZ-4800x CPU board. The Software drivers for TurboDOS also expects Interrupt Vector # 5 to be in place. This vector is an Internal Interrupt Vector which comes from the Parallel Port, NOT the S-100 Bus.

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3.15.2. SASI/SCSI Personality Board(other than OMTI)

The SASI/SCSI Interface plugs into the Parallel Port on the CPZ-4800x CPU Board.

Use the appropriate files. NO interrupt vectors are needed.

Controller	Rel Module	Format Program
-----	-----	-----
SYSGEN	DSKSYS DSTSYS1 DSTSYS2 DSTSYS3 DSTSYS4	FMTSYS
DTC-520	CPZDTC	FMTDTC
IOMEGA	DSKIOM DSTIOM1	FMTIOM

4. INTEGRATING THE OMTI

Dated 09/19/85

4.1. Introduction

The OMTI controller is a Hard Disk controller which communicates with the master through a SASI/SCSI interface to provide support for standard ST-506 Hard Disk drives and QIC-02 tape drives. This is accomplished by attaching it to the parallel port through the SASI-200 paddle card. This controller may be used in conjunction with the MD1013 Hard Disk controller board. This is handy if you are converting the system from an MD1013 to an OMTI.

4.1.1. Advantages

The OMTI controller has several advantages over the MD1013. The first is that it has a tape backup controller built into it. This will accept most any QIC-02 drive. The tape will only communicate with the drives local to the OMTI controller.

The OMTI controller is not an S-100 bus interface card. It also uses CMOS and other low power consumption chips. Therefore it may be mounted anywhere without having to worry about heat problems. It uses the same power as the Hard Disk drive so you will have to make sure the power supply has enough current to handle an added 1.5 amps of the OMTI controller (to figure out how much stress will be placed on the power supply, refer to section "POWER REQUIREMENTS FOR OMTI SERIES"). So now you have two added slots in the S-100 bus.

The OMTI also features an option for a Floppy controller. Under normal integrations, this will not be needed since the master already has a floppy controller. The advantage that it will have is when it is used on a workstation to create a stand alone single user system or file server.

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The OMTI software also provides partitioning! Up to 16 partitions is allowed per drive. All the disk parameter will be contained within a data file. This file is created using a Menu-driven program which prompts for heads, cylinders, partitions and directory parameters. Once this file is created, the formater program will pick it up and use it to format the Hard Disk.

The OMTI software was also designed to deselect the drive when not in use. This will eliminate the chances of writing over the directory during power failure and head parking before powering down. You simply execute a CHANGE.COM or CHANGE.CMD on the drives to ensure data is flushed properly when power it down.

The biggest advantage of the the OMTI-controller is that the software was completely written inhouse. Any problems encountered by the integrator may be reported to ICM and the problems be resolved without going to an outside source.

4.2. Integrating the OMTI Controller

4.2.1. Initial Setup

1) The first step in setting up the OMTI is to provide cabling from the Hard Disk power supply to the OMTI. It needs a standard 4-pin AMP connector using the same voltage on the same pins as the Hard Disk drive.(see section "SETTING UP OMTI BOARD")

You will also have to check the Hardware to make sure the boards have been modified correctly. If you have a CPZ-48000, refer to section "HARDWARE MODIFICATIONS FOR CPZ-48000". If you have a CPZ-4800X, refer to section "HARDWARE MODIFICATIONS FOR CPZ-4800X". If you have a CPZ-186, refer to section "HARDWARE MODIFICATIONS FOR CPZ-186".

The SASI paddle boards should already be modified for the OMTI, but you should check sections "HARDWARE MODIFICATIONS FOR or "SASI-200" before going any further.

2) The second step is to mount the OMTI in a convenient spot in the system. There are really no restrictions on where it is to be mounted. One way is to mount the Hard Disk drive vertically and attach the OMTI onto the back using 1/4" plastic stand-offs. The design of the OMTI makes this easy since the holes in the board match the holes on the bottom of the Hard Disk Drive. If this setup will not work, you can always mount the OMTI on one of the inside panels of the chassi.

3) The third step is to run the cabling. The SASI-/200 with its sheilded cable will have to be connected to the parallel port of the master. When mounting the SASI paddle board, make sure the sheilded cable isn't twisted too much. The 50 pin cable will be connected from the SASI paddle board to the OMTI 50-pin connector towards the middle of the board(see section 'SETTING UP OMTI BOARD'). Then the 20-pin and 34-pin cables can be connected from the drive to the edge of the OMTI board. If a tape drive is to be used, a 50-pin cable will also have to be connected from the tape drive to the 50-pin connector on the edge of the OMTI board. All four of these cables will be supplied by InterContinental Micro.

4) The next step is to boot up and reconfigure the operating system to include the OMTI driver. The drive will not format unless one of the OMTI drivers is installed. The single-user GEN file will include either the DSKOM1(one drive) or the DSKOM2(two drives). In the par file, you will have to include the drive in the disk assignment table. For partitioning, the par file must

SINGLE-USER PROCEDURES

include all partitions in the DSKAST table.

Here is an example of a single-user gen & par using two drives:

SAMPLE SINGLE-USER GEN FILE FOR OMTI

Here is an example of a single-user system with 2 hard disk drives and one floppy. The first Hard disk is set up as A: and B:, second Hard disk as C: and D:, and Floppy as E:.

CPZDOS.GEN

```
STDSINGL      ; Standard single-user w/o spooling configuration
;STDSPOOL     ; Standard single-user w/ spooling configuration
USRSUP        ; User Function Support Module
SOMCPZ        ; Single User Signon Message
PATCH        ; Include PATCH module for V1.4x TurboDOS
FASLOD        ; Use fast disk loader module
;CON192       ; Null 19.2 Kbaud Console Driver
CON96         ; Null 9600 Baud Console Driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
;LSTCTS       ; Clear to Send driver module
LSTPAR        ; Parallel Null List driver for CPZ-48000
RTCCPZ1       ; CPZ-4800x real time clock driver
;MSTRCLK      ; Include extnl clk board (CCB-100 clock board)
DSKCPZ1       ; CPZ-48000 floppy disk driver
DST58I        ; Include 48 TPI disk specs
DSKOM2       ; OMTI-5300 with 2 drives and Quick-02
;TURDSK       ; Use Turbo-Disk drive defination file
;TURBO        ; Use Turbo-Disk operation
```

****** NOTICE ***** NOTICE ***** NOTICE ***** NOTICE *******

In the master gen files distributed by ICM, the USRSUP is not included. **IT MUST BE ADDED!!!** This is needed only in the master and not in the slaves. If not in place, the QIC (tape utility) program will not run properly from a slave.

****** NOTICE ***** NOTICE ***** NOTICE ***** NOTICE *******

SINGLE-USER PROCEDURES

SAMPLE SINGLE-USER PAR FILE FOR OMTI

CPZDOS.PAR

```

SRHDRV = OFF           ; System Disk Drive F
AUTUSR = 80           ; Auto Log-on to user one, privileged
;
CONAST = 01,CONDRA    ; Console on port 1 of CPZ-48000
STOPBB = 44           ; Define 1 stop bit
;
PTRAST = 00,LSTDRA    ; List assignment table
;
STOPBA = 44           ; Define 1 stop bit
;
ATNCHR = "^@"         ; New attention character
NMBUFS = 2            ; Use only two buffers
PRTMOD = 0            ; Print mode
;
LDCOLD = OFF
COLDFN = 0,"SETUP    ","AUT"
;
DRVTBL = 41,41,41,41 ; All tandon drives assumed, step = 6ms
;
; the following defines the starting bank for TURBO-DISK
;
;MPAGE = 02           ; Start with bank above slaves
;
;-----
WRTP0 = 80            ; Write pre-comp cylinder (in hex for 8-
;                    ; bit systems, 0x80 in 16-bit sys.) For
;                    ; 1st drive.
;
;   (Physical Drive 1)
WRTP1 = 80
; Write pre - comp cyl. for 2nd drive
; refer to section 4.7.4 for WRTPX set ups on special drive
; (maxtor, Fufitsu's etc.)
;-----

;
; The following defines floppy disk drives
;
;
DSKAST = 000,DSKDRB,001,DSKDRB ; 1st Hard Disk(2 partitions)
        010,DSKDRB,011,DSKDRB ; 2nd Hard Disk(2 partitions)
        000,DSKDRA              ; Floppy Drive
;

```

Each Hard disk may be partitioned into as many as 16 logical drives maximum. The software requires that USRSUP be included in the GEN file. Before formatting, set up an operating system with the appropriate OMTI module included. If you are only running one physical drive, use the DSKOM1 in the GEN file. If

SINGLE-USER PROCEDURES

you need to run two physical drives, run the DSKOM2. Here is a listing of the entries required for the DSKAST table in the PAR file:

```
DSKAST = 000,DSKDRB      ; First drive, First partition
         001,DSKDRB      ; First drive, Second partition
         002,DSKDRB      ; First drive, Third partition
         003,DSKDRB      ; First drive, Fourth partition
         . . .
         . . .
         00E,DSKDRB      ; First drive, Fifteenth partition
         00F,DSKDRB      ; First drive, Sixteenth partition

         010,DSKDRB      ; Second drive, First partition
         011,DSKDRB      ; Second drive, Second partition
         012,DSKDRB      ; Second drive, Third partition
         013,DSKDRB      ; Second drive, Fourth partition
         . . .
         . . .
         01E,DSKDRB      ; Second drive, Fifteenth partition
         01F,DSKDRB      ; Second drive, Sixteenth partition
```

These entries can be placed in any order. Of course, you would never make use of all the partitions since there are only sixteen table entries in the DSKAST.

SINGLE-USER PROCEDURES

5) After you boot up the new single-user system, you are almost ready to format the drive. First a drive specification table must be set up. To do this, you must run the program 'OMTIDST.COM'. It will prompt you for how many physical drives there are, and which partitioning scheme you wish to choose:

5A) If you choose to partition the drive into equal parts, OMTIDST will ask you the parameters for one of the partitions and automatically divide the drive up with equal specs. The first thing it will ask you to input is the amount of heads and cylinders for that drive. Then it will tell you the recommended amount of spare tracks to set aside for that drive. If you believe the drive will have more than that, you can increase this number. The next thing it will ask is the allocation block size. It wants you to enter the whole number in decimal (If you want 4k, enter 4096). Last of all it will ask you how many directory entries you want each partition to have. (If you want 2048 entries, enter 2048).

5B) If you don't wish to divide it into equal partitions individually go through each partition and ask you to enter the specs on each one until there is no room left. The first thing it will ask you to input is the amount of heads and cylinders for that drive. It will then tell you the recommended amount of spare tracks to set aside for that drive. If you believe the drive will have more bad tracks than that, you may increase this number. It will then individually go through each partition. Each time you go through a partition, it will ask you the following:

a) First it will ask you to enter the allocation block size in decimal (if you want 4k, enter 4096).

b) Next, it will inform you on how many kilobytes are left on that drive. Then it will ask you how many kilobytes you want to allocate for that partition. On the last partition, enter 0 to take all the remaining kilobytes. If **no partitioning** is desired, enter a 0 the first time it asks you this.

c) Then it will ask you to input the number of directory entries for that partition in decimal (if you want 2048 entries, enter 2048).

It will go through these steps for each partition until you either run out of kilobytes or you put a "0" in for the amount of kilobytes.

Then it will save this configuration into a file called "OMTIDST.DAT". This should be kept on the disk which has the formatter since it will be used by the OMTI formatter.

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6) Now its time to **format** the hard disk. You do this by executing the file "**FMTOMT.COM**" or "**FMTOMT.CMD**".

First enter which physical drive you wish to format.

Next it will ask you if you only wish to write out the disk parameters. You should enter "N" since there is nothing to write them onto yet.

Then it will ask you if you want continuous format/verifying. It would be wise to say yes to this one and let it run a few times to catch any flacky characteristics of the drive. If time permits, you should let it run overnight to be on the safe side. While its running through its passes, hit a return once and wait for it to finish its pass.

Last of all it will stop and ask if you want to add any bad tracks from the defective list provided by the hard disk manufacturerer. If no defective list was given to you, just hit a return. Then the formatter will procede with writing the parameters out to each drive partition and bring you back to the main menu.

4.2.2. What If It Doesn't Work the First Time???

The Hardware set-up is fairly straight-forward. All cables and SASI-200 are supplied by ICM. The package sent to the customer will be tested as a whole before it is sent out. If it doesn't run the first time, check to make sure the cables are plugged in the right way and that they are plugged in all the way. Double check to make sure that pin one on the CPZSBC parallel port matches pin one on OMTI controller. Sometimes the stripes on the cables are misleading and the signals become crossed. Also be careful with the shielded cable. The sheild is fragile and too much twisting may cause it to open. If you suspect it is faulty, try swaping it with a non-shielded 26-pin cable. If you don't run it near AC or a power supply, it will work until you can get it replaced.

7) If formating from a single-user master, you may directly format the Hard disk and proceed with an **ERASEDIR** to clean up the directory and **HASH** it before you put data on it.

If done from a slave, you must attach your console to the master running the **MASTER** command, and then format it. If the drive formated has different parameters than the original drive, the system must be reset to bring in the new ones. Once this is complete, you should run **ERASEDIR** to clean up the directory and **HASH** it before placing data on it.

SINGLE-USER PROCEDURES

Now the drive is ready to have all the distribution diskettes copied over to it.

8) Now you may reconfigure the GEN & PAR on the hard disk to boot from the hard disk.

To Boot from the Hard disk on an **8-bit** master, just set up the CPZLOAD GEN and PAR files to look like the CPZDOS GEN and PAR files (or CPZMASTR gen and pars). The boot prom will first scan the floppy drives, and then the Hard Disk drives once they come up to speed. It may boot on any of the first 4 partitions on both the Hard Disk Drives.

To Boot from the Hard disk on a **16-bit** master, you must only use the "DSKOMTB.0" in the CPZLD16.GEN file. This is to keep the size of OSLOAD.CMD under 16K. You may still boot off the first 4 partitions of both Hard Disk Drives.

9) Using the OMTI under Multi-User

The Multi-User operating system will be set up in the exact same way that the single-user was. In Multi-User, the USRSUP module need only be placed in the master. The QIC utility, which is a menu-driven program to control the Tape Backup utilities, may then be run on any of the slaves. These utilities will lock out all the drives on the OMTI to insure safety.

10) After the hard disk drive has been formatted, you may change the drive parameters without having to reformat it. All you need to do is run the OMTIDST program over again. Then run the FMTOMT program and when it ask you if you want to only write out the drive parameters, enter "Y". This must be done on the master or while attached to the master. Then you will need to reboot so Turbodos will recognize the new parameters. If the drive has changed in the number of partions it has or has changed in the size of the partitions, an ERASEDIR will have to be run on each partition of the drive.

SINGLE-USER PROCEDURES

4.3. Hardware Modifications

4.3.1. Hardware Modifications for CPZ-48000

(all rev's)

The CPZ-48000 is our original 8-bit master which only had a 4-MHZ option. This board may be used with the OMTI series if a few modifications are made to the boards. The following steps will enhance the DMA to the parrallel port of the CPZ-48000:

MODIFICATION TO CPZ-48000 FOR DMA TO PARALLEL PORT

1. Pull out device U16 (9517-4) and bend out pin 6.
2. Insert device back into socket.
3. Take a separate 74LS74 chip and solder it into location U63 with the chip's pin 7 in the 8th position on the board.
4. Jumper from the (U63) chip's pin 14 to the pin 16 position on the board to ensure +5VDC to the chip.
5. Jumper LS74-1 to LS74-4 to LS74-10 to LS74-13 to LS74-14.
6. Jumper LS74-2 to U13-6.
7. Jumper LS74-11 to LS74-3 to U17-4.
8. Jumper LS74-6 to LS74-12.
9. Jumper LS74-9 to the bent out pin on U16 pin 6.

The OMTI driver makes use of Interupt Line 4. This line must be strapped internally on the CPZ-48000 at JC:

```
          If using OMTI--+
                    v
          0 1 2 3 4 5 6 7
          0 0 0 0 0 0 0 0
          | |   |
JUMPER JC 0 0 0 0 0 0 0 0
          |
          0 0 0 0 0 0 0 0
                    ^
                    +-- If using MD1013
```

SINGLE-USER PROCEDURES

4.3.2. Hardware Modifications for CPZ-4800X (For Revisions A and B)

To take advantage of DMA communications to the parallel port, the following enhancements must be made to the CPZ-4800X. If the modifications have not already been made by the manufacturer, they must be added. These modifications will be made by ICM if the integrator cannot make the changes.

MODIFICATION TO CPZ-4800X FOR DMA TO PARALLEL PORT

1. Pull out device U30 (74S74) and bend out pins 2 & 4.
2. Insert device back into socket.
3. On device U30 jumper pin 4 to pin 14 on the chip itself.
4. Jumper from U30 pin 2 (on the chip) to U35 pin 9.
5. Jumper U35-12 to U30-3.
6. Jumper U35-13 to U35-14 to U14-11.
7. Jumper U35-11 to U35-15 to U35-16.

The OMTI driver makes use of Interrupt Line 4. This line must be strapped internally on the CPZ-4800X at JF:

JF

	0	0	0	
	7	0	0	0
	6	0	0	0 <---If using MD1013/16
	5	0	0	0
If using OMTI-->	4	0	0	0
	3	0	0	0
	2	0	0	0
	1	0	0	0
	0	0	0	0

SINGLE-USER PROCEDURES

4.3.3. Hardware Modifications for CPZ-186 (For Revisions A and B)

To enhance DMA communications to the Parallel port, the following modifications must be made:

MODIFICATIONS TO CPZ-186 FOR OMTI USE

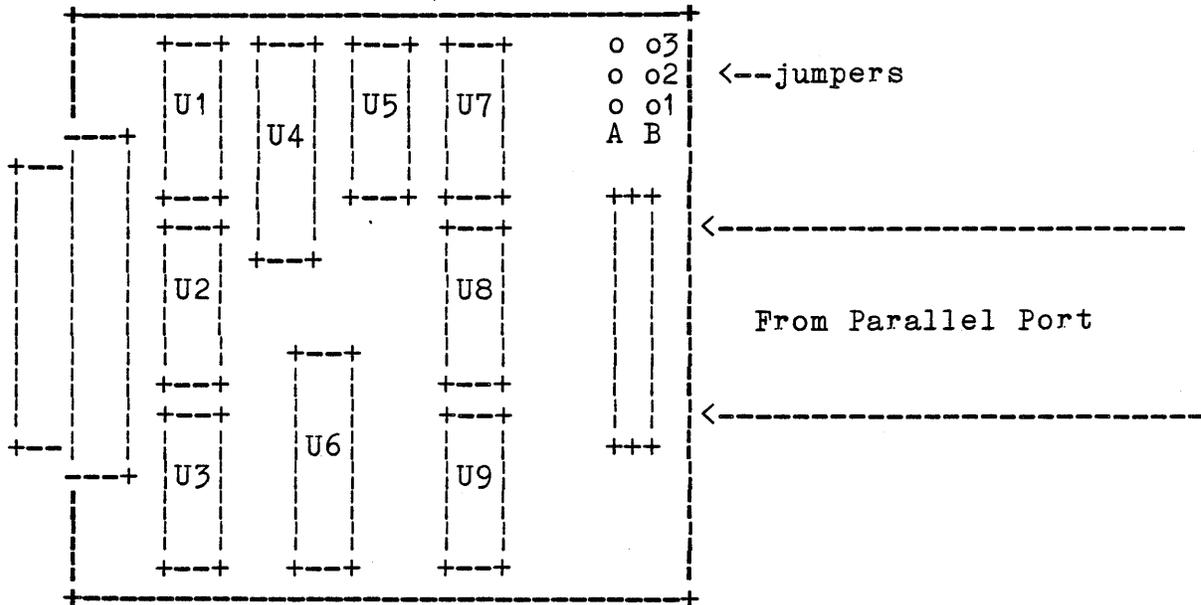
1. On the solder side of the CPZ-186, locate a pattern 0-0⁰ in the upper left corner of U39 the 80186 device (PJE).
2. Cut the trace between the two horizontal pads.
3. Add a jumper from the left topmost pad of PJE to U6 pin 20.

SINGLE-USER PROCEDURES

4.3.4. The SASI-200

The SASI-200 was designed to run the OMTI series on both the 8-bit and 16-bit masters. No change has been made in the SASI adapter board. The only changes required are two jumpers to choose for which ever master it is used on:

SASI-200



For CPZ-48000 or CPZ-4800X:

```

0  0 3
|  |
0  0 2

0  0 1
A  B
    
```

For CPZ-186:

```

0  0 3
|  |
0  0 2
|  |
0  0 1
A  B
    
```

SINGLE-USER PROCEDURES

4.4. Power Requirements for OMTI Series

<u>DEVICE</u>	<u>+5v max.</u>	<u>+12v max.</u>
OMTI 5300	1.8 Amp.	N/C
OMTI 5400	2.0 Amp.	N/C
TANBURG TAPE	2.1 Amp.	1.1 Amp. 2.5 Amp.(start-up)
RODIME 202E	1.0 Amp.	1.37 Amp. 2.00 Amp.(start-up)
CDC 20	1.0 Amp.	1.37 Amp. 3.00 Amp.(start-up)
CDC 36	1.0 Amp.	1.37 Amp. 3.00 Amp.(start-up)
FUJITSU	1.0 Amp.	1.37 Amp. 3.00 Amp.(start-up)
MAXTOR	1.0 Amp.	1.37 Amp. 4.50 Amp.(start-up)

4.5. Setting up OMTI Board

The OMTI board 5300 is equipped to support 2 Hard Disk drives ,1 Quick-02 Streaming Tape Back-up Drive.

Jumpers set ups as following:

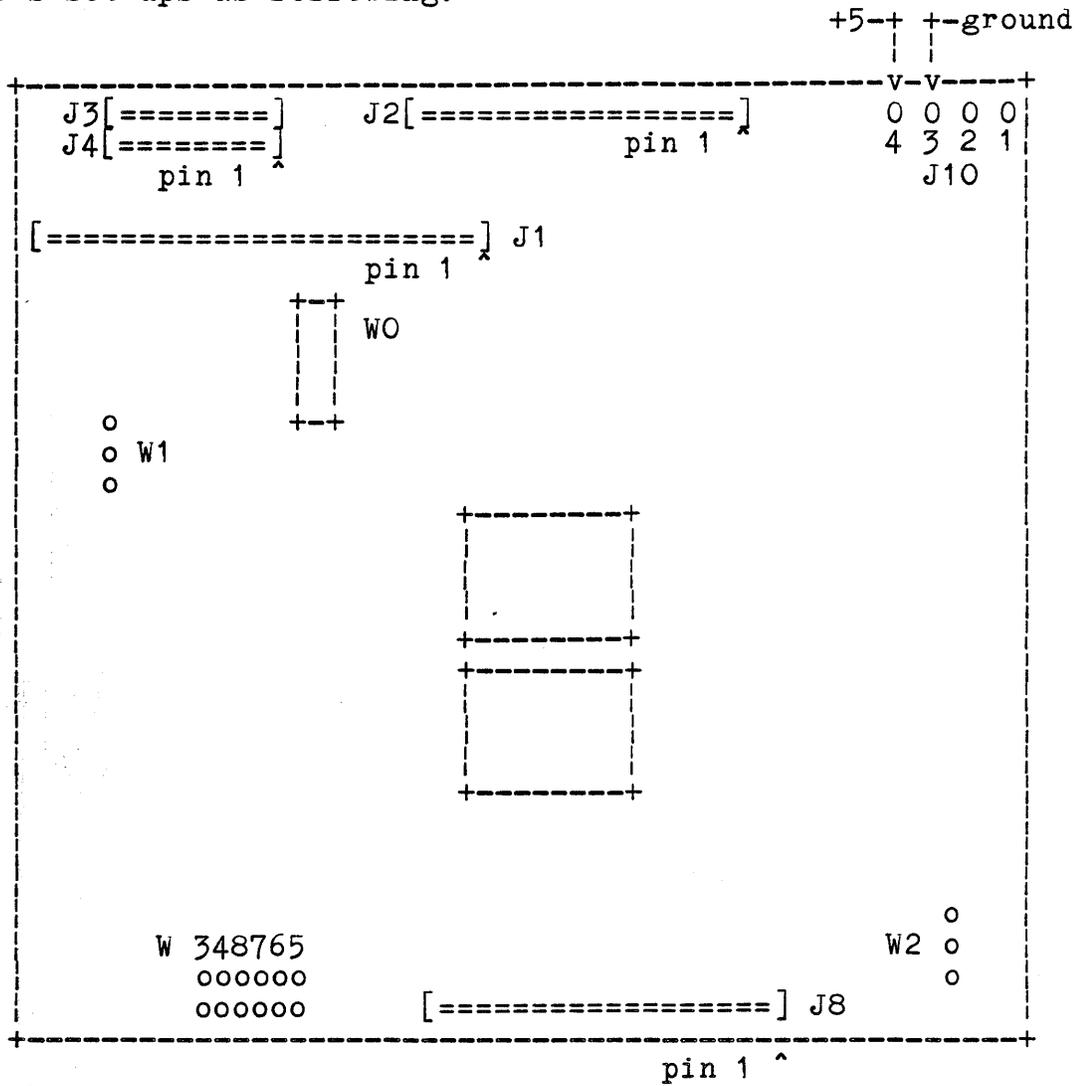


Fig. 1 (OMTI 5300)

Connectors

- J1 = SASI/SCSI Interface to SASI personality card
- J2+J3= Hard Disk Drive #1
- J2+J4= Hard Disk Drive #2
- J8 = Tape Backup Interface (used on 5300,5400)

SINGLE-USER PROCEDURES

Jumpers

W0 = SCSI Controller ID (jumper to 0)

W0

0	0	0
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0

(In Fig. 1)

W1 = Host Parity disabled (jumper 2-3)

0

W1	0
	0

(In Fig. 1)

W2 = QIC-02 Parity disabled (jumper 2-3)

0

W2	0
	0

(In Fig. 1)

W3-W4= 1024 byte Sector Size (both shorted)
W5-W8= Logical Unit Number assignments (leave all open)

W	W	W	W	W	W
3	4	8	7	6	5
0	0	0	0	0	0
0	0	0	0	0	0

(In Fig. 1)

4.6. Operating System Set-up

SINGLE-USER PROCEDURES

The OMTI diskette will provide the following operating system and utility files:

OMTI Disk Controller Files 8-bit/16-bit

- 1.) DSKOM1.0 - (16-bit master version)
DSKOM1.REL - TurboDOS Driver for 1 Hard Disk drive on an OMTI-5300 controller. (Tape support included)

(8-bit)
1st drive: TurboDOS "DSKAST" = 000, DSKDRA,001,DSKDRA,...
etc.
(16-bit)
1st drive: TurboDOS "DSKAST" = 0x00,DSKDRA,0x101,DSKDRA, ..
etc.
- 2.) DSKOM2.0 - (16-bit version)
DSKOM2.REL - TurboDOS Driver for 2 Hard Disk Drives on an OMTI-5300 controller. (Tape support included)

(8-bit)
1st drive: TurboDOS "DSKAST" = 000,DSKDRA,001,DSKDRA,... etc.
2nd drive: TurboDOS "DSKAST" = 010,DSKDRA,011,DSKDRA,... etc.
(16-bit)
1st drive: TurboDOS "DSKAST" = 0x00,DSKDRA,0x01,DSKDRA,...
etc.
2nd drive: TurboDOS "DSKAST" = 0x10,DSKDRA,0x11,DSKDRA,..etc.
- 3.) DSKOM1S.0 - (16-bit CPS-16 Slave version)
DSKOM1S1.0 - (16-bit CPS-186 Slave version)
DSKOM1S.REL - TurboDOS Driver for 1 Hard Disk Drive on an OMTI-5300 controller, (Tape support included)
For either a Non-Banked, A Banked, or the 8-Bit Workstation for use as local disk or remote disk drives.
- 4.) DSKOM2S.0 - (16-bit CPS-16 Slave version)
DSKOM2S1.0 - (16-bit CPS-186 Slave version)
DSKOM2S.REL - TurboDOS Driver for 2 Hard Disk Drives on an OMTI-5300 controller, (Tape support included)
for either a Non-Banked, A Banked, or the 8-Bit Workstation for use as local disk or remote disk drives.
- 5.) DSKOMTB.0 - (16-bit CPZ-186 Master version)
DSKOMTB.REL - TurboDOS Bootprom driver module. (Must have bootprom support drivers to complete).

N O T E ! !

You must use DSKOMTB.0 when you create your OSLOAD.CMD file. DO NOT USE THE STANDARD DRIVER SUCH AS DSKOM2.0 because your OSLOAD.CMD file will end up being greater than 16K bytes in size, which means that the bootprom will not be able to read that file.

SINGLE-USER PROCEDURES

- 6.) FMTOMT.CMD - (16-bit version)
FMTOMT.COM - OMTI disk formatter program.
"N O T E" Your TurboDOS system must be running one or the other of the drivers before you can format your drives. FMTOMT.COM checks to see if the driver is in the O/S before you are allowed to format. You must also create your disk parameters using the program "OMTIDST.COM" before you are allowed to format the drive. The file "OMTIDST.DAT" must exist on the same drive as the formatter, or you will not be allowed to format the drive.

- 7.) OMTDST.COM - (16-BIT version)
OMTIDST.COM - Parameter generator program for the OMTI disk controller. (Multiple partitions supported). (8-Bit version)

- 8.) QICLOCAL.COM - Its functions are the same as the QIC.COM program, but it talks directly to the parallel port and the OMTI controller.

- 9.) QIC.COM - Tape Backup/Restore utility for the OMTI controller. NOTE... this program will run on a 16-bit slave using TZ80.COM or directly from a 8-bit slave. You DO NOT HAVE TO BE ON A MASTER to run QIC, as it communicates with the master through TurboDOS's User-Function calles.

- 10.) QIC.DOC - Tape Backup/Restore utility documentation.

- 11.) OMTI.DOC - (This document file).

- 12.) OMTI.LST - Formated OMTI.DOC file.
To print, type: "TYPE OMTI.LST;L".

4.7. Setting drive parameter bytes in .PAR file

The drive parameters shown in the .PAR files are determined as follows:

4.7.1. Step Pulse Width

(normally this parameter can be left at default)

STPWx - Step Pulse Width: The length of time the step pulse width is asserted. The value of this byte specifies the width of the step pulse in 1 microsecond increments. The minimum value of the step pulse width is 4 microseconds.

4.7.2. Step Period

(normally this parameter can be left at default)

STPRx - Step Period: The length of time between the trailing and leading edges of step pulses. A zero value in the byte results in a 11 microsecond step period. a non-zero value specifies the time in 50 microsecond increments.

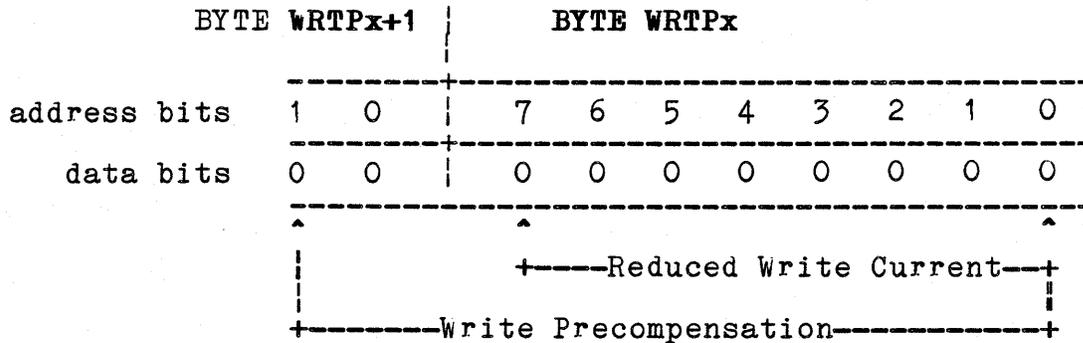
SINGLE-USER PROCEDURES

4.7.3. Write Precompensation

WRTP_x - Write Precompensation Cylinder/Reduced Write Current Address: This byte defines the cylinder address where reduced write current and/or precompensation is first applied. Reduced write current is applied to all cylinders greater than or equal to the value of this byte. A value of 0 in this bytes disables any write precompensation on that drive. The value of this byte is the cylinder number to start the write precompensation.

x = physical drive(0 or 1);

WRTP_x actually controls two parameters. It uses addresses **WRTP_x** and **WRTP_x+1** to form a 10 bit value:



SINGLE-USER PROCEDURES

4.7.3.1. Characteristics of WRTPx and WRTPx+1

1) The value in WRTPx specifies which cylinder(in hex) reduced write current starts. If this value is set to a zero, no matter what WRTPx+1 is, the reduced write current will be disabled. The maximum value for this eight bit parameter is FF hex(cylinder 255).

2) The value in WRTPx+1 and WRTPx specifies which cylinder(in hex) write precompensation starts. If this whole value is set to a zero, not only write precompensation is disabled, but reduced write current is disabled. The maximum value for this ten bit parameter is 3FF hex(cylinder 1023).

3) It should be made clear that with most drives on the market, reduced write current and write precompensation are defined as the same thing. When the manual for the drive gives a value for either of these to be set, use of the whole 10 bit value may be used.

4) If you use WRTPx+1, make sure bits 2-7 are set to zeros.

Examples:

WRTPx +1	WRTPx 7 6 5 4 3 2 1 0	PRECOMPENSATION
1 0	7 6 5 4 3 2 1 0	
0 0	0 0 0 0 0 0 0 0	No reduced wr. cur. No precompensation
0 0	0 0 0 0 1 1 1 1	red. wr. cur. starts at 0F hex precomp starts at 00F hex
0 1	0 0 0 0 0 0 0 0	No reduced wr. cur. precomp starts at 100 hex
0 1	1 0 0 1 0 0 0 0	red. wr. cur. starts at 90 hex precomp starts at 190 hex

SINGLE-USER PROCEDURES

4.7.3.2. Patching examples

1) If precompensation is needed at a value less than 255, only WRTPx has to be patched. Here is an example of the default value of cylinder 128 (80 hex) on the first physical drive:

```
WRTPO = 80          ; Write precomp starting at cylinder 128
                  ; for CPZ4800x
or
```

```
WRTPO = 0x80       ; Write precomp starting at cylinder 128
                  ; for CPZ-186
```

2) If precompensation is needed at a value greater than 255, both WRTPx and WRTPxP+1 has to be patched. Here is an example precompensation starting at cylinder 400(190 hex) on the second drive:

WRTPx+1		WRTPx							
1	0	7	6	5	4	3	2	1	0
0	1	1	0	0	1	0	0	0	0
\ /	\ /	\			/	\			/
01 hex		09 hex						00 hex	

```
WRTP1 = 90          ; Write precomp starting at cylinder 400
WRTP1+1 = 1
```

or

```
WRTP1 = 90,1       ; Write precomp starting at cylinder 400
```

4.7.4. Special Drives

Some of the newer drives (Maxtor's, Fujitsu's RODIME 204E, etc.) do not require a write precompensation and may bomb out after the formater reaches the 128th cylinder. This is because WRTPx is defaulted to 80 hex. To disable it, change this value to a 0 hex in both the CPZLOAD.PAR (CPZLD16.PAR) and CPZDOS.PAR, CPZMASTR.PAR (CPZLD16.PAR, CPZMST16.PAR) files.

Example - Place the following in the master PAR file:

WRTP0 = 0 ; Physical Drive 0 set to 0

WRTP1 = 0 ; Physical Drive 1 set to 0

4.7.4.1. The Syquest Removeable 10MB Hard Disk

The syquest drive is a little bit different because it needs a little more delay time when switching heads. This can be made up for by using the latest firmware revision (#1002406-D.5 on the prom of OMTI board) and placing the following parameters in the par files. All OMTI's sold from ICM from 9-1-85 and later will have this firmware revision, if not, contact ICM for a no charge revision. This drive was designed as a reliable back-up device, although its performance is close enough to that of any other ST-506 in its cost range. The only function it doesn't perform correctly is the booting from it since the operating system expects a quicker response from a drive therefore, it comes up with a not ready message. All you need to do is hit return to let it go on its way. Normally, this will be of no concern since its prime purpose is to be used as a quick back-up device rather than a system disk. Here is an example of the parameters needed if the drive is being used as the second drive in the system:

Place in the master par file:

STPW1 = 0

STPR1 = 0

WRTP1 = 0,30

5. THE SMC-200

5.1. Overview

The KONAN SMC-200 (or SMC-100) is a state of the art hard disk controller featuring an SMD type interface for up to two drives. DSKSMC is the TurboDOS driver enabling this product to be part of the Intercontinental Micro Systems distribution of TurboDOS. DSKSMC is available in both Z-80 and 8086 code for use with all ICM single board master processors.

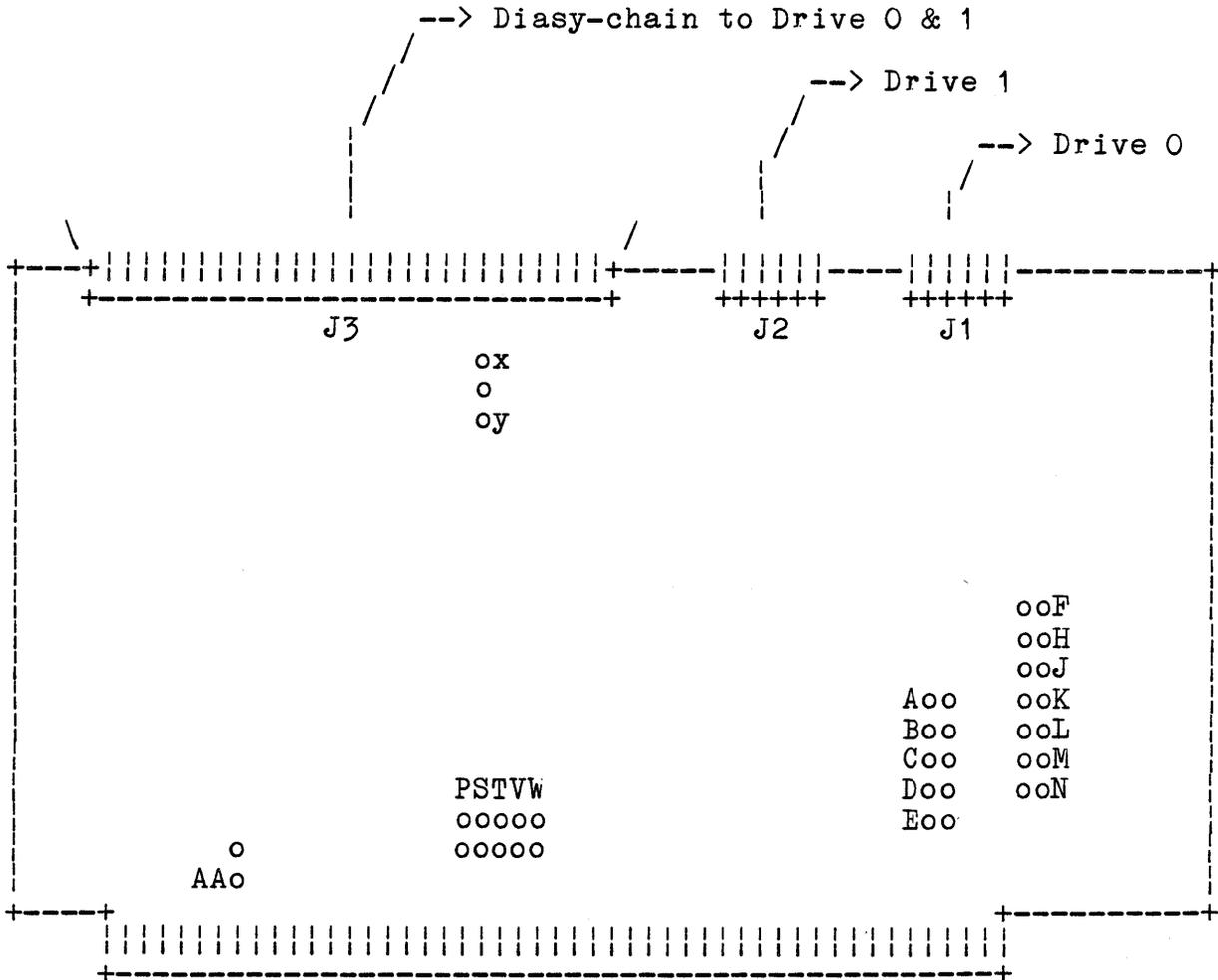
These TurboDOS driver support modules are designed for use with the KONAN SMC-200 (or SMC-100) hard disk controller. The SMC-200 (or SMC-100) controller is an S100 bus oriented board to interface to the SMD bus. One or two hard disk drives can be attached to the controller offering over 1 GigaByte of disk storage. Hard disk data transfers are performed at high speed between the drive and an on board sector buffer 512 bytes (516 including preamble) in length. On board buffer transfer to system memory is performed by programmed I/O. Disk read, write, and seek operations are polled by the driver for completion.

SINGLE-USER PROCEDURES

5.2. Integrating the SMC-200

5.2.1. Initial Setup

Here is a diagram of the way the jumpers should be set up on the SMC-200:



Remove all shunts and place plugs in the following:

V	T	E	AA
P	W	M	
S	D	N	

The port address is now set at 40 hex.

SINGLE-USER PROCEDURES

5.2.2. Setting Up the Single-User Operating System

Before formatting the hard disk, set up the single-user gen & pars to include the SMC drives. No matter which drives you use, always place DSKSMC in the gen file, and after it, place the correct 'spec table' file which match that of the drive(s) you are using (refer to section "MODULE DESCRIPTION"). If you are using the Amcodyne Arapahoe drive, the SMC distribution diskette will provide all the tables needed. If you have a different drive, there is a "DSTSMC1" and "DSTSMC2" example source file to modify. All you have to do is re-assemble the driver using TASM and the assembler will prompt the user for drive specific parameters. There are already many ICM users who have successfully modified various drives with these examples. For a listing of some of the drives, refer to section "SUPPORTED DRIVE'S" or call ICM to find out if the drive you have can be used. Here is an example 16-bit master, single-user gen & par using a Megavault drive as drive A:, and an Amcodyne Arapahoe fixed/removeable Hard Disk drive as drives B: & C:.

```
;  
;CPZ-186 Single User GEN file example of 02/06/85  
;  
STDSINGL      ; Standard Single-User O/S  
;STDSPOOL     ; Standard Single User with Spooler (if you have it)  
SOMCPZ        ; CPZ-186 Signon area  
PATCH        ; System Patch Area  
RTCCPZ        ; RTC Driver Module  
CPMSUP        ; CP/M-86 Support Module  
MSTCPZ        ; Memory Descriptor Table  
NITCPZ        ; CPZ-186 Hardware Init section  
CON192        ; NULL 19.2K Baud Console Driver  
;CON96        ; NULL 9600 Baud Console Driver  
SPDCPZ        ; CPZ-186 Serial/Parallel I/O Driver Module  
LSTCTS        ; List Clear-to-Send Driver module  
;LSTPAR       ; List Parallel Driver Module  
DSKCPZ1       ; CPZ-186 Floppy disk driver module  
DST58I        ; 8"/5" TurboDOS disk format tables  
DSKSMC       ; SMC-200 Controller module  
DSTSMC1     ; modified DSTSMC1 for Megavalt  
DSTAK12     ; Amcodyne Arapahoe Spec. table  
;MD131DRV     ; MD-1013 Hard Disk controller (1 drive)  
;MD132DRV     ; MD-1013 Hard Disk controller (2 drives)
```

SINGLE-USER PROCEDURES

```

;
;CPZ-186 Single User PAR file example of 02/06/85
;
USRSOM = 0X0D,0X0A,"ICM CPZ-186 Master CPU Board."
;
SRHDRV = 0xFF ; Search Default System Drive
COMPAT = 0xF8 ; Compatability Flags
AUTUSR = 0x80 ; Auto Logon to User 0 Privileged
;
ATNCHR = 0x00 ; Define Attention Char as BREAK Key
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial
FFCHR = 0x1A ; Console form feed character
;
PTRAST = 0x0,LSTDRA ; assign printer port
;
LDCOLD = 0x00 ; Cold start autoloader flag
LDWARM = 0x00 ; Warm start autoloader flag
;
NMBUFS = 16 ; Number of disk buffers
BUFBAS = (0x3C00) ; 16K segment reserved
BUFLen = (1024) ; paragraphs to reserve
MEMTBL+3 = (0x3BFF-0x0050) ; define memory we have
;
DRVTBL = 0x00,0x00,0x00,0x00 ; Cover 8" drives, 3ms step rate
;
DSKAST = 0x08,DSKDRB ; Megavault (fixed) 1st drive
          0x18,DSKDRB ; Amcodyne (fixed) 2nd drive,1st part.
          0x10,DSKDRB ; Amcodyne (remov) 2nd drive,2nd part.
          0x00,DSKDRA ; 1st floppy
          0x01,DSKDRA ; 2nd floppy
;

```

SINGLE-USER PROCEDURES

5.2.3. Formatting the SMC-200

After the single-user operating system has been reconfigured and booted, use the FMTSMC command to format each Logical drive. If formatting drive A:, type in at prompt:

OD}FORMAT A: <cr>

Run an "ERASEDIR" on each logical hard disk drive and set the directory "HASHED".

After formatting, you must create a temporary single-user operating system using the gen and pars above and just adding this to the par file:

SMCRTY = 0 ; Set SMC retries down to zero(default is 4)

This will cut out the amount of read retries to execute a reliable verify. Verify all Hard Disk logical drives this way. If verifying drive A:, type in at prompt:

OD}VERIFY A: <cr>

When the command comes back and asks you if you want to write out the bad blocks, type in "Y".

Now you may take out the "SMCRTY" parameter out of the par file, otherwise you will get unnesicary read errors during system operation.

5.2.4. Booting From Hard Disk and Setting Up a Multi-User System

To Boot from the SMC-200 Hard Disk, set up the gen and pars to imitate the ones given above exactly (as far as the one's we added). You will have to have a Boot prom supplied by ICM unless you are going to use your own

For a multi-user system, you may also use the same additions made to the above gen and pars without any further additions.

5.3. SMC-200 File Explanation

The following is a list of files associated with the KONAN SMC-200 controller:

- DSKSMC.REL The basic driver module that is GEN'ed into the master (DSKSMC.0) processor operating system. The source to this module is DSKSMC.MAC (DSKSMC.A).
- BPDSMC.REL The boot PROM driver module that is used to create the TurboDOS compatible boot PROM. The source to this module is BPDSMC.MAC. For 16 bit, DSKSMC itself is used for boot prom generation.
- DISK SPEC'S Disk specification modules are included in the masters .GEN file to define the parameters of the drive(s) attached to the controller. The following disk paramter modules are included.
- 1) DSTSMD.REL Parameters for the Fujitsu M2312K.
 - 2) DSTAK1.REL 8 bit Paramters for the Amcodyne Arapahoe configured as first and only physical drive with 1 logical drive on the removable cartridge and 1 logical drive on the fixed portion.
 - 3) DSTAK1.0 Same as (2) for 16 bit.
 - 4) DSTAK11.REL Same as (2) except configured as first of two phycial units.
 - 5) DSTAK11.0 Same as (4) for 16 bit.

SINGLE-USER PROCEDURES

- 6) DSTAK2.REL Same as (2) except configured for two logical units each on the removable and fixed portions.
- 7) DSTAK2.0 Same as (6) for 16 bit.
- 8) DSTAK22.REL Same as (6) except configured as second of two physical drive units.
- 9) DSTAK22.0 Same as (8) for 16 bit.
- 10) DSTAK12.0 Same as (3) except configured as 2nd of 2 physicals.
- 11) DSTAK21.0 Same as (7) except configured as 1st of 2 physicals.
- 12) DSTSMC1.0 Generic specification table for symmetrical allocation of logical units on uniformly fixed media. Drive specific parameters are prompted for at assemble-time. Configured for first physical unit. Available in 16 bit only.
- 13) DSTSMC2.0 Same as (12) except configured as second of two physical units.

- FMTSMC.COM Drive formatting program for 8 bit.
- FMTSMC.CMD Drive formatting program for 16 bit.
- EQUATE.MAC Source include file for common OS equivalences.
- DREQUATE.MAC Source include file for common driver equivalences.

NOTE: For DSTAKxy files:

x = the number of logical partitions(1 or 2)
y = the physical drive it represents(1, 2 or nothing. If nothing, its the only drive.)

5.4. Module Description

DSKSMC

The main disk driver module is included into the masters operating system. This module defines the driver initialization and functional entry points, DSKIN@ and DSKDR@ (DSKIN_ and DSKDR_ for TurboDOS 8086). A disk specification module must be included with this module (see below) for proper operation of the driver.

The master operating system parameter file which is responsible for defining the driver entry point must also configur the logical drive to physical device mapping. The drive number in the disk assignment table has been divided into fields to specify the SMC-200 physical drive, cartridge or fixed, and possible partitioning.

7	6	5	4	3	2	1	0	
| 0 |	| 0 |	| 0 |	| D |	| M |	| PARTITION |	<-- PDRDRV		

Bit 4 (D) selects the physical drive on the SMC-200 controller. D=0 selects drive 0, D=1 selects drive 1.

Bit 3 (M) selects the fixed or cartridge media of the CMD drive. M=0 selects the cartridge media, and M=1 selects the fixed media.

Bits 2 through 0 (PARTITION) select the partitioning supported through the disk specification module. One of eight partitions per physical drive/media may be defined by the disk specification module (See below for supported partitions with "DST" modules).

DSTAK1

Disk specification module for the Amcodyne Model 7110 Cartridge Module Drive. These disk specifications define one 20MB cartridge media and one 20MB fixed media per drive.

SINGLE-USER PROCEDURES

Example:

The following example shows what is included into the master OS GEN and PAR files to support two physical drives with cartridge and fixed media. These are mapped into four logical system devices.

Included in master OS GEN file

```
-----  
DSKSMC      ; KONAN SMC-200 driver  
DSTAK1      ; Disk specifications for DSKSMC
```

Included in 8-bit master OS PAR file

```
-----  
DSKAST = 000,DSKDRA ; A = Drive 0, cart  
          008,DSKDRA ; B = Drive 0, fixed  
          010,DSKDRA ; C = Drive 1, cart  
          018,DSKDRA ; D = Drive 1, fixed
```

Included in 16-bit master OS PAR file

```
-----  
DSKAST = 0x00,DSKDRA, ; A = Drive 0, cart  
          0x08,DSKDRA, ; B = Drive 0, fixed  
          0x10,DSKDRA, ; C = Drive 1, cart  
          0x18,DSKDRA  ; D = Drive 1, fixed
```

DSTAK2

Disk specification module for the Amcodyne Model 7110 Cartridge Module Drive. These disk specifications define two partitions of 10MB each on the cartridge media and two partitions of 10MB each on the fixed media per drive.

Example:

The following example shows what is included into the master OS GEN and PAR files to support two physical drives with cartridge and fixed media. These are mapped into eight logical system devices.

Included in master OS GEN file

```
-----  
DSKSMC      ; KONAN SMC-200 driver  
DSTAK2      ; Disk specifications for DSKSMC
```

SINGLE-USER PROCEDURES

Included in 8-bit master OS PAR file

```
-----  
DSKAST = 000,DSKDRA ; A = Drive 0, cart ptn #1  
         001,DSKDRA ; B = Drive 0, cart ptn #2  
         008,DSKDRA ; C = Drive 0, fixed ptn #1  
         009,DSKDRA ; D = Drive 0, fixed ptn #2  
         010,DSKDRA ; E = Drive 1, cart ptn #1  
         011,DSKDRA ; F = Drive 1, cart ptn #2  
         018,DSKDRA ; G = Drive 1, fixed ptn #1  
         019,DSKDRA ; H = Drive 1, fixed ptn #2
```

Included in 16-bit master OS PAR file

```
-----  
DSKAST = 0x00,DSKDRA, ; A = Drive 0, cart ptn #1  
         0x01,DSKDRA, ; B = Drive 0, cart ptn #2  
         0x08,DSKDRA, ; C = Drive 0, fixed ptn #1  
         0x09,DSKDRA, ; D = Drive 0, fixed ptn #2  
         0x10,DSKDRA, ; E = Drive 1, cart ptn #1  
         0x11,DSKDRA, ; F = Drive 1, cart ptn #2  
         0x18,DSKDRA, ; G = Drive 1, fixed ptn #1  
         0x19,DSKDRA ; H = Drive 1, fixed ptn #2
```

FMTSMC

Format program for the KONAN SMC-200 driver. This program uses the format track function of the DSKSMC driver and assumes that the driver, disk specifications, and logical device mapping has been installed into the TurboDOS master operating system. FMTSMC must be executed from bank 0 of the master operating system but does not require buffers to be released. The command line for FMTSMC is as follows:

```
FMTSMC d: {;v}
```

Where "d:" is the specified TurboDOS device to format (A: through P:). This will depend on your disk assignment table configuration and the disk specification module you are running.

The optional ";v" will perform only the verify pass of the formatter. NOTE: The verify pass is always performed after the format pass to inform the operator of defective tracks on the media.

If media flaws are found with the verify pass of the formatter, the TurboDOS verify utility should be run next to mark flaws in the directory so attempts to write data into these areas will be avoided. The TurboDOS erase directory utility may be run either before or after the verify utility to convert the directory into the hashed format.

5.5. Source Information

The sources to all the modules supporting the KONAN SMC-200 controller and drive specifications are provided to allow reconfiguration for the system integrators specific needs.

SMC-200 Base I/O Address:

The SMCEQU file contains the equate for the base I/O address of the SMC-200 controller. This equate has a default setting of 40 hex, but may be changed to any other valid base and the driver module re-assembled.

SINGLE-USER PROCEDURES

5.6. Supported Drive's

Here is a listing of some of the Drives already used with the SMC-200:

Amcodyne Arapahoe fixed/removable(20MB fixed/20MB removeable)

-For info. call Dick Langhan at S-100
(602)991-7870

Amcodyne Comanche(160 MB)

-For info. call Dick Langhan at S-100
(602)991-7870

Megavault(older models-50 MB)

-For info. call Marc at ICM

CDC 9771/800(800MB)

-For info. call Al Pease at IBS
(415)443-3131

CDC 9766(300MB)

-For info. call Rick Surwillo at JBS
(201)962-9000

CDS AMS 513-1(513MB)

-Set jumpers on drive to know about 59 sectors
-Set software to know about 58 sectors
-For info. call Eric Lennington at Southwest Computers
(214)522-1512

6. MULTI-USER PROCEDURES

Now that your single-user implementation of TurboDOS is complete and functional, you are ready to begin the upgrade for multi-user operation.

6.1. Adding Slave Processors

Basically, the changes will be the addition of slave hardware and software drivers to the already existing system. Again we suggest that you start with a "minimum system" and progress step-by-step through the addition of various peripherals and software driver capabilities.

The following procedure will take you step-by-step from the

MULTI-USER PROCEDURES

end of the single-user configuration through a multiple slave, fairly sophisticated multi-user system. This procedure does not explain all possible capabilities of the hardware or software. As with the single-user section, a continuous reference to the ICM hardware manuals, appendixes and the TurboDOS software manuals are required.

STARTING CONFIGURATION ASSUMED:

Single-user OSMaster.SYS

- including: 1. 2 floppies (B: & C:) (via FPB-158)
- 2. 1 CRT (console) (via RPB-200 with MODEM OPTIONS)

You will note that there are a number of additional or new drivers listed in the CPZMASTR.GEN. These are the differences between single-user and multi-user configuration for the operating system.

MCDCPS is the **Master Circuit Driver** that controls communications to both 8 and 16 bit slave processors. This new driver (V 1.4X) differs from the previous versions in that you don't need to specify the number of slaves in the network. The driver will now scan the bus to re-configure the Circuit Initialization routine (**CKTIN@**) according to how many slaves it finds active. There are numerous new parameter names which relate to slave and master-slave operation. Refer to the ICM software documentation and the TurboDOS manual for further details on these parameters. You must now create a new operating system image via the GEN operation. There is no need to re-GEN the **OSLOAD.COM** file as it will remain fixed. You will need to GEN the **CPZMASTR.GEN & PAR** files and target the output file to a new text file called **OSTESTM.SYS**. (The default values for the **CPZMASTR.GEN & .PAR** are in appendix C:)

OA}GEN CPZMASTR OSTESTM.SYS <CR>

MULTI-USER PROCEDURES

The CPSSLAVE.GEN & PAR files are minimal configurations as shipped on the ICM distribution diskette, and you will need to GEN them to a target file OSSLAIVE.SYS. As there has been no Z-80 slave system files provided, you should use the OSSLAIVE.SYS filename to preclude having to change the TurboDOS patch point SLVFN located in the module NETSVC required for start-up operation.

The CPSSLAVE.PAR file sets the master and slave console at 9600 baud with a "privileged user" logon capability (No password). Gen the OSSLAIVE.SYS file thus:

```
OA}GEN CPSSLAVE OSSLAIVE.SYS
```

The system should be shut down and a single ICM CPM-MX (8-bit) slave board inserted in the S-100 Bus. Power-up and perform the same voltage checks suggested at the beginning of the single-user procedures. Assuming all voltages are good, power-down and attach a personality card (RPB-100) between connector J3 on the CPS-MX slave card and a CRT terminal via the same type cable as suggested for the master console in the single-user section. CRT set-up is also identical to the master console.

The CPS slave card must be configured to respond to a unique address on the S-100 bus. All CPS-MX or CPS-BMX cards are strapped to I/O address 7F Hex when they are shipped from ICM. All CPS-16 or CPS-186 cards are strapped to I/O address 3F Hex when they are shipped from ICM. Each CPZ SBC can address slaves (7FH thru 70H) or (3F thru 30H). The CPSSLAVE and CPZMASTR files are setup to communicate to slaves in any I/O address order. However, there is no restriction regarding slaves except that there can be only one slave enabled at each I/O port address location. Reference the CPS-MX manual pages 18 or the on next page.

MULTI-USER PROCEDURES

T A B L E 6-1: 8 and 16 Bit Slave I/O Port Jumpering

Slave	8 Bit I/O Port	Physical Representation	16 Bit I/O Port	Physical Representation
1	7F	10000000	3F	00000011
2	7E	10000001	3E	10000011
3	7D	10000010	3D	01000011
4	7C	10000011	3C	11000011
5	7B	10000100	3B	00100011
6	7A	10000101	3A	10100011
7	79	10000110	39	01100011
8	78	10000111	38	11100011
9	77	10001000	37	00010011
10	76	10001001	36	10010011
11	75	10001010	35	01010011
12	74	10001011	34	11010011
13	73	10001100	33	00110011
14	72	10001101	32	10110011
15	71	10001110	31	01110011
16	70	10001111	30	11110011

1 = Jumper
0 = Open

The CPS-MX slaves each carry 64K of RAM. All slave RAM in the system resides in the same 64K address space and is addressed from the master using the slaves I/O Port select signal. This 64K block is placed immediately above the CPZ-4800X Masters 64K Memory Space.

Re-apply power to the system and allow the single-user "default" system to re-load. Perform a new operating system load as follows:

OA}OSLOAD OSTESTM.SYS <CR>

The master console CRT should indicate the normal TurboDOS message and the console will terminate since CONREM (console remote) is enabled in the master GEN file. The slave console should now display the same messages. If the slave doesn't boot, replace the CONREM in the masters GEN file with CON96 and try to load the slave again. If the master comes back with a OA} prompt, the softwares probably alright, and you may have to go back a few steps and make sure the hardware is set up correctly.

Test for proper operation at each slave console through DIR, COPY, TYPE, etc. operations. Make sure that each console can access each disk device. You have successfully started your TurboDOS Multi-User system.

6.2. Printer on Slave

Both parallel and serial printer drivers are provided in the **CPSSLAVE.GEN** file. Enable the desired driver depending on your device interface capabilities. Edit the **CPSSLAVE.PAR** file to include a **PTRAST**. This parameter file will assign the list device to the proper driver during the **GEN** process.

For SERIAL printer on serial port:
PTRAST = OO,LSTDRA (assigns serial device to 1st serial port, slave CPS or Masters CPZ)

For PARALLEL printer on parallel port:
PTRAST = OO,LSTDRA (defaults to parallel port regardless of 1st byte entry).

In this configuration, the slave knows about the printer but no other users are aware that it exists. To assign shared devices, refer to Appendix D for examples of shared printers on slaves.

6.3. Remote or Physical Master Console

As mentioned earlier, it is preferable to have the master SBC configured without a console (i.e. NO user). This is due to the reduction in system performance which is experienced by the slaves when the master is being used for other than system support functions. There is, however, the need to be able to access the master via a console. **CONREM** which is meant to replace the **CON96** or **CON192** driver in the **CPZMASTR.GEN** file provides this function. **CONREM** enables a user's slave to communicate directly to the master on his own terminal via the **MASTER** command. Only one user is allowed to hook to the master at a time.

EXAMPLE:

```
A}MASTER <CR>
```

Console attached to master processor

```
A}
```

The **MASTER** command can be used to perform direct disk commands such as **FORMAT**, **VERIFY**, **BACKUP** or **HALT**. After executing these commands, detach from the masters console by hitting **BREAK**, **^C**. This will enable other users to access the master console. Edit the **CPZMASTR.GEN** and disable the operational console drivers and enable the **CONREM** module.

6.4. Clock/Calendar on Slave

In multi-user TurboDOS the CPZMASTR.GEN file must be edited to enable the MASTRCLK.REL driver only if it is to be attached directly to the master SBC and not placed on a slave.

To allow the master parallel port to be used for a central printer or possibly to access the disk drives via a personality board and still have the system clock available, there is a provision made to connect the clock board, CCB-100, to any one of the slaves in the system and have the TIME/DATE automatically forwarded to the master for use by all other slaves. This operation occurs at power-up/boot.

For the slave which will have the CCB-100 installed, the CPSSLAVE.PAR file must be modified to enable the LDCOLD (i.e. LDCOLD = OFF). COLDFN must also be enabled by removing the semicolon (;) from the front of the filename. **Note that the SLVCLK.AUT file is NOT included in the CPSSLAVE.GEN file.** The file SLVCLK.AUT must be copied to user 0 with the copy command if the system is fully privileged. If using a LOGON system (a password system covered later in this section), the SLVCLK.AUT must be copied to user 31.

Place in Master Par File.

EXAMPLE: LDCOLD = OFF
COLDFN = 0, "SLVCLK", "AUT"

Remember that whenever any GEN or PAR files are altered, you must re-gen them with the GEN command and the system must be reloaded. (In this case, there is no need to re-boot the system, only a need to reload the master so it will re-load the slaves to cause the date/time to be read into the system.)

OA}OSLOAD OSTESTM.SYS <CR>

After reloading the master and slave operating systems the clock/date information should be available on (all) slave consoles. This can be tested by typing OA}DATE on all the slave consoles.

MULTI-USER PROCEDURES

6.5. Clock/Calander on a 16-bit Slave

To enable a CCB-100 on a 16-bit slave, LDCOLD needs to be changed to 0xFF and COLDFN will execute TDTIMES.CMD. This command can be found on the ICM Utilities diskette. If the slave is set up for logon security, copy this command up to user 31, otherwise it should be kept on user 0.

```
USRSOM = 0x0D,0x0A,"Intercontinental Micro Systems, Corp."  
        0x0D,0x0A,"8086 Slave."  
;  
SRHDRV  = 0xFF          ;Search Default System Drive  
COMPAT  = 0xF8          ;Compatibility Flags  
AUTUSR  = 0x80          ;Auto Logon to User 0 Privileged  
;  
ATNCHR  = 0x00          ;Define Attention Char as "BREAK" Key  
CONAST  = 0x01,CONDRA  ;Assign Console to Port B Serial  
;  
MAXMBS  = 0x03  
MAXRPS  = 0x03  
;  
MEMTBL+3 = (0x3FFF-0x0050) ; 256 Kbyte Slave memory specs  
;MEMTBL+3 = (0x7FFF-0x0050) ; 512 Kbyte Slave memory specs  
;MEMTBL+3 = (0xFFFF-0x0050) ; 1 Mbyte Slave memory specs  
;  
LDCOLD  = 0xFF          ;Enable Cold Load function  
COLDFN  = 0,"TDTIMES, CMD";Init TurboDOS Data/Time using CCB-100  
LDWARM  = 0x00          ;Disable Warm Load function
```

6.6. Adding Banked Slaves

Banked slaves will have to be Gen'ed up from the SLVBNK.PAR and SLVBNK.GEN sample files. The SLVBNK files are almost identical to the CPSSLAVE files except that it has all of the Bank Manager modules included. Modifications made to these slaves will be done in the exact same ways as the CPSSLAVE slaves, so it will not be discussed in this section. There is only one change to be made when generating this file:

```
OA}GEN SLVBNK OSSLAVER.SYS;KFCOO
```

The suffix "B" was added to OSSLAVER to distinguish it from a 64K slave which may be in the system. The ;KFCOO defines the common area between the banks on the slave and if not included the slave will crash! The slave suffix table in the CPZMASTR.PAR file was also have to reflect this:

```
SSTCSA = " BB B "      ; O/S Suffix table for CPS-MX
          "ZZZZZZZZ"    ; O/S Suffix table for CPS-16

PATCSA = 7F,7E,7D,7C   ; Status port table for CPS-MX
          7B,7A,79,78
          3F,3E,3D,3C   ; Status port table for CPS-16
          3B,3A,39,38
```

Now the sample file is set up 64K-Slaves on ports 7F,7E,7B,79 and 78. The 128-Banked Slaves are set on ports 7D,7C, and 7A. To implement more than eight Z-80 slaves, change the port and suffix tables for the amount you require. The driver can be included more than once in the GEN file to support more than 16 slaves. The GEN will produce a duplicate symbol error which can be ignored.

6.7. 16 BIT MASTER (CPZ-186)

The 16-bit master uses a powerful 80186 processor to orchestrate the S-100 network. It operates at 8-Mhz with no onboard wait-states required. It comes with standard 256K of memory, which is expandable to 1 megabyte with the addition of 256*1K dynamic RAM chips and a prom. Its advantage as a network server over an 8-bit master is not only the increased word size and speed, but also its abundance of onboard memory. It can now handle any size operating system without sacrificing TPA (Transient Program Area) space. The onboard caching buffers can also be increased to an amount which is more suitable for system disk buffering. With the 1 megabyte option, 700k can be allotted for buffers. As with the rest of ICM's products, the 16-bit master can be used with the rest of our existing products, including 8-bit slaves.

Before bringing up the system, go over the Bus Voltage Check discussed at the beginning of the manual. The board will boot up using the configuration 'I' 80186 boot diskette. If using a Monitor Dynamics Hard Disk controller, there is a 16-bit version of the format program available on the ICM-UTILITIES diskette named TESTMD.COMD. The configuration 'I' diskette also comes with a 16-bit assembler(TASM.COMD) and a linker program which replaces the 8-bit GEN command(TLINK.COMD).

T A B L E 6-2: File extensions used in 16-bit TurboDOS

???????.CMD	----->	16-bit executable commands
???????.0	----->	16-bit relocatable files
???????.A	----->	16-bit source files

Both 8 and 16-bit files can exist on the same drive since both operating systems will default to their own extensions. Only the 16-bit operating system will look for .CMD files when executing a command. For good housekeeping, it is a good idea to keep the .REL and .0 files on separate users.

7. CPZ-186 MASTER MULTI-USER SYSTEM CHANGES**7.1. Software Modifications**

The GEN files for the CPZ-186 based system are very similar to the 8-bit versions presented earlier. The PAR files are very similar as well. The major difference between the 8-bit and the 16-bit versions is that to denote a HEX (base 16) number, the number has to be preceded with a 0x. In the patch table, it is required to set "(" and ")" around variable declarations as defined in the examples given by Software 2000 with the distribution diskettes.

Listed below is an example of the port assignment table for the slaves:

```

8-bit      PATCSA = 7F,7E,7C
16-bit     PATCSA = 0x7F,0x7E,0x7C

```

The 0x tells the linker TLINK to take the next number as a hex value. If the 0x is not supplied, the number is assumed to be decimal.

Below is an example of the CPZ-186 as a multi-user master supporting 8-bit and 16-bit slaves:

```

;CPZMST16.GEN  CPZ-186 NETWORK MASTER
STDMASTR      ; STANDARD 16-Bit Multi-User OS
;NETREQ       ; Support module for Despooling/Networking
;MSGFMT       ;      "      "      "      "      "
;NETLOD       ;      "      "      "      "      "
;NETFWD       ;      "      "      "      "      "
PATCH        ; SYSTEM PATCH AREA
RTCCPZ        ; RTC DRIVER MODULE
CPMSUP        ; CP/M-86 SUPPORT MODULE
MSTCPZ        ; MEMORY DESCRIPTOR TABLE
NITCPZ        ; HARDWARE INITIALIZATION
CONREM        ; Use remote console for slaves
;CON192       ; NULL 19.2K BAUD CONSOLE DRIVER
;CON96        ; NULL 9600 BAUD CONSOLE DRIVER
SPDCPZ        ; SERIAL/PARALLEL I/O DRIVER
LSTCTS        ; LIST CLEAR-TO-SEND DRIVER
;LSTPAR       ; LIST PARALLEL DRIVER
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
MD131DRV      ; Monitor Dynamics MD-1013 with 1 drive
;MD132DRV     ; Monitor Dynamics MD-1013 with 2 drives
MCDPCS        ; 16 Bit Master/Slave circuit driver module
;LANCPZ       ; TurboLAN Network Driver Module

```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

```

;CPZMST16.PAR    CPZ-186 NETWORK MASTER
SRHDRV = 0xFF    ; Search Default System Drive
COMPAT = 0xF8    ; Compatibility Flags
AUTUSR = 0x80    ; Auto Logon to User 0 Privileged
;
;
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial
;
;
PATCSA = 0x7F,0x7E,0x7D,0x7C ; Status port table for CPS-MX)
        0x7B,0x7A,0x79,0x78 ; (default values)
        0x3F,0x3E,0x3D,0x3C ; Status port table for CPS-16
        0x3B,0x3A,0x39,0x38 ; (default values)
;
SSTCSA = " B      " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
PTRAST = 0x00,LSTDRA ; assign printer to port 00
QUEAST = 0x00,(0x0000) ; Queue assignment table
;
LDCOLD = 0x00 ; Cold start autoload flag
;COLDFN = 0,"TDTIMEM","CMD"; Init TurboDOS Date/Time function
LDWARM = 0x00 ; Warm start autoload flag
;
OSMLEN = (1024) ; allow 16K for Dynamic expansion
;
NMBUFS = 128 ; Number of disk buffers
BUFBAS = (0x2000) ; 16K memory segment reserved
BUFLEN = (8192) ; paragraphs to reserve
MEMTBL+3 = (0x1FFF-0x0050) ; define memory we have for O/S
;
BFLDLY = (0x64) ; Flush buffers every 2 seconds
;
DRVTBL = 0x41,0x41,0x41,0x41 ; 6ms step rate, tandon bit set
;
DSKAST = 0x01,DSKDRB,0x00,DSKDRA,0x01,DSKDRA,0x02,DSKDRA
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000)

```


7.3. CALCULATING DISK BUFFERS FOR CPZ-186

The CPZ-186 has the memory divided between DISK BUFFERS, OPERATING SYSTEM and TPA. Tlink is used for 16-bit TurboDOS and accepts decimal values. All of these calculations are done in decimal. NOTE: Parenthesis () are at times required to signify a 16-bit value.

To calculate the pathes for the master PAR file use the following formulas:

NMBUFS Is the number of disk buffers and can range between 1 to 255 decimal.

BUFSIZ Takes on the following values:

3 to mean 1024 byte buffers
4 to mean 2048 byte buffers
5 to mean 4096 byte buffers

BUFLEN The buffer length is NMBUFS times BUFSIZ divided by 16.

Example $8192 = (128 * 1024) / 16$

BUFBAS Is the amount of memory minus the buffer length.

$BUFBAS = MEMMAX - BUFLN$

Where MEMMAX = 16,384 for 256K
32,768 for 512K
65,535 for 1-MEG

$MEMTBL+3 = (BUFBAS - 0x0050)$

Example $MEMTBL+3 = (8192 - 0x0050)$

Since the NUMBUF can only go up to 255 to get more then 255K of disk buffers you have to increase the buffers size and recompute the buffer information and install it into the PAR file.

DOUBLE CHECK YOUR MATH ! ! Buffer allocation is critical and must be done corectly.

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

You will need a de-wire wrapping tool or a pair of tweezers and some jumpers to make the Extended Addressing Select changes:

8-BIT SLAVES
CPS-MX or CPS-BMX

Using CPZ4800x:

```

A23      A16
0 0 0 0 0 0 0 0
| | | | | | | |
0 0 0 0 0 0 0 0
    
```

Using CPZ-186:

```

A23      A16
0 0 0 0 0 0 0 0
| | | | | | | |
0 0 0 0 0 0 0 0
    
```

16-Bit SLAVES
CPS-16

Using CPZ4800x:

```

A16      A20
0 0 0 0 0
| | | | |
0 0 0 0 0
    
```

Using CPZ-186:

```

A16      A20
0 0 0 0 0
| | | | |
0 0 0 0 0
    
```

LANS100

S-100 ARCnet controller in memory mapped mode

Using CPZ4800x:

```

0----0 A23
0----0
0----0
0----0
0      0
0      0
0      0
0      0
0      0 A16
    
```

Using CPZ-186:

```

0----0 A23
0----0
0      0
0----0
0      0
0      0
0      0
0      0
0      0 A16
    
```

7.4. 16 Bit Slaves

Configuring a system with 16-bit slaves is very similar to 8-bit slaves. The main difference is the Relocatable modules are called *.O files instead of *.REL files. Another difference is that all values in the parameter files have to be preceded with a 0x to distinguish it as a HEX value; the default base is decimal. All 16-bit executable commands have a tail defaulting at *.CMD. There is a Z80 emulator on the MUTD-G disk called TZ80.CMD. This will enable you to run most CP/M-80 programs from a 16-bit slave. Because each command needs to run through the emulator, you can expect a substantial decrease in speed especially with screen intensive programs. To exit the emulator, press the "break" and "^C" keys.

The 16-bit slave uses the "CPSSLV16" Gen and Par files available on the MUTD-G diskette. This can be modified on either an 8-bit editor or a 16-bit editor. Since this is a 16-bit operating system, it can only be linked on a 16-bit processor. It is a good rule of thumb to link this file before modifying the master Gen and Par files. TLINK.COM will replace the GEN.COM on the 16-bit slave:

```
OA}TLINK CPSSLV16 OSSLAVER.SYS
```

The diskette already has an "OSSLAVER.SYS" file on it which only assumes a 9600 baud terminal with 8 data bits, 2 stop bits, and no parity. The "CPZMASTR.PAR" already has this suffix included in its slave suffix table at port address 3F,3E,3D,3C,3B,3A,39 and 38:

```
PATCSA = 7F,7E,7D,7C      ; Status port table for CPS-MX,
          7B,7A,79,78
          3F,3E,3D,3C      ; Status port table for CPS-16
          3B,3A,39,38
;
SSTCSA = "                " ; O/S suffix table for CPS-MX
          "ZZZZZZZZ"        ; O/S suffix table for CPS-16
```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

Below is an example of CPSSLV16 Gen and Par File with a Direct Printing Local Serial Printer:

CPSSLV16.GEN

```

STD SLAVE      ; Standard 16 Bit Slave O/S Module
PATCH        ; Include system patch area
SOMCPS        ; I.C.M. Slave Sign-on Module
RTCNU         ; Null RTC driver module
CPMSUP        ; CP/M-86 Support Module
MSTCPS        ; 16 Bit Memory Descriptor Table
NITCPS        ; 16 Bit Slave hardware init module
;CON192       ; Include Null 19.2K baud Terminal Driver
CON96         ; Include Null 9600 baud Terminal driver
SPDCPS        ; Include Serial I/O driver
LSTCTS        ; Include Serial List Clear to Send driver
;LSTPAR       ; Include Parallel List Null Driver
RESCPS        ; 16 Bit Slave Keyboard Reset Module
SCDCPS        ; 16 Bit Slave Circuit Driver Module
    
```

CPSSLV16.PAR

```

USRSOM = 0x0D,0x0A,"ICM CPS-16 SLAVE"
SRHDRV = 0xFF ; Search Default System Drive
COMPAT = 0xF8 ; Compatibility Flags
AUTUSR = 0x80 ; Auto Logon to User 0 Privileged
;
ATNCHR = 0x00 ; Define Attention Char as BREAK Key
RESKEY = 0x00 ; Define the reset detection key
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial
FFCHR = 0x1A ; Console form feed character
;
PTRAST = 0x00,LSTDRA ; Local printer as A
PRTMOD = 0 ; Print mode = Direct

LDCOLD = 0x00 ; Cold start autoload flag (0=disabled,FF=enabled)
LDWARM = 0x00 ; Warm start autoload flag (0=disabled,FF=enabled)
;
; If using TurboDos Ver. 1.41, include
; patches 2,3
    
```

7.4.1. One Megabyte 16 Bit Slaves

With the availability of the 256k*1 dynamic RAM chips, the CPS-16 can hold up to 1 Megabyte, with the addition of a PROM #(310-04) in IC location U66. For this example, we'll use the name OSSLAWE1.SYS for the 1 Megabyte Slave.

CPZMASTR.PAR

```

AUTUSR = 80                ; Auto Log-on to user one, privileged
SRHDRV = OFF              ; Search system disk for command files
;
;----- If Using CB-80 V1.3 Only -----+
;      Must be the same in Slave files
;COMPAT = OB8            ; If using CB-80 V1.3
;CPMVER = 22            ; Inhibit CB-80 Record Locking
;----- ELSE using CB-80 V1.4 -----+
;      Must be the same in Slave files
COMPAT = OF8            ; File/Record Locking Flags
;CPMVER = 30            ; Allow CB-80 Record Locking
;-----+
;
;
NMBUFS = 0A                ; Default number of Disk Buffers (hex)
BUFSIZ = 03                ; Default disk buffer size
MEMRES = (0400)           ; Dynamic Memory Expansion of TurboDOS
;
PATCSA = 7F,7E,7D,7C      ; Status port table for CPS-MX
          7B,7A,79,78
          3F,3E,3D,3C      ; Status port table for CPS-16
          3B,3A,39,38
;
SSTCSA = "                " ; O/S suffix table for CPS-MX
          "1Z1ZZZZZ"       ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA        ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA        ; List assignment table
STOPBA = 44
;
(Rest of File omitted)

```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

As shown in Appendix B, the Memory Table Variable has to be changed in the CPSSLV16.PAR file:

CPSSLV16.PAR

```
USRSOM = 0X0D,0X0A,"ICM CPS-16 SLAVE"  
SRHDRV = 0xFF ; Search Default System Drive  
COMPAT = 0xF8 ; Compatibility Flags  
AUTUSR = 0x80 ; Auto Logon to User 0 Privileged  
;  
ATNCHR = 0x00 ; Define Attention Char as BREAK Key  
RESKEY = 0X00 ; Define the reset detection key  
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial  
FCCHR = 0x1A ; Console form feed character  
MEMTBL+3 = [0xFFFF-0x50] ;Memory table for 1MByte slave  
;MEMTBL+3 = [0x8000-0x50] ; Memory table for 512KByte slave  
;MEMTBL+3 = [0x4000-0x50] ; Memory table for 256KByte slave  
;MEMTBL+3 = [0x2000-0x50] ; Memory table for 128KByte slave  
;  
PTRAST = 0x00,LSTDRA  
PRTMOD = 0  
;  
LDCOLD = 0x00 ; Cold start autoloader flag (0=disabled,FF=enabled)  
LDWARM = 0x00 ; Warm start autoloader flag (0=disabled,FF=enabled)  
;  
; If using TurboDos Ver. 1.41, include  
; patches 2,3
```

This example shows the 1-Megabyte,16-bit slaves at I/O port 3F and 3D. On those slaves, type in TPA to verify.

7.4.2. Mixing 8 And 16 Bit Slaves

The suffix table supplied with the CPZMASTR.PAR file has already made provisions for mixing 8 and 16-bit slaves. The Master Circuit Driver is set up to address the first eight 8-bit slaves and the first eight 16-bit slaves:

```
PATCSA = 7F,7E,7D,7C      ; Status port table for CPS-MX
          7B,7A,79,78
          3F,3E,3D,3C      ; Status port table for CPS-16
          3B,3A,39,38
;
SSTCSA = "          "      ; O/S suffix table for CPS-MX
          "ZZZZZZZZ"      ; O/S suffix table for CPS-16
```

The Circuit Initialization routine will go to the bus and scan for the number of slaves present in a system, so the number of slaves does not have to be modified in the CPZMASTR.PAR as in the older versions of TurboDos. The 8-bit slaves are defaulted as OSSLAZE.SYS (no suffix) and the 16-bit slaves are defaulted as OSSLAZEZ.SYS (Z suffix). This enables you to bring up a basic TurboDos operating system with no modifications.

If you need to include more than eight 8-bit slaves or more than eight 16-bit slaves in your system, just reassign the values in the **PATCSA** and **SSTCSA** in the tables above to shift either way. If you want to assign more than 16 slaves, you will need to include the Master Circuit Driver twice in Master gen file. When you GEN the CPZMASTR with two drivers, it will give you a duplicate symbol error, but it will still link that module correctly. A second Port Assignment Table and Suffix Table will also have to be patched. Refer to the example below: .i.e. more than 16 slaves

```
CPZMASTR.GEN
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
;NETREQ       ; Network request module
;MSGFMT       ; Message format module
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 centronics board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM ccb board drvtr to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive installed
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive installed
MDCDPS        ; 1st CPZ-48000 / CPS-MX Master Circuit Driver
```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

MCDCPS ; 2nd CPZ-48000 / CPS-MX Master Circuit Driver

CPZMASTR.PAR

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = OFF ; Search system disk for command files
;
;----- If Using CB-80 V1.3 Only -----+ \
; Must be the same in Slave files ; "Don't forget
;COMPAT = OB8 ; If using CB-80 V1.3 + the patches for
;CPMVER = 22 ; Inhibit CB-80 Record Locking / CB-80 V1.3"
;----- ELSE using CB-80 V1.4 -----+ /
; Must be the same in Slave files
COMPAT = OF8 ; File/Record Locking Flags
;CPMVER = 30 ; Allow CB-80 Record Locking
;-----+
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default disk buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion of TurboDOS
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX (std
; default value)
; 7B,7A,79,78 ; value)
; 3F,3E,3D,3C ; Status port table for CPS-16 (std default
; 3B,3A,39,38 ; value)
PATCSB = 77,76,75,74 ; 2nd Status port table for CPS-MX
; 73,72,71,70
; 37,36,35,34 ; 2nd Status port table for CPS-16
; 33,32,31,30
;
SSTCSA = " " ; O/S suffix table for CPS-MX (std default values)
; "1Z1ZZZZZ" ; O/S suffix table for CPS-16 (std default values)
SSTCSB = " " ; 2nd O/S suffix table for CPS-MX
; "ZZZZZZZZ" ; 2nd O/S suffix table for CPS-16
;
NMBCKT = 2 ; using 2 circuits (one for each 16 slaves)
CKTAST = (0000),CKTDRA,(0100),CKTDRB; Circuit Assignment
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA ; List assignment table
STOPBA = 44
;
ATNCHR = "^@" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
MPAGE = 02 ; Use memory above slave address for Turbo-disk
;
;following defines floppy disk drives
;
(rest of file omitted)

```

7.5. Automatic Logon

Automatic Logon provides a method of having each slave execute the LOGON command after it boots. This command will not let you get into the system unless you can enter the correct ID and password. Each slave booting in this method will need its slaves PAR file modified:

```
;LOGON SECURITY PASSWORD INCLUDED
;AUTUSR = 80      ; DEFAULT = User 0, Privileged
                  O;(delete for LOGON function)
SRHDRV = OFF     ; Search System Disk for .COM Files
;
;----- If Using CB-80 V1.3 Only -----+
;      Must be the same in CPZMASTR.PAR file
;COMPAT = OB8    ; If using CB-80 V1.3
;CPMVER = 22     ; Inhibit CB-80 Record Locking
;----- ELSE using CB-80 V1.4 -----+
;      Must be the same in CPZMASTR.PAR file
COMPAT = OF8     ; File/Record Locking Flags
;CPMVER = 30     ; Allow CB-80 Record Locking
;-----+
;
ATNCHR = "^@"    ; Use "BREAK" Key for Attention
RESKEY = "^\"    ; Define slave reset key
;
CONAST = 01,CONDRA      ; Console on port 1 of CPS-80
STOPBB = 44            ; Define 1 stop bit
;
LDCOLD = 000          ; Disable Cold start autoload
                      ; (change to OFF to enable)
LDWARM = OFF          ; Enable Warm start autoload
                      ; (change to 000 to disable)
;
;LDCOLD must be enabled if you want to auto-init TurboDOS time
;and date function using the ICM CCB-100 Clock/Calendar board.
;
;COLDFN = 0,"SLVCLK  ","AUT"      ;init system clock
;WARMFN = 0,"WARMSTRT","AUT"      ;init system logon
;
; If using TurboDos Ver. 1.41, include patch 1
;
```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

Here is an example of 16-bit slave PAR file with LOGON enabled:

```

USRSOM = 0x0D,0x0A,"Intercontinental Micro Systems, Corp."
        0x0D,0x0A,"8086 Slave."
;
SRHDRV  = 0xFF          ;Search Default System Drive
COMPAT  = 0xF8          ;Compatibility Flags
;AUTUSR = 0x80          ;Auto Logon to User 0 Privileged
;
ATNCHR  = 0x00          ;Define Attention Char as "BREAK" Key
CONAST  = 0x01,CONDRA   ;Assign Console to Port B Serial
;
MAXMBS  = 0x03
MAXRPS  = 0x03
;
MEMTBL+3 = (0x3FFF-0x0050) ; 256 Kbyte Slave memory specs
;MEMTBL+3 = (0x7FFF-0x0050) ; 512 Kbyte Slave memory specs
;MEMTBL+3 = (0xFFFF-0x0050) ; 1 Mbyte Slave memory specs
;
LDCOLD  = 0x00          ;Disable Cold Load function
;COLDFN = 0,"TDTIMES CMD";Init TurboDOS Data/Time using CCB-100
LDWARM  = 0xFF          ;Enable Warm Load function
WARMFN  = 0,"16STRT  ", "AUT";Execute Logon Security

```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

"AUTUSR = 80" was disabled so that the slave would come up on user 31. "LDWARM = OFF" was enabled so that the slave could automatically execute a command on boot. The command which it will execute will be WARMSTRT.AUT which is a default parameter in the CPSSLAVE.PAR file (WARMFN = 0,"WARMSTRT","AUT"). The command that needs to be executed is LOGON.COM which is in user 0, so copy the LOGON.COM command to user 31 and rename it WARMSTRT.AUT. If you are using both 16-bit and 8-bit slaves, you will have to make WARMFN patch on the 16-bit slave equal to a different name such as 0,"16STRT","AUT". Then copy LOGON.COM to user 31, renaming it 16STRT.AUT.

```
OA}COPY OA:LOGON.COM 31A:WARMSTRT.AUT
OA}COPY OA:LOGON.COM 31A:16STRT.AUT
```

Now the LOGON command is set up to look for a file called USERID.SYS. USERID.SYS is a text file created by the integrator to contain the user passwords with a word processor such as WordStar. The format is as follows:

```
[USER ID],[PASSWORD],[USER # (and P for Privileged)],[DRIVE],
```

The commas are mandatory !

Example:

```
OA}TYPE USERID.SYS
```

```
CHUCK,ROAST,OP,A
JOHN,SMITH,1P,B
BOB,RUIZ,26,A
```

```
OA}
```

In this USERID file, Chuck Roast will be logged onto user 0, and the drive on which it booted, in this case drive A. John Smith was logged onto 1B, and Bob Ruiz was logged onto 26A. Chuck Roast and John Smith are privileged users and can change User numbers any time they wish, but Bob Ruiz will be logged on User 26 and stuck there. Because a lot of users will be stuck on higher user levels, and the commands are located on user 0, all of the commands you want available to others must be set global:

NOTE: The backslash '\', allows mutiple commands to be put on a single line.

```
OA}SET *.COM;G\SET *.CMD;G
```

7.6. Batch Processing

Batch processing is a way to set aside a slave whose only purpose is to receive commands from other slaves and execute them on a First-In First-Out basis. This will enable you to send time consuming commands such as linking, compiling, or long copy routines out to that slave and go on to other jobs. The slave set up for batch cannot have a console attached to it and cannot receive commands which require console input in order to execute.

To set up a slave for batch processing, set up the slave suffix table in the CPZMASTR.PAR to know of only one batch slave. In this example, the batch is known as 'B' at 7F:

```
SSTCSA = "B          " ; O/S suffix table for CPS-MX
         "ZZZZZZZZ" ; O/S suffix table for CPS-MX
```

Make changes in the CPSSLAVE.PAR so that the slave will execute the command "BATCH.AUT" when it boots:

```
LDWARM = OFF ; Enable Warm start autoloader (change to OFF to enable)
;
WARMFN = 0,"BATCH ", "AUT"
```

You will now want to create a file called BATCH.AUT. The file that needs to be executed in this case will be a DO file. Fortunately TurboDos provides a command which can accomplish this called AUTOLOAD. The file which we want to create into an autoloader file will be DO BATCH.DO:

```
OA}AUTOLOAD DO BATCH.DO
Auto load file created
OA}RENAME AUTOLOAD.AUT BATCH.AUT
OA}SET BATCH.AUT;G
```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

Put BATCH.AUT in user 0 and set it global since the batch slave will have to be set up as a privileged user. The file you set up as BATCH.DO will now have to be set up as a FIFO. We will set it up to suspend processing in case the FIFO is empty so that it won't waste the masters processing time by executing BATCH.AUT over and over again:

OA}FIFO BATCH.DO

FIFO file not found, creating new file
Enter FIFO type (Ram/Disk): D
Suspend processing on full/empty conditions? (Yes/No): Y
Enter maximum number of records (1-65535): 128
FIFO file created

OA}SET BATCH.DO;G

To test out, let the batch processor copy a file up to different drive using the BATCH command:

5A}BATCH COPY A: B:;N

5A}DIR B:<CR>

****NOTICE**** : The COPY command that was sent to the Batch slave had the option ";n" to insure that it wouldn't expect any console input from the local console.

To set up a 16-bit slave for Batch Processing, do the same as above except use the CPSSLV16.PAR and CMD commands.

7.6.1. Master Batching

In extreme cases, where small application programs have to access to bus I/O ports directly; batch processing may be implemented on the master processor. **WARNING! If the application program requires direct console input, like the FORMAT program, the batching will hang.** This can be compensated for by putting a terminal on the master. This may be accomplished by enabling the Warm Boot Function to execute BATCH.AUT on the master. Set up the BATCH.AUT and BATCH.DO in the same manner as it was for Batch on the slave. The main difference to be made is to enable CON96 on the CPZMASTR.PAR file instead of CONREM. This will ensure that no one will try to attach to the master and provides a facility to monitor the batch processing if needed during integration. Below is an example CPZMASTR GEN and PAR file for master batching:

```
; CPZMASTR.GEN
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
CPMSUP        ; CP/M function support module
;CONREM       ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
CON96         ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 centronics board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM ccb board drv r to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive installed
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive installed
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-48000 / CPS-MX Master Circuit Driver
```

CPZ-186 MASTER MULTI-USER SYSTEM CHANGES

```

;CPZMASTR.PAR
AUTUSR = 80           ; Auto Log-on to user one, privileged
SRHDRV = 01          ; Search A: for command files
;
NMBUFS = 0A           ; Default number of Disk Buffers (hex)
BUFSIZ = 03           ; Default disk buffer size (log2(size/128))
MEMRES = (0400)       ; Allow for Dynamic Memory Expansion of TurboDOS
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX (std default values)
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16 (std default values)
        3B,3A,39,38
;
SSTCSA = "           " ; O/S suffix table for CPS-MX (std default values)
        "ZZZZZZZZ"    ; O/S suffix table for CPS-16 (std default values)
;
CONAST = 01,CONDRA    ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA    ; List assignment table
STOPBA = 44
;
ATNCHR = "^S"         ; New attention character (Break Key)
PRTMOD = 0            ; Print mode (0 = direct, 1 = Spooled)
;
;
;MPAGE = 02           ; Use memory above slave address for Turbo-disk
;
DRVTLB = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,002,DSKDRA,003,DSKDRA ; floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 001,DSKDRB,000,DSKDRA,001,DSKDRA,002,DSKDRA ;MD + Floppies
;           000,DSKDRB ;deselect for hard disk before power down
;
LDWARM = OFF ; Enable Warm Start Autoload(000 to disable)
;
WARMFN = 0,"BATCH " ,"AUT"

```

8. LOCAL AREA NETWORK OVERVIEW

This section deals with the configuration of networking various systems. Networking allows the user to share data and expensive peripherals between many users. With networking, large hard disk drives and expensive printers can be shared between totally separate systems. A link can be established to connect several systems in an office or between cities of different offices; all users can access central data easily. Diverse configurations can be achieved through any combination of ICM supplied ARCnet and RS232/RS422 Serial LAN products in any desirable combination.

Before jumping into the various configurations, a few concepts which apply to all sections of this chapter must be covered first. This overview section will describe Intercontinental Micro's contribution to the LAN market place and then will be split into subsections to cover both the hardware and software aspects of the individual LAN products.

8.1. A Very Short Time Ago ...

Micro computers have gained a large amount of power in a very short time. Less than a decade ago, micro computers for small business applications became feasible. The systems were single user systems made up of several separate cards. There was a CPU card, several memory cards, an Input/Output card and a cassette interface or floppy controller card, about 5 separate cards in all were required to make up a single user system. These systems typically ran the CP/M operating system.

Technology advanced and hard disk drives became available for the single user micros. Their use in business expanded and more powerful chips were becoming available. Intercontinental Micro was a pioneer in the micro computer industry, developing the CPZ-48000 single board computer which combined the features of CPU, large amounts memory, Serial and Parallel Input/Output, Floppy disk controller, Boot up prom and a state of art memory management unit on a single board.

The micros were becoming very dependable business tools and businesses wanted a way to have several people using the same system at the same time. A compatible operating system was developed by the authors of CP/M, called MP/M. MP/M allowed ONE CPU to serve several users by giving its attention to a user for a short time and then moving on to the next user. This approach, called Multi-Tasking, would bog down very quickly when more than a couple of users were on the system. ICM adapted the CPZ-4800X to the MP/M environment by using the 256KMB RAM board. Unsatisfied with the performance, we searched for a better system, and found it in TurboDOS. With TurboDOS we maintained compatibility with CP/M and MP/M, but the multi-user system had a CPU for each user called a Slave and a Master CPU to manage the slaves. This CPU per user approach is referred to as Multi-Processor systems.

LOCAL AREA NETWORK

ICM developed the CPS-MX 64K Z80 slave, which when coupled with the CPZ-4800X, out performed the same number of MP/M users and was expandable to 16 users. Application programs were becoming larger and more memory intensive so ICM developed the CPS-BMX 128K Z-80 slave.

The rage for more memory was on and the authors of CP/M moved in to the 16-bit environment with CP/M-86. CP/M-86 allowed users to have up to 16 times the amount of memory that was available for the typical Z-80 user. Spread sheet programs gained popularity for business and the added memory and speed was eagerly accepted by business. TurboDOS added support for 16-bit slaves and ICM introduced the CPS-16 256K to 1 Meg 8086 slave for high performance business use.

The size of these systems was growing and a way to tie systems together was desirable. Again, we were glad we had chosen TurboDOS since Networking systems together is very feasible with TurboDOS. To this end we developed the LANS100 ARCnet controller with speeds of 2.5 Mbits per second. Support of hard disk speeds between systems was deliverable to the market. This LAN scheme took the lid off the single S-100 box, which had been limited to 16 users, and allowed up to 256 16-user systems, a total of up to 4080 users, to be networked together.

The ARCnet interface was placed on a card for use in the IBM-PC, allowing the low storage capacity PC's to store data on the Multi-processor File Server. These nets are typically of a star topology, which means they all come to a common point for communications. One example is that all slaves go to the master for disk access and all PC's share the S100 system hard disk drive. The star network, typically could only support nodes at a distance of no more than 2300 feet, without repeaters. To allow connections at greater distances, Circuit Serial was developed, which makes use of RS-422 to communicate over twisted pairs at lengths up to 4000 feet. It also supports RS-232, which enables it to make use of modems. This allows a system in San Diego to be connected to a system in Los Angeles and on to New York over dedicated phone lines with 300 to 9600 baud modems. The system in Los Angeles will automatically forward data being transferred from San Diego to New York.

To increase the speed and power of the file server ICM has developed the CPZ-186 256K to 1 MEG 80186 single board computer. The CPZ-186 supports all other ICM products and greatly enhances the speed of the network. ICM is committed to supplying the microcomputer market place with the latest state-of-the-art in hardware, software and support.

8.2. ARCnet Local Area Network

All of our arcnet controllers use SMC COM9026 controller IC's. These boards allow serial communications over a coax or twisted pair link which will run at 2.5 megabits per second. This speed eliminates any bottleneck in the system-to-system link, since it is 2 1/2 times the speed of bus transfers. The systems connected with ARCnet are typically in the same building, but can be up to 2300 feet apart.

LOCAL AREA NETWORK

There are three arcnet controllers available.

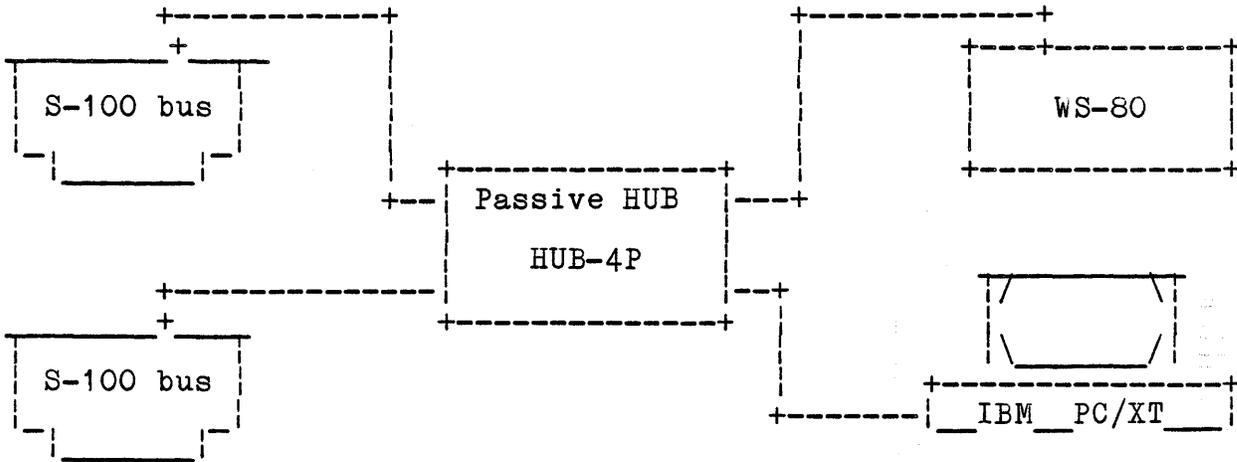
- (1) The LANS100 will link an S-100 master to a network.
- (2) The WS80 is a bank slave with ARCnet built onto it. This board has no bus and only needs a power supply, which is offered with the optional enclosure.
- (3) The LANPC will plug into the IBM PC/XT bus and links it into the network.
- (4) WS-286 is ICM's PC compatible 80286 based workstation /fileserver reduces entry level costs of networking. Designed with the most common components used by both file servers and network workstations all on one board. Our WS-286 contains all the common local area network components like ARCnet, SCSI, 1 MB RAM, and 5 expansion slots. Placing all these components on a single board reduces your integration requirements, repair costs, system complexity, and your need to stock multiple costly inventory components. In particular, the on-board SCSI controller provides an easy interface to ICM's single board disk and tape controller, so the WS-286 can be used as a fileserver or a fast and inexpensive diskless workstation. The WS-286 supports both Novell and TurboDOS Operating Systems. The WS-286, functioning as a network workstation, runs at 10 MHz, almost twice as fast (11.5 on Norton Utility) as the IBM AT. The five expansion slots are synchronized with the CPU to operate at 4.77 MHz allowing full XT expansion card compatibility, while the processor operates at full speed with no wait states. The WS-286 fits into standard IBM-XT type enclosures with no software or hardware modification. ICM supplies this product either with or without an XT type enclosure.

LOCAL AREA NETWORK

8.2.1. ARCnet Hardware Overview

The basic structure of a Local Area Network is to provide an ARCnet controller for each system to be linked together and connect the systems with coax or twisted pair cables. The standard coax cabling to use is RG-62, which is a 93 ohm cable. If only two controllers are used, the link only requires one coax to connect the systems with distance up to 2300 feet. If more than two controllers are involved, you will need one or more hubs to link the network.

There are two basic types of hubs, passive and active. A passive hub is a simple resistor network which can link up to four controllers with distance up to 100 feet.

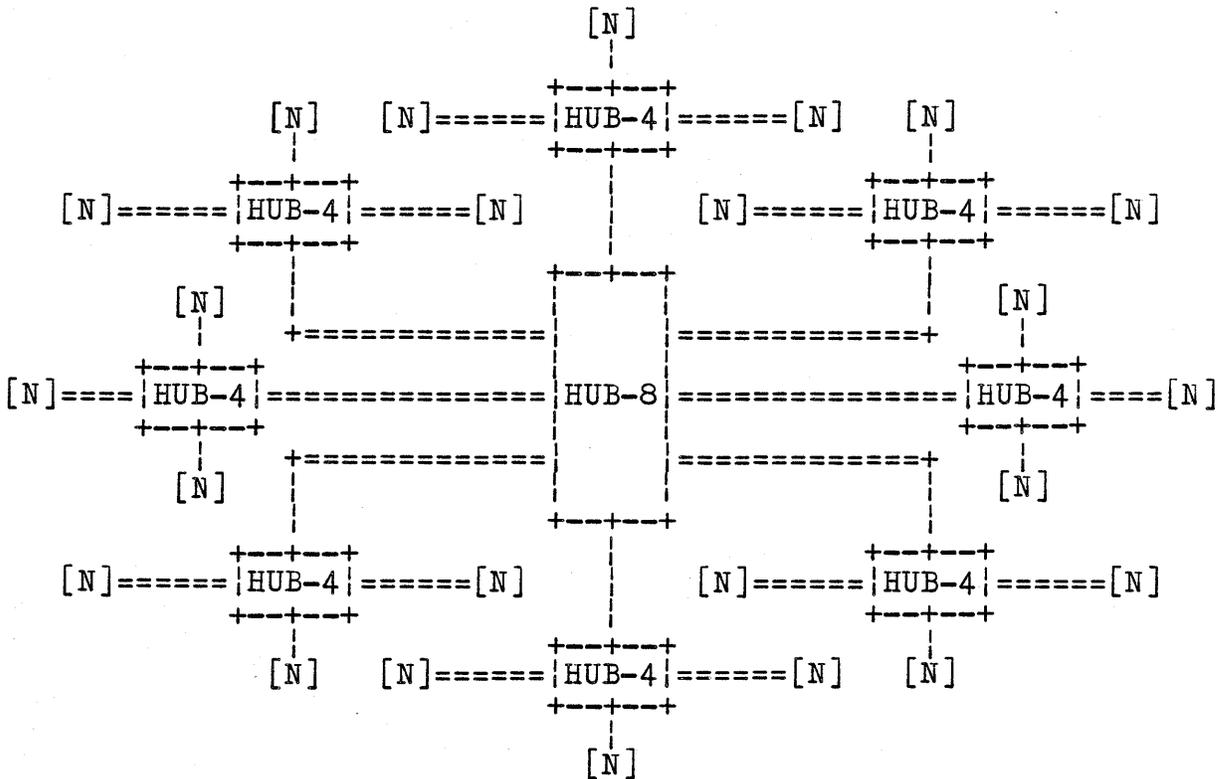


T A B L E 8-1: Passive ARCnet HUB (HUB-4P)

LOCAL AREA NETWORK

When connecting more than four controllers an active hub needs to be incorporated into the star. Up to eight passive hubs (HUB-4P), may be connected to the active hub (HUB-8A), it achieve to 24 nodes.

The following illustration depicts a typical application of active HUBS to implement a LAN.



Note: N(node) can be a Workstation, a Fileserver or any device which can link into the ARCnet LAN.

T A B L E 8-2: Active ARCnet HUB (HUB-8A)

Special care should be taken when setting up the cabling for the network. If all necessary precautions aren't taken, a network error will result when accessing remote devices. When routing the cable out the back of the S-100 chassis, make sure the shielded portion of the cable does not short to ground. This signal is not internally grounded, but kept at a balanced voltage. If a B&C connector is placed on the chassis, use an insulated type with plastic threads. If a HUB-4P is used do not allow the metal chassi come in contact with anything. If crimp on connectors are used on the coax cables, use an ohmmeter to check for shorts between the center and shield. Also verify that bending will not cause connector to loosen and open the link.

LOCAL AREA NETWORK

8.2.2. ARCnet SOFTWARE OVERVIEW

CHECKLIST TO HOOK UP THE IBM PC TO THE TurboDOS COMPUTER

Before you start, make sure you have the following equipment and tools.

- o IBM PC (or compatible)
- o LANPC Board
- o LANS100 Board
- o CPZ4800X or CPZ186 Board
- o Jumper plugs
- o Dewire wrapping tool or a pair of tweezers
- o Multimeter
- o S100 Bus chassis and floppy drives
- o COAX cable with MOLEX and BNC connectors
- o Software
 - o Multi-user TurboDOS (8 or 16 bit)
 - o TurboDOS/PC
 - o TurboLAN

ARCNET RAM BUFFER TEST FOR THE LANPC BOARD USING AN IBM PC OR COMPATABLE

1. Check your LANPC board to verify your I/O ADDR (near the Bus connector) is 010001. (1 = JUMPER) (0 = OPEN). This sets it to 2E0.
2. Verify the MEM ADDR (located to the right of the I/O ADDR) is 00101. This sets it to D000:0.
3. Verify the LANS ID switch (located at the top of the board) is 00100100. (Pushed In = 0, Pulled Out = 1). This sets it to 24H.

NOTE: Do not confuse the NODE SELECT switch with the LANS ID switch. The NODE SELECT switch is used only with diskless download.

4. Insert the LANPC BOARD into the PC Bus.

NOTE: If your LANPC board has the old bracket (it'll have a hole at the top rather than slots) it is too wide to fit the newer XT or AT. To test the LANPC remove the old bracket and follow step 3. To install the board you'll need to order the new bracket from ICM.

5. Boot up the PC with PC-DOS or MS-DOS.
6. Enter **DEBUG** (CR) (CR will represent the phrase "Press the RETURN key." throughout the rest of this document).
7. Enter **I 2E0** (CR). An output of F5 or F4 or E5 or E4 (representing controller status bits) should be displayed. A return of FF usually means the I/O ADDR is not set properly. If this occurs reverify step 1.
8. To display the ARCnet RAM Buffer, enter **D D000:0** (CR). The first byte displayed should be D1 (hex). The second byte displayed should be the LANS ID number. (Default is set to 24 hex.)
9. To fill the ARCnet RAM Buffer, enter **F D000:0,FF,55** (CR)

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10. To redisplay the ARCnet RAM Buffer, Enter D D000:0 (CR) All 255 bytes displayed should be the value 55 (hex). This verifies the integrity of the data paths and memory.
11. Enter Q to quit DEBUG program.
12. If the above test doesn't work, perform one or more of the following steps.
 - a. For PC compatibles, check pin 3 of the LAND hybrid chip on the presence of 5 VDC. If it is not there:
 - b. Check the PC Bus connector B07 for the presence of 12 VDC. If it is not there:
 - c. Cut the trace leading up to pin 2 of the LANS hybrid chip on the solder side. Add a jumper from pin 3 of the LANS hybrid chip to PC Bus connector pin B05.
 - d. Remove U30 (74LS245), bend out pin 16 of U22 and bend out pin 11 of U20.

****This concludes the DEBUG test for the LANPC Board.****
13. Turn off the PC and re-boot it to re-initialize the LAND/PC board before proceeding.

ARCNET RAM BUFFER TEST FOR THE LANS100 USING THE CPZ-4800X OR CPZ-186 MASTER

	8 Bit	16 Bit
1. Check your LANS100 board to verify your I/O PORT ADDR is jumpered as the illustration on the left. (0 0 = Open) (0--0 = Jumper). This sets it to 68.	0--0 0 0 0 0 0--0 0 0 0--0 0--0 0--0	0--0 0 0 0 0 0--0 0 0 0--0 0--0 0--0
2. Verify the EXTND ADDR is jumpered as the illustration on the left. This sets it to FF80.	0--0 0--0 0--0 0--0 0 0 0 0 0 0 0 0 0 0	0--0 0--0 0 0 0--0 0 0 0 0 0 0 0 0 0 0
3. Verify the LANS ID (located at the top of the board) is jumpered as the illustration on the left. This sets it to a LAN ID of 1.	0--0 0--0 0--0 0--0 0--0 0--0 0--0 0 0	0--0 0--0 0--0 0--0 0--0 0--0 0--0 0 0

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4. Insert the LANS100 Board into the S100 Bus.
5. Boot up the system with the Single User Operating System and complete the following steps:

If using the 8 Bit Master (CPZ4800X)

6. Enter **MONITOR** (CR).
7. Enter **I 68** (CR). One of the following (representing controller status bits) should be displayed. 68 = F5 or 68 = F4 or 68 = E5 or 68 = E4. A return of FF usually means the I/O ADDR is not set properly. If this occurs reverify step 1.
8. To map the Buffer enter **O E1,FF** (CR).
9. To display the ARCnet RAM Buffer, enter **D 1800,18FF** (CR). The first byte displayed should be D1 (hex). The second byte displayed should be the LANS ID number. (Default is set to 1 hex.)
10. To fill the random contents of the ARCnet RAM buffer with a constant pattern, enter **F 1800,18FF,55** (CR).
11. To redisplay the ARCnet RAM Buffer, enter **D 1800,18FF** (CR). All 255 bytes displayed should be the value 55 (hex). This verifies the integrity of the data paths and memory.
12. Type **Q** to quit MONITOR program.

If Using the 16 Bit Master (CPZ186)

13. Enter **TBUG** (CR).
14. Enter **I 68** (CR). One of the following (representing controller status bits) should be displayed. 68 = F5 or 68 = F4 or 68 = E5 or 68 = E4. A return of FF usually means the I/O ADDR is not set properly. If this occurs reverify step 1.
15. To map the Buffer enter **O 306,B** (CR).
16. To display the ARCnet RAM Buffer, enter **D FF80:0** (CR). The first byte displayed should be D1 (hex). The second byte displayed should be the LANS ID number. (Default is set to 1 hex.)
17. To fill the random contents of the ARCnet RAM buffer with a constant pattern, enter **F FF80:0,FF,55** (CR).
18. To redisplay the ARCnet RAM Buffer, enter **D FF80:0** (CR). All 255 bytes displayed should be the value 55 (hex). This verifies the integrity of the data paths and memory.
19. Enter **Q** to quit TBUG program.

****This concludes the test for the LANS100 Board****

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20. Re-boot the S100 computer to re-initialize the LANS100 board before proceeding.

THE LANS100 BOARD SET-UP AND VERIFICATION

Before you start, we'd like to suggest you use an RG-62 93 Ohm COAX cable for distances up to 2300 feet or an RG-59 75 Ohm COAX cable for distances up to 300 feet. ICM has provided you with a short cable (about 2 1/2 feet), to run from the top of the LANS100 to the back of the chassis. We've also included one female MOLEX connector, one BNC connector, a nut, lockwasher and spacers.

The MOLEX connector is white and shaped like a rectangle. It has two slots cut into the top half of one side. The Molex end of the cable has two conductors sticking out of it. The "solid core" conductor is a single wire running through a plastic casing. The "shielded" conductor has multiple strands of wire that look like they're braided. These conductors run through the cable and connect with the BNC connector. This connector is shaped like a cylinder. The "center tap" (solid core on the MOLEX end) runs through the very center of the connector, while the shielded conductor connects to the outside metal part surrounding the center tap.

1. To mount the cable to the S100 chassis:

- a. Insert and pull the MOLEX end of the cable through a hole in the chassis' back panel (If you don't have a hole you'll have to drill one.) until the BNC connector and panel are flush. Fasten the connector against the panel by tightening the nut.
- b. Hold the MOLEX connector so the slotted side is facing you. Attach it to the cable by sliding the conductors in until they connect securely. Be sure the solid core conductor is on the left side of the MOLEX connector when it's attached to the LANS100 board.
- c. Hook one end of the RG-62 or RG-59 cable to the BNC connector at the back of the S100 chassis and perform the following test.

2. To perform the Continuity Test:

- a. Turn the Multimeter on. Touch the two probes together and adjust the meter to register 0 resistance.
- b. To make this test easier place two straightened paperclips into the holes at the top of the MOLEX connector making sure they touch the conductors.

1. To verify 0 resistance between the two connectors, place one probe on the paperclip in the multi-stranded shield side of the MOLEX conductor and the other probe against the outside metal part of the BNC connector. The Multimeter should register 0 resistance.

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2. Next, place the probe against the paperclip in the solid core side of the MOLEX connector and the other probe in the center tap conductor of the BNC connector. The Multimeter should register 0 resistance.
 3. To check for shorts between the two connectors, place a probe on the multi-stranded shield conductor of the MOLEX connector. Place the other probe in the center tap of the BNC connector making sure it's held steady. The Multimeter should register infinite resistance. THERE MUST BE NO CONNECTION BETWEEN THESE POINTS.
 4. To check for shorts between the BNC connector and the back panel, place a probe against the outside of the metal part of the BNC connector and the other against the panel. The Multimeter should register infinite resistance.
- c. Hook up the cable to the LANS100 Board by inserting the female MOLEX connector into the male MOLEX connector located on the LANS100 board just above the LANS ID switch. Make sure the solid core connector is closer to the center of the board. Hook one end of your RG 62 or Rg 59 cable to the BNC connector at the back of the S100 chassis and the other end to the LANPC board connector.

TO INSTALL AND RECONFIGURE TURBODOS SOFTWARE

Setting up the software on the server is simple. Use your Text Editor to add the **LANCPZ** driver to the end of the multi-user 8 or 16 bit TurboDOS GEN file.

1. Edit the multi-user PAR file by adding the following lines.

If using CPZ-4800X (8 bit) based server enter the following:

```
NMBCKT = 2 ; Number of circuits
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Slaves on Ckt 0
; ARCnet on Ckt 2
```

If using CPZ-186 (16bit) based server enter the following:

```
NMBCKT = 2 ; Number of circuits
CKTAST = (0000),CKTDRA,(0X0200),CKTDRB ; Slaves on Ckt 0
; ARCnet on Ckt 2
```

2. Re-GEN or RE-TLINK your operating system.
3. Enter **CHANGE** to flush the buffers to disk.
4. Enter **OSLOAD** to bring up the new server system.

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TO INSTALL AND RECONFIGURE TURBODOS/PC SOFTWARE

Before you do anything else boot up the PC system and make a back-up copy of your TurboDOS/PC diskette before using the Configuration Utility. After you do this, proceed as follows:

2. Copy the uninstalled driver to the workfile by entering the following commands:

Copy lantpc.drv Turbopc.drv (CR)

CFGTPC (CR)

CFGTPC is menu driven software. Instructions are provided through the use of prompts that let you know when to enter data and what to do next. You can also access HELP screens any time during your session by entering ?. (This information is also available in the last section of your TurboDOS/PC Manual.)

3. The following table is a list of corrections that should be made to some of the default values on your TurboDOS/PC diskette. Make sure your hardware settings match the following values. It's best to bring up one remote disk before adding the other remote disk drives. To make the changes select option A from the Main Menu and enter the corrections on the LAN Assignments Menu.

MENU	OPTION	DEFAULT VALUE SHOULD BE
A = LAN ASSIGNMENTS	E	2EOH
	F	D000H
	*G	2,24H
	**H	2,1H

*G: This configuration represents the unique circuit,node number for your PC. Note that it is for the PC's LAN network address, (step 3, page 1) not the server's network address. The circuit number will always be set at 2. The node number represented by the LANS ID switch setting for the LANPC BOARD is always entered in Hex. (Default 2,24H displays as 2,36 decimal.)

**H: This configuration is for the server network address, not the destination network address. The circuit number will always be set at 2. The node number (default 1H) representing the LANS ID setting on the LANS100 BOARD should be referenced in Hex.

4. When you've completed the LAN Assignments (sub-menu A) proceed as follows:
 - a. Return to the Main Menu.
 - b. Select option C to assign disk drive names for local and remote disks and the circuit/node numbers of the servers' network address. (Typically 2,1H).

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- c. If you need to change printer or queue assignments, return to the Main Menu and select option D for printer assignments or E for queue assignments.
- d. When you've finished entering the changes, return to the Main Menu and enter F to end the session.
- e. To save the changes enter Y at the prompt "Save Modified Driver on Disk (Y/N)?".
- f. At the "A>" prompt enter TURBOPC2 (CR). The following is a sample of what you'll see on your screen.

Local Drives	A-B
Remote Drives	C
Remote Printers	A
Remote Queues	A

5. To test the Network:

a. Enter DIR C:

The system should respond with the directory of user O found on the remote drive that has been mapped to drive C. If a message indicating the "Volume of disk C has no label" and "File not found" appears, repeat all the steps on this checklist.

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8.2.3. S-100 ARCnet Interface

LINKING TWO INDEPENDENT MASTERS

When linking two masters, the only hardware needed is a LANS100 ARCNET card for each master and a strip of RG-62 Q30RM coax cable to connect them together. When running the cable through the back of the chassis, check that the shielded portion is not shorted, otherwise you may receive a "Network Error". When adding more nodes, passive or active hubs will be needed as described in the Arcnet Overview.

As long as neither of the masters will be used to download operating systems across the network, the ID can be set at any value between 1 and 255(OFF hex). All LANS100's sent out from ICM are configured at 01 hex.

WARNING: LAN'S I.D. CANNOT BE 0 HEX!

Below is an example of a LANS100 with its ID (top right-hand corner) set at 2, which is used as an ID in the next example:

T A B L E 8-3: LANS100 LAN ID SWITCH (ID set for 2 hex)

Board	Bit	Value	
0----0	7	0	MSB
0----0	6	0	
0----0	5	0	
0----0	4	0	
0----0	3	0	
0----0	2	0	
0 0	1	1	
0----0	0	0	LSB

Both systems will need to have the LANCPZ module (purchased separately or with TurboLan Package) and the NETLOD and NETFWD modules (already on distribution disk) added in the GEN file.

System #1 will consist of 2 hard disks (A: & B:), 2 floppies (C: & D:) and two remote floppies on System #2(E: & F:). System #1 also has its own printer as A and a remote printer on system #2 as B. The slaves in both of these systems will be assumed as being standard non-modified slaves. The ID of the LANS100 on System #1 will 02 hex.

LOCAL AREA NETWORK

The example shown is of the CPZMASTR GEN & PAR's in System #1:

```

STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader module
NETFWD        ; Network Message Forwarded
;CPMSUP       ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvtr to set date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
MD132DRV      ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MCDGPS        ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Local Area Network Driver for CPZ-4800x
    
```

LOCAL AREA NETWORK

PAR file for system #1:

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = 01 ; Search A: for command files
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA,81,(0201) ; List assignment table
QUEAST = 00,(0000),81,(0201) 0; Queue assignment table
DSPPAT = 1,2 ; Despool Printer Assignment table
STOPBA = 44
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines Hard Disk and disk drives
;
DSKAST = 001,DSKDRB,002,DSKDRB,000,DSKDRA,001,DSKDRA ; Local
080,(0201),081,(0201) ; Remote
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

LOCAL AREA NETWORK

System #2 will have 2 floppies (A: and B:), 2 remote Hard Disks on system #1 (C: & D:) and 2 remote floppies on system #1 (E: & F:). It has its own local printer known as A and a remote printer on system #1 known as B. The ID of system #2 is set at 01 hex.

Below are the CPZMASTR GEN & PAR's for System #2:

```

STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ      ; Network request module
MSGFMT     ; Message format module
NETLOD     ; Network Loader module
NETFWD     ; Network Message Forwarded
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvr to set date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ     ; Local Area Network Driver for CPZ-4800x
  
```

LOCAL AREA NETWORK

PAR file for System #2:

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = OFF ; Search A: for command files
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion of
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments |
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA,80,(0202) ; List assignment table
QUEAST = 00,(0000),80,(0202) ; Queue assignment table
DSPPAT = 1,2,3 ; De-Spool printer table
STOPBA = 44
;
ATNCHR = "^@" ; New attention character (Break Key)
PRMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA ; Local
        80,(0202),81,(0202),82,(0202),83,(0202) ; Remote
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

Although this configuration is easy to set-up and implement, there are some obvious drawbacks involved. First of all, if the systems are located far from each other, there may be confusion when using both systems periodically. Also, there could be some confusion in realizing exactly which remote device you are actually attached to. Secondly, once the amount of remote devices get too numerous, new users will have more difficulty in using the system.

LOCAL AREA NETWORK

If system organization needs to be optimized, the disk assignment and printer assignment tables will need to be rearranged. The goal is to be able to physically mark a logical assignment to each drive and printer and be able to access them in that way from any of the systems. In the example below, the tables have been rearranged for the two systems described above.

SYSTEM #1
(master with Arcnet i.d. = 8 hex)
DRIVES: A: B: C: D:
PRINTERS: A:

SYSTEM #2
(master with Arcnet i.d. = 21 hex)
DRIVES: E: F:
PRINTERS: B:

(slave #1)
PRINTERS: C:

SYSTEM #1 GEN & PARS:

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader module
NETFWD        ; Network Message Forwarded
;CPMSUP       ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drv to set date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
MD131DRV      ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDPS        ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Local Area Network Driver for CPZ-4800x
```

LOCAL AREA NETWORK

PAR file for System #1:

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = 01 ; Search A: for command files
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA,81,(0221),82,(0221) ; List assignment table
QUEAST = 00,(0000),81,(0221),82,(0221) ; Queue assignment table
DSPPAT = 1,2,3 ; Despool Printer Assignment table
STOPBA = 44
;
ATNCHR = "^S" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
eDSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines Hard Disk and floppy disk drives and remote drives
;
DSKAST = 001,DSKDRB,00,DSKDRB,000,DSKDRA,001,DSKDRA ; Local
        084,(0221),085,(0221) ; Remote
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

LOCAL AREA NETWORK

The CPZLOAD on system #2 will need to be modified to boot on drive E:. Below is an example of CPZLOAD GEN & PAR:

```

STDLOADR      ; Standard O/S loader configuration
RTCNUl        ; Null RTC driver
;CON192       ; Null 19.2 Kbaud Console Driver
CON96         ; Null 9600 Baud Console Driver
NITCPZ        ; CPZ-48000 Z-80 processor board initialization
SPDCPZ        ; Serial and Parallel I/O for the CPZ-48000
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive

```

```

CONAST = 01    ; Console on chan B of CPZ-4800x
MEMTOP = (0000) ; Do Not test RAM.
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;The following defines floppy disk drives
;
DSKAST = OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; disable
          000,DSKDRA,001,DSKDRA                        ; enable

```

Below is an example of System #2:

CPZMASTR GEN & PAR:

```

STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader module
NETFWD        ; Network Message Forwarded
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvr to set date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Local Area Network Driver for CPZ-4800x

```

LOCAL AREA NETWORK

PAR file fo system #2:

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = OFF ; Search A: for command files
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = "P " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 80,(0208),00,LSTDRA,82,(0001) ; List assignment table
QUEAST = 80,(0208),00,(0000),82,(0001) ; Queue assignment table
DSPPAT = 1,2,3 ; Despool assignment table
STOPBA = 44
;
ATNCHR = "^@" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines disk drives
;
DSKAST = 80,(0208),81,(0208),82,(0208),83,(0208) ; Remote
        000,DSKDRA,001,DSKDRA ; Local
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

LOCAL AREA NETWORK

Shown below is an example of the CPSSLAVE GEN & PAR file which was set up for OSSLAVERP.SYS:

```

STDSLAVE      ; Standard Networking Slave Module
SOMCPS        ; Signon message
PATCH        ; Include PATCH module
NETLOD        ; Network loader module
NETSVC        ; Network service module
RTCNU        ; Null clock driver module
DSPPOOL       ; Allow DE-Spooling on Slaves
CPMSUP        ; CP/M Function Support Module
NITCPS        ; CPS-MX hardware initialization
;CON192       ; 19.2K Baud Console Driver
CON96         ; 9600 Baud Console Driver
SPDCPS        ; CPS-MX Serial Drivers
;LSTPAR       ; Use parallel null driver (CPI-100 board)
LSTCTS        ; Use list clear to send null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

```

AUTUSR = 80      ; DEFAULT = User 0, Privileged
SRHDRV = OFF    ; Search System Disk for .COM Files
;
ATNCHR = "^@"   ; Use "BREAK" Key for Attention
RESKEY = "^\"   ; Define slave reset key
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-80
STOPBB = 44      ; Define 1 stop bit
;
PTRAST+6 = 00,LSTDRA
QUEAST+6 = 00,(0000)
DSPPAT = 1,2,3
QUEPTR = 3
;
LDCOLD = 000    ; Disable Cold start autoload
LDWARM = 000    ; Disable Warm start autoload
;
;LDCOLD must be enabled if you want to auto-init TurboDOS time
;and date function using the ICM CCB-100 Clock/Calendar board.
;
;COLDFN = 0,"SLVCLK ", "AUT"
;
;WARMFN = 0,"WARMSTRT", "AUT"
;
; If using TurboDos Ver. 1.41, include patch 1
;

```

LOCAL AREA NETWORK

Below is an exact duplicate of system #1 in the last example using a CPZ-186 master:

```

STDMASTR          ; STANDARD 16-Bit Multi-User OS
NETREQ            ; Support module for Despooling/Networking
MSGFMT           ; " " " " "
NETLOD           ; " " " " "
NETFWD           ; " " " " "
PATCH           ; SYSTEM PATCH AREA
RTCCPZ           ; RTC DRIVER MODULE
CPMSUP           ; CP/M-86 SUPPORT MODULE
MSTCPZ           ; MEMORY DESCRIPTOR TABLE
NITCPZ           ; HARDWARE INITIALIZATION
CONREM           ; Use remote console for slaves
;CON192          ; NULL 19.2K BAUD CONSOLE DRIVER
;CON96           ; NULL 9600 BAUD CONSOLE DRIVER
SPDCPZ           ; SERIAL/PARALLEL I/O DRIVER
LSTCTS           ; LIST CLEAR-TO-SEND DRIVER
;LSTPAR          ; LIST PARALLEL DRIVER
DSKCPZ1          ; CPZ-16 Floppy disk driver module
DSK58I           ; 8"/5" TurboDOS disk format tables
MD131DRV         ; Monitor Dynamics MD-1013 with 1 drive
;MD132DRV        ; Monitor Dynamics MD-1013 with 2 drives
MCDPCPS          ; 16 Bit Master/Slave circuit driver module
LANCPZ           ; TurboLAN Network Driver Module
    
```

LOCAL AREA NETWORK

```

SRHDRV = 0xFF ; Search Default System Drive
COMPAT = 0xF8 ; Compatability Flags
AUTUSR = 0x80 ; Auto Logon to User 0 Privileged
;
CONAST = 0x01,CONDRA ; Assign Console to channel 1 serial
;
PATCSA = 0x7F,0x7E,0x7D,0x7C ; Status port table for CPS-MX)
        0x7B,0x7A,0x79,0x78 ; (default values)
        0x3F,0x3E,0x3D,0x3C ; Status port table for CPS-16
        0x3B,0x3A,0x39,0x38 ; (default values)
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
;-----Circuit assignment and LAN parameters-----
;
NMBCKT = 0x02 ; Using 2 circuits (8/16 bit & LAN)
CKTAST = (0x0000),CKTDRA,(0x0200),CKTDRB ; Circuit Assignment
;
;-----
;
PTRAST = 0x00,LSTDRA,0x81,(0x0221),0x82,(0x0221)
QUEAST = 0x00,(0x0000),0x81,(0x0221),0x82,(0x0221)
DSPPAT = 1,2,3,4
QUEPTR = 1
;
LDCOLD = 0x00 ; Cold start autoload flag
;COLDFN = 0,"TDTIMEM CMD"; Init TurboDOS Date/Time function
LDWARM = 0x00 ; Warm start autoload flag
;
OSMLEN = (1024) ; allow 16K for Dynamic expansion
;
NMBUFS = 128 ; Number of disk buffers
BUFBAS = (0x2000) ; 16K memory segment reserved
BUFLen = (8192) ; paragraphs to reserve
MEMTBL+3 = (0x1FFF-0x0050) ; define memory we have for O/S
;
DSKTBL = 0x41,0x41,0x41,0x41 ; 6ms step rate, tandon bit set
;
DSKAST = 0x01,DSKDRB,0x00,DSKDRB,0x00,DSKDRA,0x01,DSKDRA
        0x84,(0x0221),0x85,(0x0221),0xFF,(0x0000),0xFF,(0x0000)
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000)
        0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000),0xFF,(0x0000)
;
; If using TurboDos Ver. 1.41, include
; patches 2,3,5,6,13,15,16

```

LOCAL AREA NETWORK

8.2.3.1. DISKLESS MASTER

There is an added feature in TurboDos which will allow you to download an operating system through the network to another master. The only major changes to be made are in the ID settings. The ID of the system being downloaded to needs to reside between 20 and 2F Hex. The system which is doing the downloading must be set at 08 hex.

In the next example, System #1 will download an operating system to System #2. The file it will load will be called OSSLAWE1.SYS. The file originates from the Gen and Par files in the CPZMASTR set up for System #2. Once this file is active on System #2, the slave operating system files can be download. Shown below is an example of System #1:

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader module
NETFWD        ; Network Message Forwarded
;CPMSUP       ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvr to set date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
MD131DRV      ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MCDPCS        ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Local Area Network Driver for CPZ-4800x
Note: Diskless down load require a diskless down load prom from ICM
```

LOCAL AREA NETWORK

PAR file for System #1

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = 01 ; Search A: for command files
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
LNSSTA + 21 = "1" ; Diskless Master Download Suffix
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = " " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA,81,(0221),82,(0221) ; List assignment table
QUEAST = 00,(0000),81,(0221),82,(0221) ; Queue assignment table
DSPPAT = 1,2,3 ; Despool Assignment table
STOPBA = 44
;
ATNCHR = "^S" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines Hard disk and disk drives
;
DSKAST = 001,DSKDRB,00,DSKDRB,000,DSKDRA,001,DSKDRA ; Local
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

LOCAL AREA NETWORK

The CPZMASTR GEN & PAR files for System #2 will need to be Gen'ed and renamed OSSLAVE1.SYS, since '1' was the suffix specified in the download suffix table in System #1.

Below is an example of the CPZMASTR GEN & PAR files for System #2:

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader module
NETFWD        ; Network Message Forwarded
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDRA@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvr to set date/time
;DSKCPZ1      ; CPZ-16 Floppy disk driver module
;DSK58I       ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Local Area Network Driver for CPZ-4800x
```

LOCAL AREA NETWORK

PAR file for System #2

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = OFF ; Search A: for command files
;
;
;-----This Sets the Number of Circuits in Systems-----+
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
;
;-----+
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16
        3B,3A,39,38
;
SSTCSA = "P " ; O/S suffix table for CPS-MX
        "ZZZZZZZZ" ; O/S suffix table for CPS-16
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 80,(0208),00,LSTDRA,82,(0001) ; List assignment table
QUEAST = 80,(0208),00,(0000),82,(0001) ; Queue assignment table
DSPPAT = 1,2,3 ; Despool Assignment Table
STOPBA = 44
;
ATNCHR = "^@" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines disk drives
;
DSKAST = 80,(0208),81,(0208),82,(0208),83,(0208) ; Remote
;
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

The slave operating systems for System #2 files can also be kept on System #1. Once the download is complete, the master on System #2 can go out to the network for files.

LOCAL AREA NETWORK

The second addition to be made to the CPZMASTR.PAR file is to supply a suffix for the OSSLAWE.SYS file which will be downloaded to the Workstation when it is requested. This suffix will be loaded into a table which contains 256 entries. The table is named LNSSTA and the area in which the suffix is stored is equal to its ID. In this case the parameter is:

LNSSTA + 22 = "W"

Now when a Workstation, which is set at ID #22, requests a download of a LANS100, set at ID #8, the Master on that LANS100 will know that this request, sent from ID #22, should receive the file named OSSLAWEV.SYS.

Below is an example of the CPZMASTR GEN & PAR files:

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH Module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
NETLOD        ; Network Loader
NETFWD        ; Network message Forwarded
;CPMSUP       ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-48000 hardware initialization
SPDCPZ        ; CPZ-48000 Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 centronics board)
RTCCPZ        ; CPZ-48000 real time clock driver
;MSTRCLK      ; Include ICM clk board drvtr to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
MD131DRV      ; Monitor Dynamics 1013 with 1 drive
MDCDCPS       ; CPZ-48000 / CPS-MX Master Circuit Driver
LANCPZ        ; Network Driver
```

LOCAL AREA NETWORK

PAR file for CPZMASTR:

```

AUTUSR = 80 ; Auto Log-on to user one, privileged
SRHDRV = 01 ; Search A: for command files
;

NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default disk buffer size (log2(size/128))
MEMRES = (0400) ; Allow for Dynamic Memory Expansion of TurboDOS

;
;-----This Sets the Number of Circuits in Systems-----
;
NMBCKT = 2 ; Using 2 Circuits (8/16 bit,LAN)
CKTAST = (0000),CKTDRA,(0200),CKTDRB ; Circuit Assignments
LNSSTA + 22 = "W" ; Workstation Download Suffix
;
;-----
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX (std default values)
        7B,7A,79,78
        3F,3E,3D,3C ; Status port table for CPS-16 (std default values)
        3B,3A,39,38
;
SSTCSA = " " ; O/S suffix table for CPS-MX (std default values)
        "ZZZZZZZZ" ; O/S suffix table for CPS-16 (std default values)
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-48000
STOPBB = 44
;
PTRAST = 00,LSTDRA ; List assignment table
STOPBA = 44
;
ATNCHR = "^S" ; New attention character (Break Key)
PRTMOD = 0 ; Print mode (0 = direct, 1 = Spooled)
;
LDWARM = OFF
WARMFN = 0,"WARMSTRT","AUT"
;
MPAGE = 02 ; Use memory above slave address for Turbo-disk
;
DSKTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines disk drives
;
DSKAST = 001,DSKDRB,000,DSKDRA,001,DSKDRA ;Hard Disk&floppies
;
; If using TurboDos Ver. 1.41, include patches 1,12,and 14
;

```

LOCAL AREA NETWORK

The Workstation's GEN & PAR files are very similar to the Banked Slave. The major difference is that the master circuit drivers were taken out and the LANWS80 module was added in.

In the WSS0.PAR file, the Circuit was reassigned up to O2xx, which match the LANCPZ. In the Disk Assignment table, the first drive was set to read Drive A(hard Disk) on the main system and the second and third drives where assigned to read the first two floppies on the main system.

Below is an example of the WSS0 GEN & PAR files:

```
STDSLAVE      ; Standard Networking Slave
SOMCPS        ; Signon Message
PATCH        ; Include PATCH module
BNKMGR        ; Use bank switch manager for slave
BNKREQ        ; Bank Request Module
NETSVC        ; Network service module if DE-Spooling on slave
RTCCPS        ; Real-Time-Clock driver
;RTCNU        ; Null clock driver module if DE-Spooling on slave
;DSPOOL       ; If DE-Spooling with Slave printers
CPMSUP        ; CP/M Function Support Module
NITCPS        ; CPS-MX hardware initialization
;CON192       ; 19.2K Baud Console Driver
CON96         ; 9600 Baud Console Driver
SPDCPS        ; CPS-MX Serial Drivers
;LSTPAR       ; Use parallel null driver (CPI-100 centronics board)
;LSTCTS       ; Use list clear to send null driver
BNKCPS        ; Include slave bank switch module (GEN with KFCOO option)
LANW80        ; LAN Driver WS-80 workstation
```

LOCAL AREA NETWORK

PAR file for WSS0:

```

USRSOM = OD,OA,"Intercontinental Micro Systems, Corp."
          OD,OA,"WS-80 Workstation"
;AUTUSR = 80      ; DEFAULT = User 0, Privileged (delete for LOGON function)
SRHDRV = OFF      ; Search A:
;
;----- If Using CB-80 V1.3 Only -----+
;      Must be the same in CPZMASTR.PAR file
;COMPAT = OB8      ; If using CB-80 V1.3
;CPMVER = 22      ; Inhibit CB-80 Record Locking
;----- ELSE using CB-80 V1.4 -----+
;      Must be the same in CPZMASTR.PAR file
COMPAT = OF8      ; File/Record Locking Flags
;CPMVER = 30      ; Allow CB-80 Record Locking
;-----+
;
;CKTAST = (0200),CKTDRA ; Circuit Assignment table
DEFDID = (0208)        ; Default Destination ID
;
;LANTCA = 02          ; LAN time-out count in seconds
;
;NMBMBS = 4          ; Pre-Allocate Message Buffers
;NMBRPS = 2          ; Pre-Allocate Reply Waiting Packets
;
;ATNCHR = "^@"      ; Use "BREAK" Key for Attention
;
;CURBNK = 1          ; default to bank 1 (TPA bank)
;
;CONAST = 01,CONDRA ; Console on port 1 of CPS-80
;STOPBB = 44        ; Define 1 stop bit
;
;LDCOLD = 000      ; Disable Cold start autoloader (change to OFF to enable)
;LDWARM = 000      ; Disable Warm start autoloader (change to OFF to enable)
;
;LDCOLD must be enabled if you want to auto-init TurboDOS time
;and date function using the ICM CCB-100 Clock/Calendar board.
;
;COLDPFI = 0,"SLVCLK ", "AUT" ;init system clock using ICM clock board.
;
;WARMFNI = 0,"WARMSTRT", "AUT"
;
;DSKAST = 80,(0208),81,(0208),82,(0208)
;
; If using TurboDos Ver. 1.41, include patch 1
;

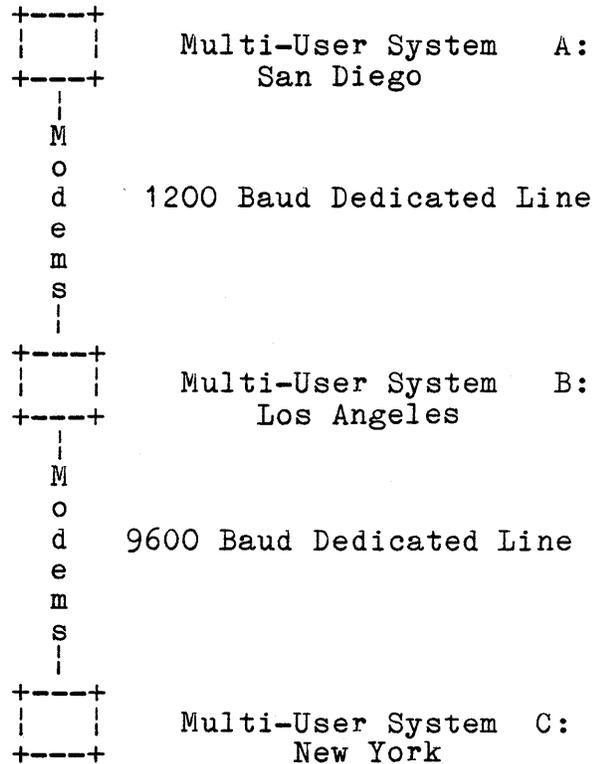
```

"Don't forget
+ the patches for
CB-80 V1.3"

8.3. CKTSER - Serial Modem Link

The other form of Network link is the serial circuit driver. This allows you to connect systems in the same way, except it is achieved through a serial port instead of a high-speed ARCnet controller. The advantage of this setup is not only lower cost, but that it may be routed through dedicated phone lines with high speed modems to remote locations. This driver is also a separate TurboDOS circuit. The serial circuit is very effective and feasible for networking several sites or very inexpensive for low volume use in an office or a school.

The remote site concept uses dedicated phone lines between sites and message forwarding tables to allow intermidate systems to pass on messages to the destined system. The example below is quite simple, but shows the power of this type of LAN.



As you can see different baud rates and different quality lines can be used. The system automatically does error detection and retry. The data files on A drive are in San Diego, data files on B drive are in Los Angeles, and data files on C drive are in New York. The resource sharing goes beyond drives to include printers as well. So a user in the New York main office can get an instant report from the San Diego office and have it printed for use in Los Angeles.

APPENDIXES

9. List of Appendixes

- Appendix A - Definitions of I.C.M.'s Drivers & Utilities
- Appendix B - ICM's Drivers - Global Symbols and Default Values
- Appendix C - Sample Basic .GEN and .PAR Files
- Appendix D - Printers on Slaves Sample .GEN's and .PAR's
- Appendix E - Patches for WordStar Ver. 3.0 and 3.3
- Appendix F - Hard disk Drives for MD1013/16 and OMTI
- Appendix G - Sample Floppy Drive Characteristics
- Appendix H - How to change baud rates

A. Appendix A - Definitions of I.C.M.'s Utilities & Drivers

-- CONFIG E --

AM80INIT.ASM	SW2000 Access Manager support programs
AM80INIT.COM	SW2000 Access Manager support program
CLKSETM.COM	Allows setting the CCB-100 from the CPZ-4800X for proper Date/Time.
CLKSETS.COM	Allows setting the CCB-100 from the CPS-MX slave processor card for proper Date/Time. If either CLKSETM or CLKSETS does not find a clock on that particular processor, an error message will be generated.
CPSSLAVE.GEN	The GEN module to configure the slave system file OSSLAIVE?.SYS. This contains the list of modules to include into the OSSLAIVE?.SYS for Non-banked slaves.
CPSSLAVE.PAR	Contains the Parameter (.PAR) listing that the GEN command uses to change GLOBAL labels in the OSSLAIVE?.SYS Non-banked slave system.
CPZDOS.GEN	Contains the listing of modules for the GEN command to link together for the Single-User TurboDOS. This also defines the default single user configuration.
CPZDOS.PAR	Contains the Parameter (.PAR) listing that the GEN command uses to change GLOBAL labels for the Single-User TurboDOS operating system.
CPZLOAD.GEN	The text file used to create the OSLOAD.COM module with the GEN command for loading TurboDOS single user or Multi-User operating systems. This is the default loader supplied to load the single user system.
CPZLOAD.PAR	The parameter text file used by the GEN command to change GLOBAL labels for the OSLOAD.COM file.
CPZMASTR.GEN	The text file which is used by the GEN command to create the Multi-User operating system for the CPZ-4800X.
CPZMASTR.PAR	The text file which defines all GLOBALS to be changed in the Multi-User operating system.

Appendix A - Definitions of I.C.M.'s Utilities & Drivers

DIRALL.COM Program written by D.M.M. Software allows the user to get a sorted directory listing of all user areas on disk drives. If a user area contains no files, then there will be no display for that area.

Command Options:

DIRALL *.*<cr> ;search all user areas on default disk and
;list to console.
DIRALL *.*;U0<cr> ;search only user 0 of default drive and list
;to console.
DIRALL *.*;U3-U7<cr> ;search users 3 to 7 on default drive and list
;to console.
DIRALL D:.*;U1-U3<cr> ;search drive D:, users 1 to 3 and list to
;console.
DIRALL ;[option] L<cr> ;above options with listing printed
;on printer device.

Full FILENAME.EXT options apply as well as Wild-Card options such as [filename.*] or [*.*ext] or [file????.*?m]. The ";" character after the filename.ext is the separator for USER number selections. Normal Cntl-S, Cntl-Q allow screen display freeze and Cntl-C allows aborting at any time. Full error trapping is incorporated to check for user numbers in range, listed backwards, or incorrect options.

DSPCLKM.COM Master Version. (CPZ-4800X)
Stand alone program to read the Date/Time directly from the CCB-100 clock calendar board. Useful under CP/M and in some cases under TurboDOS. Command options: DSPCLKM<cr> will display the Date/Time on console.
DSPCLKM R<cr> will display the Date/Time until any key is pushed to abort. If CCB-100 is not present, an error message will be generated.

DSPCLKS.COM Slave Version (CPS-MX or CPS-BMX)
Stand alone program to read the Date/Time directly from the CCB-100 clock calendar board. Command options:
DSPCLKS<cr> will display the Date/Time on console.
DSPCLKS R<cr> will display the Date/Time until any key is pushed to abort.
If CCB-100 is not present, error message will be generated.

Appendix A - Definitions of I.C.M.'s Utilities & Drivers

FORMAT.COM This file is the format program for the TurboDOS 8" diskettes. Formats supported are as follows: 128 byte single sided single density (CP/M standard) 1024 byte single sided/double sided double density TurboDOS format with 0 reserved tracks. Other options are not supported and usually come up with a drive not ready error when verifying.

FORMAT5.COM This program is the 5" turboDOS disk format program. Formats supported are: 1024 bytes single/double sided double density TurboDos only.

PRLTOCOM.ASM SW2000 Access Manager support program

PRLTOCOM.COM SW2000 Access Manager support program

SLVBNK.GEN This is the GEN module to configure the slave system file OSSLAIVE?.SYS. This contains the list of modules to include into the OSSLAIVE?.SYS for Banked slave processors CPS-BMX series.

SLVBNK.PAR This module contains the Parameter (.PAR) listing that the GEN command uses to change GLOBAL labels in the OSSLAIVE?.SYS Banked file.

SLVCLK.AUT This is the 8-bit Auto-Init file for setting the TurboDOS date/time when the clock board (CCB-100) is attached to a slave card. It does not matter which slave board the clock is attached to, as the SLVCLK.AUT checks to see if the clock is present on a port before it reads the clock. THIS MODULE SHOULD NEVER BE INCLUDED IN THE slave .GEN FILE and must be copied to user 31 and LDCOLD and COLDFN enabled in the CPSSLAVE.PAR file.

TURDSK.MAC This source file defines the size of TURBO-DISK based on the amount of memory you have for TURBO-DISK. It requires the Microsoft M80 to assemble. It will be GEN'ed together with TURBO-DISK during system generation of either CPZMASTR for Multi-User or CPZDOS for single user TurboDOS. The TURDSK.REL file supplied is configured for one 256K liner memory card.

B. Appendix B - ICM's Drivers - Global Symbols and Defaults

**INTERCONTINENTAL MICRO SYSTEMS, CORP.
TurboDOS REL file Symbols**

This document file explains the GLOBAL symbols in each of the ICM driver, .REL modules and their functions. These Symbols, as explained, exist only in the Intercontinental Micro Systems implementation of TurboDOS from Software 2000 Inc. The symbols listed below in each module may be changed by replacing or placing the symbol name shown in the .PAR file with the new constant desired.

The format in the PAR file is:

GLOBAL [+ or - offset] = value,value,symbolic address ;comment

The GLOBAL is the point being patched. The optional offset makes patches relative to the GLOBAL starting point. The = sign is required. The values default base is hex. The Z-80 implementation and decimal in the 8086 implementation. The base can be changed from decimal to hex in the 8086 implementation by starting the value with a 0x. The Z-80 version uses () to signify the start and end of a word, 2 byte value. The 8086 version uses [] for a similar function.

B.1. Modules applying to both Z-80 and 8086 Versions

"REL" & "O" FILE MAP

- CPZ-4800X - All versions of the Z-80 master processor board.
- CPS-MX - Z-80 non-banked slave processor board.
- CPS-BMX - Z-80 banked slave processor board.
- WS-80 - Z-80 banked slave workstation board.
- CPS-16 - 8086 slave processor board.
- ALL - All of the above products

MODULE	DESCRIPTION	USAGE
CON96	9600 baud null console driver	ALL
CON192	19200 baud null console driver	ALL
LSTCTS	Hardware handshake serial printer driver	ALL
LSTPAR	Parallel printer driver	ALL
LSTXON	XON-XOFF handshake serial printer driver	ALL

```
=====
"REL" & "O" FILE EXPANDED DESCRIPTIONS
=====
```

```
-----
B.1.1. Console Drivers
```

Three console drivers are provided, the two shown below and the standard multi-user master console driver CONREM. Use CONREM in the master (CPZMASTR.GEN) and do not add either of the two below. If a real console is wanted on the master, disable CONREM in the CPZMASTR.GEN file.

```
-----
CON96                9600 Baud Console Driver
Patches:             CONBR = 8E ;Z-80
                    CONBR = 0x8E ;8086
                    Byte sets the BAUD RATE (see Appendix H)
                    SHFIN = 0D,0A,80,0,0,0,0,0,0,0,0,0,0
                    Shift In Sequence string for User CRT.
                    SHFOUT = 0D,0A,80,0,0,0,0,0,0,0,0,0,0
                    Shift Out Sequence string for User CRT.
```

```
-----
CON192               19200 Baud Console Driver
Patches:             CONBR = 8E ;Z-80
                    CONBR = 0x8E ;8086
                    Byte sets the BAUD RATE (see Appendix H)
                    SHFIN = 0D,0A,80,0,0,0,0,0,0,0,0,0,0
                    Shift In Sequence string for User CRT.
                    SHFOUT = 0D,0A,80,0,0,0,0,0,0,0,0,0,0
                    Shift Out Sequence string for User CRT.
```

*** NOTE *** SHFIN and SHFOUT may be used to create a 25th status line, Low intensity, etc. on the user CRT in accordance with the TurboDOS Console Driver definitions found in the Implementer's Guide.

B.1.2. Printer Drivers

LSTCTS Clear to send, serial hardware handshake printer driver. This driver is used with printer that provided a signal on pins 20,19 or 11.

Patches: CTSBR = 6E ;Z-80
CTSBR = 0x6E ;8086

Clear to Send Baud rate (see Appendix H)

CTSFF = "^L"

Formfeed byte for Printer

LSTPAR Parallel Printer Driver Module

LSTPFF = "^L"

Formfeed byte for Printer

LSTXON XON/XOFF Printer Driver Module

XONBR = 07

Baud Rate byte (see Appendix H & T Func. 37)

XONFF = "^L"

Formfeed byte for Printer

B.2. TurboDOS Driver Doc, Z-80 VER, REV 2, NOV 15 1984

T A B L E B-1: REL FILE EXPANDED DESCRIPTIONS

CPZ-4800X - All versions of the Z-80 master processor board.
 CPS-MX - Z-80 non-banked slave processor board.
 CPS-BMX - Z-80 banked slave processor board.
 WS-80 - Z-80 banked slave workstation board.

MODULE	DESCRIPTION	USAGE
BNKCPS	Bank driver	CPS-BMX or WS-80
DSKCPZ	Floppy disk driver	CPZ-4800X
DSKCPZ1	Floppy disk driver (rev 1)	CPZ-4800X
DST58F	Disk specification tables for 5 and 8 inch floppies	CPZ-4800X
DST58I	Disk specification tables for 5 and 8 inch floppies (ICM)	CPZ-4800X
DST5F	Disk specification tables for 5 inch floppies	CPZ-4800X
DST8F	Disk specification tables for 8 inch floppies	CPZ-4800X
MDCPS	CPS master circuit driver	CPZ-4800X
NITCPS	Hardware initialization	CPS-MX, CPS-BMX, or WS-80
NITCPZ	Hardware initialization	CPZ-4800X
RESCPS	Reset detection	CPS-MX or CPS-BMX
RTCCPS	Real-time-clock driver	CPS-BMX or WS-80
RTCCPZ	Real-time-clock driver	CPZ-4800X
RTCCPZ1	Real-time-clock driver (rev 1)	CPZ-4800X
SCDCPS	CPS slave circuit driver	CPS-MX or CPS-BMX
SERIAL	Multi-serial interface module	CPZ-4800X, CPS-MX CPS-BMX or WS-80

continued

Appendix B - ICM's Drivers - Global Symbols and Defaults

MODULE	DESCRIPTION	USAGE
SOMCPS	Sign-on message area	CPS-MX, CPS-BMX, or WS-80
SOMCPZ	Sign-on message area	CPZ-4800X
SPDCPS	Serial/parallel I/O driver	CPS-MX, CPS-BMX, or WS-80
SPDCPZ	Serial/parallel I/O driver	CPZ-4800X
SPICPS	Serial/parallel I/O driver with Tx and EXT interrupts	CPS-MX, CPS-BMX, or WS-80
SPICPZ	Serial/parallel I/O driver with Tx and EXT interrupts	CPZ-4800X
TURBO	Turbo-Disk RAM disk driver	CPZ-4800X

=====

"REL" FILE EXPANDED DESCRIPTIONS

=====

BNKCPS.REL Banked memory driver for the CPS-BMX and WS-80 slave processor boards. This module is included for TurboDOS generations supporting banked transient program area operations. Mode 2 type interrupt vectors from 10 hex through 2F hex that occur while in bank 1 are trapped by this module and the real interrupt service routine in bank 0 is called.

Entries:

BNKNIT	Module initialization routine. Called from the hardware initialization module.
SELBNK	Select memory bank routine. Called from TurboDOS to select either bank 0 or bank 1.
LOKBNK	Obtain bank 1 mutual exclusion lock routine. This entry may be called from processes running in bank 0 that wish to lock out TurboDOS bank 1 switching.
FREBNK	Release bank 1 mutual exclusion lock routine. This entry must be called from a process that previously called LOKBNK to lock out TurboDOS bank 1 switching.

Patches: NONE

DSKCPZ.REL Floppy disk driver for the CPZ-4800X master processor board. This driver module has only changed names from its previously known module CPZFDK.

Patches:

FLSRT	= 01
-------	------

Floppy Step Rate (0=3ms, 1=6ms, 2=10ms, 3=15ms) NOTE: when 5 1/4 inch drives are being used, the floppy step rate is cut in half for the 5 1/4 inch drives. EXAMPLE: If the rate is set for 1, the 8 inch drives operate at 6 ms step and the 5 1/4 inch drives will step at 12 ms.

STATCT = 02

Drive Status retry count.

DLYCNT = 90

Delay Constant for Slim Line Floppies

DSKPTR = Uses 8" Disk Specification POINTERS
For All Four Drives.

Allows the mixture of 8" and 5 1/4"
drives on the same system (4 drives
max.)

DSKCPZ1.REL Revision 1 floppy disk driver module for the CPZ-4800X master processor board. This driver module is used in conjunction with disk specification tables supplied in separate module form for differing implementations (see DST??? file types below).

IMPORTANT NOTE: The revision 1 of the real-time-clock driver (RTCCPZ1.REL) must be used with this driver.

Standard 8 and 5 inch drive sizes are supported with this driver as well as mixing of drive sizes with the CPZ-48004 and CPZ-48006 revisions. Tandon drive type motor start-up control is also supported (see drive type table definition). IBM-PC DOS format (8-sector type) is supported for recovery of files with the READPC TurboDOS utility.

Entries:

DSKIN@ Driver initialization entry point. Called from the hardware initialization module (NITCPZ).

DSKDR@ Driver request entry point. Called from TurboDOS to perform requested driver functions.

DSKTIC Disk tick interrupt service routine. Called from the real-time-clock driver (RTCCPZ1) to perform motor control and ready test timer functions of the driver.

Appendix B - ICM's Drivers - Global Symbols and Defaults

Patches: DRVTBL = 0,0,0,0

Drive type table. This table allows the mixing of drive types within this single driver. This table contains a byte entry for each of four possible drives, the first byte corresponding to drive select 0 and the last byte to drive select 3. The bits of the drive byte are defined as follows:

Bit 0-1 select the drive step rate.

0 = 3ms (8-inch) or 6ms (5-inch)
1 = 6ms (8-inch) or 12ms (5-inch)
2 = 10ms (8-inch) or 20ms (5-inch)
3 = 20ms (8-inch) or 40ms (5-inch)

Bit 2-3 are reserved for internal use.

Bit 4 selects mini-floppy drives.

Bit 5 selects 96 TPI mini-floppy drives and must be used in conjunction with bit 4.

Bit 6 select Tandon drive type motor control operation. This bit instructs the driver to attempt 8-inch motor start-up by forcing the head load line active.

Externals: LOKBNK Lockout bank 1 switching. This routine is called prior to beginning a floppy disk DMA operation. This routine is normally supported by the bank switch driver module.

FREBNK Free lockout on bank 1 switching. This routine is called after a floppy disk DMA operation has completed. This routine is normally supported by the bank switch driver module.

DST58F.REL Disk specification tables for 8-inch and 5-inch floppies. This module is used in conjunction with the floppy disk driver (DSKCPZ1.REL). This module supports specifications for standard TurboDOS 8-inch floppies, standard TurboDOS 5-inch floppies, and special specifications for 5-inch (512 byte per sector, 8 sector per track) floppies which allows the TurboDOS READPC utility to recover IBM-PC DOS written files.

Patches: NONE

DST58I.REL Disk specification tables for 8-inch and 5-inch floppies with alterations to support the ICM non-standard 1D and 2D format types. This module is used in conjunction with the floppy disk driver (DSKCPZ1.REL). This module supports specifications for non-standard ICM 8-inch floppies (1D and 2D, 1024 byte per sector, 8 sectors per track, single and double sided). Standard TurboDOS 5-inch floppies and special specifications for 5-inch (512 byte per sector, 8 sector per track) floppies which allows the TurboDOS READPC utility to recover IBM-PC DOS written files.

Patches: NONE

DST5F.REL Disk specification tables for 5-inch floppies. This module is used in conjunction with the floppy disk driver (DSKCPZ1.REL). This module supports specifications for standard TurboDOS 5-inch floppies, and special specifications for 5-inch (512 byte per sector, 8 sector per track) floppies which allows the TurboDOS READPC utility to recover IBM-PC DOS written files.

Patches: NONE

DST8F.REL Disk specification tables for 8-inch floppies. This module is used in conjunction with the floppy disk driver (DSKCPZ1.REL). This module supports specifications for standard TurboDOS 8-inch floppies.

Patches: NONE

MCDCPS.REL Master circuit driver for the CPZ-4800X master processor. This driver controls network traffic for all bus oriented slave processor boards. Mixed combinations of slave processor boards with gaps between I/O port addresses are supported by this driver. A maximum of 16 slave processor boards may be supported. The routine for outgoing messages to slave processors from the master is coded for re-entrant use by TurboDOS server processes with a maximum of 16 pending messages (one per each slave). Slaves are polled for receive messages in a round robin fashion in the order defined by the port assignment table (see below).

MCDCPS.REL represents a package of three modules:

MCNCPS.REL - Circuit driver nucleus code.
DLC80.REL - Downloader for Z80 processors.
DLC86.REL - Downloader for 8086 processors.

Support of up to 16 CPS slaves (any mix) was determined as a practical limit for one occurrence of the circuit driver nucleus code. Support for more slaves (in increments of 16) may be added by GENing in additional copies of the circuit driver and properly configuring the port and suffix assignment tables. The circuit driver nucleus (MCNCPS.REL) is used for additional circuits to avoid multiple defined name errors due to repeats of the downloaders (DLC80 and DLC86). Refer to GEN and PAR file examples relative to this circuit driver in this section.

Entries:

CKTIN@ Circuit initialization routine. Called from the hardware initialization module. This routine will scan the system for active slaves processor boards (up to 16 as defined by the port assignment table). The OS variable NMBSVC will be increased by the number of active slaves found. The OS variable NMBMBS will be increased by two times the number of active slaves and the OS variable NMBRPS will be increased by the number of slaves. The OS circuit assignment table is scanned for an entry to this driver and if found, the circuit number will be extracted from the table and considered the circuit number for all slave processors. NOTE: This is the only parameter that need be setup to change the CPS circuit number.

CKTDR@ Circuit driver entry point. This routine is called from TurboDOS to receive and send message accross the network.

Appendix B - ICM's Drivers - Global Symbols and Defaults

Patches: PATCS@ = 7F,7E,7D,7C,7B,7A,79,78
 3F,3E,3D,3C,3B,3A,39,38

Port assignment table for CPS slave processor boards. This 16 byte table defines the I/O status/command port addresses for slave processor boards. The slaves node assignment is also derived from this table; the slave with the first I/O address will be known on the circuit as node 1 and the slave with the last I/O address will be known as node 16. For compatibility with previous drivers, the first 8 ports default to CPS-MX and CPS-BMX addresses, and the second 8 ports default to CPS-16 addresses.

NOTE: The driver automatically determines if the slave is an eight bit or 16-bit slave and loads to that type of board based on the suffix table. To support more than eight Z-80 slaves change the port assignment and suffix tables. This driver can be included in the GEN file more than once and can support more than 16 slaves; however if included more than once a meaningless duplicate symbol is displayed.

IMPORTANT NOTE: Due to the fact that the system is scanned for active slave processor boards based on the port assignment table. Multiple port addresses must not be allowed in the table.

SSTCS@ = " "
 "ZZZZZZZZ"

Slave suffix table for OSSLAIVE.SYS downloading. This 16 byte table defines the suffix character appended to the file name OSSLAIVE?.SYS for initial system downloading. The first character corresponds to node 1 and the last to node 16. Flexible combinations of common or unique system files may be downloaded to slave processors by configuring this table. For compatibility with previous drivers, the first 8 characters default to an ASCII space and the second 8 characters default to a "Z".

Appendix B - ICM's Drivers - Global Symbols and Defaults

ENPCS@ = OFF

Enable TurboDOS parameter patching. This flag, when patched to 0, will disable all automatic parameter patching done by this driver (see CKTIN@ discription in this driver). The TurboDOS parameters NMBSVC, NMBMBS, and NMBRPS must be setup by the user in the parameter file.

Example #1: One circuit preset to accept up to sixteen non-banked CPS slaves (CPS-MX) with port addresses from hex 7F through 70. All slaves are downloaded from the file OSSLAIVE.SYS.

- GEN file entries -

MDCDCPS ; Master Circuit driver (CKTDR@=CKTDRA)

- PAR file entries -

```
NMBCKT = 1 ; Number of circuits
CKTAST = (0000),CKTDRA ; Circuit assignment
PATCSA = 7F,7E,7D,7C,7B,7A,79,78 ; CPS ports
        77,76,75,74,73,72,71,70
SSTCSA = " " ; CPS suffixs
```

Banked CPS slaves (CPS-BMX) could be added within this range of ports and downloaded from the file OSSLAVER.SYS by configuring the suffix table to correspond with the banked slaves port addresses. For example, if CPS slaves located at ports 7B and 7A are banked slaves, the suffix table would change as follows:

```
SSTCSA = " BB " ; CPS suffixs
```

Example #2:

Two circuits, with the first circuit setup to accept up to eight non-banked Z80 slaves (CPS-MX) at port addresses from hex 7F through 78 and up to eight banked Z80 slaves (CPS-BMX) at port addresses from hex 77 through 70. The second circuit is setup to accept 8086 slaves (CPS-16) at port addresses from hex 3F through 30. Non-banked Z80 slaves are downloaded from the file OSSLAVER.SYS, banked Z80 slaves from the file OSSLAVER.SYS, and 8086 slave from the file OSSLAVER.SYS.

- GEN file entries -

```
MCDCPS ; Master circuit driver #1
MCNCPS ; Master circuit driver #2
```

- PAR file entries -

```
NMBCKT = 2 ; Number of circuits
CKTAST = (0000),CKTDRA
        (0100),CKTDRB ; Circuit assignments
PATCSA = 7F,7E,7D,7C,7B,7A,79,78
        77,76,75,74,73,72,71,70 ; Ports
SSTCSA = "BBBBBBBB" ; Suffixs
PATCSB = 3F,3E,3D,3C,3B,3A,39,38
        37,36,35,34,33,32,31,30 ; Ports
SSTCSB = "ZZZZZZZZZZZZZZZZZZ" ; Suffixs
```

Preparing the network master OS in this fashion will allow expansion of slave processor boards (any type) into the system without the need of reconfiguration. Depending on the I/O port address of the slave, suffixs for the download OS will already be setup.

Appendix B - ICM's Drivers - Global Symbols and Defaults

NITCPS.REL Hardware initialization routines for CPS-MX, CPS-BMX, and WS-80 slave processors.

Entries: HDWNIT This entry is called from TurboDOS in order to allow the hardware to be initialized.

Externals: BNKNIT This routine is called to initialize the BNKCPS module (optional for the CPS-BMX or WS-80 slave processors).

 SPINIT This routine is called to initialize the SPDCPS module (serial/parallel I/O routines).

 RTCNIT This routine is called to initialize the real-time-clock driver (RTCNUL for CPS-MX slaves, and RTCCPS for CPS-BMX or WS-80 slaves).

 DSKINA,DSKINB,DSKINC,DSKIND

 These routines are called to initialize disk drivers included in the system.

 CKTINA,CKTINB,CKTINC,CKTIND

 These routines are called to initialize circuit drivers included in the system.

Patches: NONE

NITCPZ.REL Hardware initialization for the CPZ-4800X master processor board. Contains initialization for the pre-defined interrupt structure of the master. S100 VI interrupt levels 0 through 7 are supported through the on-board 9519 universal interrupt controller and Z-80 mode 2 type interrupts. An interrupt page of 0 is set with address 10H corresponding to VI7 and address 1EH to VIO.

Entries: HDWNIT This entry is called from TurboDOS to allow the hardware to be initialized.

 INTENA VI Interrupt enable routine. This entry may be called from drivers wanting to use the interrupt structure of the system. Upon entry, register HL should point to the interrupt service routine address, and register A should contain the VI level number (0-7). Upon exit, the proper interrupt page vector is initialized and the mask released in the 9519 for the VI level number.

CLRIMR or SETIMR

Clear or set 9519 interrupt mask register. These entries are maintained for compatibility with previous versions of this module and user integrated drivers. Upon entry, register A contains the VI level number (0-7). Upon exit, the 9519 interrupt mask register is either cleared or set.

Externals: MMNIT This routine is called to initialize the DMA memory to memory move module (optionally included).

 SPINIT This routine is called to initialize the SPDCPS module (serial/parallel I/O routines).

 RTCNIT This routine is called to initialize the real-time-clock driver (RTCNUL for CPS-MX slaves, and RTCCPS for CPS-BMX or WS-80 slaves).

 CLKNIT This routine is called to initialize the hardware clock support module (optional).

Appendix B - ICM's Drivers - Global Symbols and Defaults

DSKINA,DSKINB,DSKINC,DSKIND

These routines are called to initialize disk drivers included in the system.

CKTINA,CKTINB,CKTINC,CKTIND

These routines are called to initialize circuit drivers included in the system.

USRPRA,USRPRB,USRPRC,USRPRD

These routines are called to initialize resident system processes included in the system.

Patches:

PATCSI = 7F,7E,7D,7C,7B,7A,79,78
77,76,75,74,73,72,71,70
3F,3E,3D,3C,3B,3A,39,38
37,36,35,34,33,32,31,30

Port assignment table for CPS slave initialization. This 32 byte table defines possible I/O addresses for any type of CPS slave that is in the system. Part of the hardware initialization includes disabling CPS slaves. This table defines where CPS slave I/O addresses may be assigned.

ENACSI = OFF

Enable flag for CPS initialization. This byte may be patched to 0 to disable the CPS slave initialization routine in single user systems not containing any slaves.

RTCCPS.REL

Real-time-clock driver for CPS-BMX or WS-80 slave processor boards. This module contains the interrupt service routine for the generation of system ticks for the TurboDOS delay manager. System ticks occur every 1/60th of a second in systems using this module.

IMPORTANT NOTE: This driver cannot be supported by the hardware of the CPS-MX slave processor.

Entries:

RTCNIT This entry is called by the hardware initialization module to setup the system tick interrupt.

Patches:

NONE

Appendix B - ICM's Drivers - Global Symbols and Defaults

RTCCPZ.REL Real-time-clock driver for the CPZ-4800X master processor board. This module contains the interrupt service routine for the generation of system ticks for the TurboDOS delay manager. System ticks occur every 1/50th of a second in systems using this module.

Entries: RTCNIT This entry is called by the hardware initialization module to setup the system tick interrupt.

Externals: MOTOFF This routine is called during every system tick interrupt to check a timer controlling motor shut-off with 5-1/4 inch floppy disk drives. This routine is located in the floppy disk driver module DSKCPZ.

Patches: NONE

RTCCPZ1.REL Real-time-clock driver for the CPZ-4800X master processor board. This module contains the interrupt service routine for the generation of system ticks for the TurboDOS delay manager. System ticks occur every 1/60th of a second in systems using this module.

Entries: RTCNIT This entry is called by the hardware initialization module to setup the system tick interrupt.

Externals: DSKTIC This routine located in the floppy disk driver (DSKCPZ1.REL) is called at every system tick for support of motor control and ready time out functions.

Patches: NONE

Appendix B - ICM's Drivers - Global Symbols and Defaults

RESCPS.REL Slave reset detection module for CPS-MX, CPS-BMX, or WS-80 slave processor boards. This module is included in the system to allow soft resets of slave processors from the keyboard.

Entries: RESDET This routine is called from the serial/parallel I/O driver SPDCPS to allow a check of the keyboard character that was just received.

Patches: RESKEY = "^@"

Slave reset key assignment. This byte may be patched to change the character detected for a soft reset.

CNTRES = 4

Count of reset keys. This byte may be patched to change the number of reset key strokes typed before a soft reset is performed.

SCDCPS.REL Slave circuit driver for the CPS-MX or CPS-BMX slave processors. This driver is the Z-80 slave processor side of the MDCPS master circuit driver.

Entries: CKTIN@ Circuit initialization routine. Called from the hardware initialization module. This routine will scan the TurboDOS circuit assignment table for a match with the driver entry point and if found, will patch its circuit and node assignment to those passed by the master circuit driver.

If the TurboDOS default processor destination ID (DEFDID) is found in its default state of 0, the circuit assignment will be patched to that passed by the master circuit driver.

The TurboDOS disk assignment table (DSKAST), printer assignment table (PTRAST), and queue assignment table (QUEAST) are scanned for their default assignments as remote across the network, and if found, the circuit assignment will be patched to that passed by the master circuit driver.

Appendix B - ICM's Drivers - Global Symbols and Defaults

CKTDR@ Circuit driver entry point. This routine is called from TurboDOS to receive and send messages across the network.

Externals: PTMCKT,PTMNOD

Patch circuit and node numbers into sign-on message. These routines (located in the SOMCPS module) are called to allow patching of the circuit and node numbers into the default sign-on message.

Patches: NMBSIM = 2

Number of slave included message and reply buffers. This byte variable is used to add message and reply buffers to the slave operating system as follows:
NMBMBS <= NMBMBS+(2*NMBSIM)
NMBRPS <= NMBRPS+NMBSIM

SERIAL.REL Multi-serial interface module. This module allows multiple serial drivers to be linked together in a TurboDOS system. Up to four driver modules controlling multiple serial channels each can exist with the use of this module.

Drivers wishing to use this interface module must contain the two global entry points SERIN@ and SERIO@, which are assigned A,B,C, or D by TurboDOS system generation conventions depending on the ordering in the GEN file.

SERIN@ must perform all initialization associated with the I/O ports it will support and return a count of supported channels in register A.

SERIO@ must perform the standard TurboDOS request for a communications channel driver for a particular channel (always relative to 0) passed through in register B.

Globals: SPINIT Driver initialization module. Called from the hardware initialization module. This routine calls for initialization of the optional four modules through the entry points SERINA, SERINB, SERINC, and SERIND. Each of these routines, if they exist, must return the number of supported serial channels in register A. SERIAL will store this information for

later use when called by TurboDOS console, list, and communications drivers.

SERIAL or COMDRV

Main driver entry point. Called from TurboDOS console, list, and communications drivers. This routine looks through a table of driver entries and supported serial channels to determine which of four possible serial drivers to branch to. Possible serial driver entries are SERIOA, SERIOB, SERIOC, and SERIOD.

Example: Assume three serial channel drivers are GEN'ed into a TurboDOS system as follows:

```
SERIAL      ; Multi-serial interface module
SPICPZ      ; Serial/parallel driver (CPZ-4800X)
SERINO      ; Serial driver (INO-2808)
SERKON      ; Serial driver (KONAN)
```

SPICPZ supports two serial channel, SERINO supports eight serial channels, and SERKON supports four serial channels. Each driver returned this information at initialization time. Serial will honor driver requests for logical serial channels 0 through 13. Logical channels 0 and 1 are routed to SPICPZ as physical channels 0 and 1, logical channels 2 through 9 are routed to SERINO as physical channels 0 through 7, and logical channels 10 through 13 are routed to SERKON as physical channels 0 through 3.

It is the responsibility of each serial driver module using absolute global names NOT to conflict with any other module.

Appendix B - ICM's Drivers - Global Symbols and Defaults

SOMCPS.REL User sign-on message area for CPS-MX, CPS-BMX, or WS-80 slave processors. This module contains an area that may be patched by the user for his own custom sign-on message displayed after the TurboDOS sign-on message.

Entries: PTMCKT,PTMNOD

These entry points are called from the slave circuit driver to allow the sign-on message to be patched with the correct circuit and node assignment of that slave processor. On entry, the ACC contains the circuit or node number.

Patches: USRSOM = 0 [Repeated 80 times]
 "Circuit: ",0,0,0,", Node: ",0,0,0,"\$"

This message string is displayed by TurboDOS at system start-up time. The string is terminated with a "\$" character (already supplied after the circuit and node message area). The first 80 bytes may be patched by the user (NOT terminated by a "\$" character unless the circuit and node message is not desired).

SOMCPZ User sign-on message area for the CPZ-4800X master processor board. This module contains an area that may be patched by the user for his own custom sign-on message displayed after the TurboDOS sign-on message.

Patches: USRSOM = 0 [Repeated 80 times],"\$"

This message string is displayed by TurboDOS at system start-up time. The string is terminated with a "\$" character (already supplied) The first 80 bytes may be patched by the user.

SPDCPS Serial/parallel I/O driver for the CPS-MX, CPS-BMX, or WS-80 slave processor boards. This driver contains the drivers for the SIO and PIO devices located on the slave processor boards.

Entries: SPINIT Driver initialization routine. Called from the hardware initialization module.

COMDRV or SERIAL

Main driver entry point. Called from the console and list device drivers.

PAROUT Parallel output entry point. Called from the parallel list device driver.

Patches:

SOIBSZ = (20)
S1IBSZ = (20)

Serial input buffer sizes. These word patch points define input buffer sizes for serial channels 0 and 1.

STOPBA = 4C
STOPBB = 4C

Stop bit byte (4C = 2 s/b) (44 = 1 s/b)
Value used to program SIO write register 4 for 16X clock, Number of Stop Bits and Parity.

STOPBA+2 = C1
STOPBB+2 = C1

Receive Control Byte value used to program SIO write register 3 for Rx 8 bit character, Rx enable. can also be used to program Auto-Enables (hardware handshake).

STOPBA+4 = EA
STOPBB+4 = EA

Transmit Control Byte value used to program SIO write register 5 for DTR, Tx 8 bit character, Tx enable, RTS.

SPDCPZ

Serial/parallel I/O driver for the CPZ-4800X master processor. This driver contains the drivers for the SIO and PIO devices located on the master processor boards.

Entries:

SPINIT Driver initialization routine. Called from the hardware initialization module.

COMDRV or SERIAL

Main driver entry point. Called from the console and list device drivers.

PAROUT Parallel output entry point. Called from the parallel list device driver.

Appendix B - ICM's Drivers - Global Symbols and Defaults

Patches: SOIBSZ = (20)
 S1IBSZ = (20)

Serial input buffer sizes. These word patch points define input buffer sizes for serial channels 0 and 1.

STOPBA = 4C
STOPBB = 4C

Stop bit byte (4C = 2 s/b) (44 = 1 s/b)
Value used to program SIO write register 4 for 16X clock, Number of Stop Bits and Parity.

STOPBA+2 = C1
STOPBB+2 = C1

Receive Control Byte value used to program SIO write register 3 for Rx 8 bit character, Rx enable. can also be used to program Auto-Enables (hardware handshake).

STOPBA+4 = EA
STOPBB+4 = EA

Transmit Control Byte value used to program SIO write register 5 for DTR, Tx 8 bit character, Tx enable, RTS.

SPICPS.REL

Serial/parallel I/O driver for the CPS-MX, CPS-BMX, or WS-80 slave processor boards. This driver contains the necessary support for the SIO and PIO devices on these boards.

IMPORTANT NOTE: This module is configured for use with the multi-serial interface module (SERIAL) which must be GEN'ed into each system using SPICPS (see SERIAL documentation above). Also must be used for Circuit Serial to work.

The features of this driver are full interrupt driven support of the receiver, transmitter and MODEM control lines. The driver may be configured to automatically change the state of the data terminal ready line (DTR) based on how full the receive buffer is. Calls to external user supplied modules are performed when the data carrier detect line (DCD) changes state.

Appendix B - ICM's Drivers - Global Symbols and Defaults

SPICPS supports two logical serial channels which are the physical SIO channels A and B. When CTS handshaking is selected on either channel (bit 6 of the baud rate code), the channel's DTR line will be automatically driven inactive when the receive input buffer reaches 75% full. DTR is then driven active again when the buffer falls to 25% full. This allows receive handshaking with other serial devices to avoid input buffer overrun conditions.

Entries:

SERIN@ Driver initialization routine. Called from the multi-serial interface module (SERIAL) during initialization phase. This driver returns the value 2 in register A for the number of supported channels.

SERIO@ Main driver entry point. Called from the multi-serial interface module (SERIAL) when I/O channel requests are mapped to this driver. The following exceptions to the standard defined serial functions apply to this module.

A baud rate code where bits 0-3 are 0 (normally selects 50 baud) now selects 38.4k baud. Most terminals today support this speed.

Bit 6 set in the baud rate code (normally selects CTS handshaking) now selects automatic DTR handshaking also.

PAROUT Parallel output entry point. Called from the parallel list device driver. Register C contains the parallel output character.

Patches:

SOIBSZ = (20) <-- channel 0
S1IBSZ = (20) <-- channel 1

Serial input buffer sizes. These word patch points define the size of each channels receive character input buffer.

SOOBSZ = (20) <-- channel 0
S1OBSZ = (20) <-- channel 1

Serial output buffer sizes. These word patch points define the size of each channels transmit character output buffer.

Appendix B - ICM's Drivers - Global Symbols and Defaults

SOWR4 = 4C <-- channel 0
S1WR4 = 4C <-- channel 1

Serial channel number of stop bits. These byte patch points normally default to 2 stop bits but may be patched to a 44 hex for 1 stop bit.

Externals: RESDET Slave keyboard reset detect support call. This routine (normally found in the RESCPS module) is called at every keyboard input if attention detect is enabled (bit 7 of the baud rate code). The input character is passed in the A register. All other registers must be preserved.

SODCDE <-- channel 0
S1DCDE <-- channel 1

These entry points are called when a change of state is detected on the DCD input line. Register A is set to an FF hex if DCD went active, else set to 0 if DCD went inactive. The calls are performed from within the external status interrupt service routine, so care must be taken not to re-enable interrupts. Registers A,BC,DE, and HL may be used within the user written routine.

SPICPZ.REL Serial/parallel I/O driver for the CPZ-4800X processor boards. This driver contains the necessary support for the SIO and PIO devices on this board.

IMPORTANT NOTE: This module is configured for use with the multi-serial interface module (SERIAL) which must be GEN'ed into each system using SPICPZ (see SERIAL documentation above). Also must be used to make Circuit Serial work.

The features of this driver are full interrupt driven support of the receiver, transmitter and MODEM control lines. The driver may be configured to automatically change the state of the data terminal ready line (DTR) based on how full the receive buffer is. Calls to external user supplied modules are performed when the data carrier detect line (DCD) changes state.

SPICPZ supports two logical serial channels which

are the physical SIO channels A and B.

When CTS handshaking is selected on either channel (bit 6 of the baud rate code), the channel's DTR line will be automatically driven inactive when the receive input buffer reaches 75% full. DTR is then driven active again when the buffer falls to 25% full. This allows receive handshaking with other serial devices to avoid input buffer overrun conditions.

Entries: SERIN@ Driver initialization routine. Called from the multi-serial interface module (SERIAL) during initialization phase. This driver returns the value 2 in register A for the number of supported channels.

SERIO@ Main driver entry point. Called from the multi-serial interface module (SERIAL) when I/O channel requests are mapped to this driver. The following exceptions to the standard defined serial functions apply to this module.

A baud rate code where bits 0-3 are 0 (normally selects 50 baud) now selects 38.4k baud. Most terminals today support this speed.

Bit 6 set in the baud rate code (normally selects CTS handshaking) now selects automatic DTR handshaking also.

PAROUT Parallel output entry point. Called from the parallel list device driver. Register C contains the parallel output character.

Patches: SOIBSZ = (20) <-- channel 0
 S1IBSZ = (20) <-- channel 1

Serial input buffer sizes. These word patch points define the size of each channels receive character input buffer.

SOOBSZ = (20) <-- channel 0
 S1OBSZ = (20) <-- channel 1

Serial output buffer sizes. These word patch points define the size of each channels transmit character output buffer.

SOWR4 = 4C <-- channel 0
 S1WR4 = 4C <-- channel 1

Appendix B - ICM's Drivers - Global Symbols and Defaults

Serial channel number of stop bits. These byte patch points normally default to 2 stop bits but may be patched to a 44 hex for 1 stop bit.

Externals: SODCDE <-- channel 0
 S1DCDE <-- channel 1

These entry points are called when a change of state is detected on the DCD input line. Register A is set to an FF hex if DCD went active, else set to 0 if DCD went inactive. The calls are performed from within the external status interrupt service routine, so care must be taken not to re-enable interrupts. Registers A,BC,DE, and HL may be used within the user written routine.

TURBO.REL Turbo-DISK RAM disk driver for the CPZ-4800x master processor. This driver controls linear addressed RAM above any slave ram and makes it available as a logical drive.

Patches: MPAGE = 01

Defines the memory page start address for TURBO-DISK. Default = 01 for standard I.C.M. 256 K memory boards. Set MPAGE = 02 for use of TURBO-DISK with Multi-user TurboDOS. This places the memory start address at the next 64 Kbytes above the Z-80 Slave cards and will have to be set to 5 if 16 bit slaves with 256K of RAM are used in the system. Higher if 512 or 1 Meg slaves are used.

=====

B.3. TurboDOS Driver Doc, 8086 VER, REV 1, Nov 15 1984

T A B L E B-2: 0 FILE EXPANDED DESCRIPTIONS

CPS-16 - 8086 slave processor board (all versions)

MODULE	DESCRIPTION	USAGE
MSTCPS	CPS memory specification table	CPS-16
NITCPS	Hardware initialization	CPS-16
RESCPS	Reset detection	CPS-16
SCDCPS	CPS slave circuit driver	CPS-16
SOMCPS	Sign-on message area	CPS-16
SPDCPS	Serial/parallel I/O driver	CPS-16

"O" FILE EXPANDED DISCRPTIONS

=====

MSTCPS.0 Memory specification table for the CPS-16 slave processor board. The default memory configuration is for 256K of on-board memory.

Patches: MEMTBL+1 = (0x50)
 MEMTBL+3 = (0x4000-0x50)

Memory table variables. The first word defines the base paragraph for TurboDOS memory (NOTE: the 1st 1K is reserved for 8086 interrupt vectors followed by a reserved 256 byte area for future IBM BIOS type emulations). The second word is the length of TurboDOS memory (expressed in paragraphs). The following list defines the patches needed to support other memory sizes.

128K: MEMTBL+3 = (0x2000-0x50)
 256K: MEMTBL+3 = (0x4000-0x50)
 512K: MEMTBL+3 = (0x8000-0x50)
 1MB: MEMTBL+3 = (0x0000-0x50)

IMPORTANT NOTE: Be sure to patch the master circuit driver (MCDPCS) to support the proper processor reset memory address (PRM86@). See Z-80 version implementation guide.

NITCPS.0 Hardware initialization module for the CPS-16 slave processor board. Contains initialization for the predefined interrupt structure of the slave. The slave processor board contains an 8259 for the handling of local interrupting devices.

Entries: HDWNIT This entry is called from TurboDOS to allow the hardware to be initialized.

 INTNIT 8259 interrupt setup and enable routine. Called with register BX pointing to the interrupt service routine and register DL equal to the IREQ channel number (0 through 7). On exit, the vector offset and segment value are placed in the interrupt vector area and the 8259 is unmasked and enabled for interrupts.

Appendix B - ICM's Drivers - Global Symbols and Defaults

Externals: SPINIT This routine is called to initialize the serial/parallel I/O driver module.

 RTCNIT This routine is called to initialize the real-time-clock driver module (either RTCNUL or RTCCPS).

CKTINA,CKTINB,CKTINC,CKTIND

 These routines are called to initialize circuit drivers included in the system.

RESCPS.0 Slave reset detection module for the CPS-16 slave processor board. This module is included in the system to allow soft resets of slave processors from the keyboard.

Entries: SLVRES This entry is called from the serial/parallel I/O module SPDCPS to allow a check of the keyboard character that was just received.

Patches: RESKEY = 0x1C ; Control-[bankslant]

 Slave reset key assignment. This byte may be patched to change the character detected for a soft reset.

CNTRES = 4

 Count of reset keys. This byte may be patched to change the number of reset key strokes typed before a soft reset is performed.

SCDCPS.0 Slave circuit driver for the CPS-16 slave processor board. This driver is the 8086 slave side of the MDCPS master circuit driver.

Entries: CKTIN_ Circuit initialization routine. Called from the hardware initialization module. This routine will scan the TurboDOS circuit assignment table for a match with the driver entry point and if found, will patch it's circuit and node assignment to those passed by the master circuit driver.

Appendix B - ICM's Drivers - Global Symbols and Defaults

If the TurboDOS default processor destination ID (DEFDID) is found in its default state of 0, the circuit assignment will be patched to that passed by the master circuit driver.

The TurboDOS disk assignment table (DSKAST), printer assignment table (PTRAST), and queue assignment table (QUEAST) are scanned for their default assignments as remote across the network, and if found, the circuit assignment will be patched to that passed by the master circuit driver.

CKTDR Circuit driver entry point. This routine is called from TurboDOS to receive and send messages across the network.

Externals: PTMCKT,PTMNOD

Patch circuit and node numbers into sign-on message. These routines (located in the SOMCPS module) are called to allow patching of the circuit and node numbers into the default sign-on message.

Patches: NMBSIM = 2

Number of slave included message and reply buffers. This byte variable is used to add message and reply buffers to the slave operating system as follows:
NMBMBS <= NMBMBS+(2*NMBSIM)
NMBRPS <= NMBRPS+NMBSIM

USRSOM.0 User sign-on message area for the CPS-16 slave processor board. This module contains an area that may be patched by the user for his own custom sign-on message displayed after the TurboDOS sign-on message.

Entries: PTMCKT,PTMNOD

These entry points are called from the slave circuit driver to allow the sign-on message to be patched with the correct circuit and node assignment of the slave processor. On entry, register AL contains the circuit or node number.

Appendix B - ICM's Drivers - Global Symbols and Defaults

Patches: USRSOM = 0 [repeated 80 times]
 "Circuit: ",0,0,0,", Node: ",0,0,0,"\$"

This message string is displayed by TurboDOS at system start-up time. The string is terminated with a "\$" character (already supplied after the circuit and node message area). The first 80 bytes may be patched by the user (NOT terminated by a "\$" character unless the circuit and node message is not desired).

SPDCPS.0 Serial/parallel I/O driver for the CPS-16 slave processor board. This driver contains the drivers for the SCC and CIO devices located on the slave processor board.

Entries: SPINIT Driver initialization routine. Called from the hardware initialization module.

 COMDRV or SERIAL

 Main driver entry point. Called from the console and list device drivers.

 PAROUT Parallel output entry point. Called from tthe parallel list device driver.

Patches: SOIBSZ = (16)
 S1IBSZ = (16)

 Serial channel input buffers size. These word variables may be patched to increase or decrease the size of the input buffers for channels 0 and 1.

Appendix C - Sample .GEN and .PAR Files

C. Appendix C - Sample .GEN and .PAR Files

```

; ----- CPZDOS.GEN (OSMASTER.SYS)-----
;
STDSINGL      ; Standard single-user w/o spooling configuration
;STDSPPOOL    ; Standard Single user with Spooling
PATCH        ; Include patch module
FASLOD        ; Use fast disk loader module
;CON192       ; Null 19.2 Kbaud Console Driver
CON96         ; Null 9600 Baud Console Driver
NITCPZ        ; CPZ-4800X hardware initialization
SPDCPZ        ; CPZ-4800X Serial and Parallel I/O
LSTCTS        ; Clear to Send driver module
;LSTPAR       ; Parallel Null List driver for CPZ-4800X
RTCCPZ1       ; CPZ-4800X real time clock driver
;MSTRCLK      ; Include external CCB board (CCB-100 clock board)
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive installed
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive installed
;TURDSK       ; Use Turbo-Disk drive definition file
;TURBO        ; Use Turbo-Disk operation

; ----- CPZDOS.PAR (OSMASTER.SYS)-----
;
SRHDRV = OFF      ; System Disk Drive F
AUTUSR = 80       ; Auto Log-on to user one, privileged
;
CONAST = 01,CONDRA ; Console on port 1 of CPZ-4800X
STOPBB = 44       ; Define 1 stop bit
;
PTRAST = 00,LSTDRA ; List assignment table, 1 Serial, 1 Parallel
STOPBA = 44       ; Define 1 stop bit
;
ATNCHR = "^@"     ; New attention character
NMBUFS = 2        ; Use only two buffers
PRTMOD = 0        ; Print mode (0 = Direct,
                    1 = Spooled using STDSPPOOL)
;
DRVTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;the following defines the starting bank for TURBO-DISK
;MPAGE = 02       ; Start with bank above slaves
;
; The following defines floppy disk drives
DSKAST = 000,DSKDRA,001,DSKDRA,002,DSKDRA,OFF,(0000) ;Floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;MD + Floppies
;          000,DSKDRB ;deselect for hard disk before power down

```

Appendix C - Sample .GEN and .PAR Files

```

; ----- CPZLOAD.GEN (OSLOAD.COM)-----
;
STDLOADR      ; Standard O/S loader configuration
RTCCPZ1       ; Real Time Clock driver
;CON192       ; Null 19.2 Kbaud Console Driver
CON96         ; Null 9600 Baud Console Driver
NITCPZ        ; CPZ-4800X Z-80 processor board initialization
SPDCPZ        ; Serial and Parallel I/O for the CPZ-4800X
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive installed
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive installed

; ----- CPZLOAD.PAR (OSLOAD.COM)-----
;
CONAST = 01    ; CONSOLE ON PORT 1 OF CPZ-4800X
MEMTOP = (0000) ; Do Not test RAM.
;
DRVTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;The following defines floppy disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,002,DSKDRA,003,DSKDRA ;Floppies
;
;The following defines floppies + Monitor Dynamics Hard Disk
;with bootup from floppy disk drives only.
;
;DSKAST = 00,DSKDRA,01,DSKDRA,02,DSKDRA,OFF,DSKDRA ;Floppies
;          01,DSKDRB,OFF,DSKDRB,OFF,DSKDRB,OFF,DSKDRB ;Monitor Dynamics
;
;The following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA,003,DSKDRA ;Floppies
;

```

Appendix C - Sample .GEN and .PAR Files

```

; ----- CPZMASTR.GEN (OSMASTER.SYS)-----
;
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH module
FASLOD        ; Use fast disk loader module
NETREQ        ; Network request module
MSGFMT        ; Message format module
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-4800X hardware initialization
SPDCPZ        ; CPZ-4800X Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Parallel Printer driver (CPI-100 centronics board)
RTCCPZ1       ; CPZ-4800X real time clock driver
;MSTRCLK      ; Include ICM ccb board drvtr to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive installed
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive installed
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-4800X / CPS-16 Master Circuit Driver

; ----- CPZMASTR.PAR (OSMASTER.SYS)-----
;
AUTUSR = 80           ; Auto Log-on to user one, privileged
SRHDRV = OFF         ; Search system disk for command files
;
;----- If Using CB-80 V1.3 Only -----+
;      Must be the same in Slave files      \
;COMPAT = OB8       ; If using CB-80 V1.3      + "Don't forget
;CPMVER = 22        ; Inhibit CB-80 Record Locking + the patches for
;----- ELSE using CB-80 V1.4 -----+      CB-80 V1.3"
;      Must be the same in Slave files      |
;COMPAT = OF8       ; File/Record Locking Flags |
;CPMVER = 30        ; Allow CB-80 Record Locking |
;-----+-----+
;
NMBUFS = 0A          ; Default number of Disk Buffers (hex)
BUFSIZ = 03          ; Default disk buffer size (log2(size/128))
MEMRES = (0400)      ; Allow for Dynamic Memory Expansion of TurboDOS
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX (std default values)
SSTCSA = "           " ; O/S suffix table for CPS-MX (std default values)
;
CONAST = 01,CONDRA   ; Console on port 1 of CPZ-4800X
STOPBB = 44
;
PTRAST = 00,LSTDRA   ; List assignment table
STOPBA = 44
;
ATNCHR = "^@"       ; New attention character (Break Key)

```

Appendix C - Sample .GEN and .PAR Files

```
PRTMOD = 0          ; Print mode (0 = direct, 1 = Spooled)
;
;MPAGE = 02         ; Use memory above slave address for Turbo-disk
;
DRVTBL = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines floppy disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,002,DSKDRA,OFF,DSKDRA ;Floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;
;DSKAST = 00,DSKDRA,01,DSKDRA,02,DSKDRA,000,DSKDRB ;Floppies
;          01,DSKDRB,OFF,DSKDRB,OFF,DSKDRB,OFF,DSKDRB ;Monitor Dynamics
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;MD + Floppies
;          000,DSKDRB ;deselect hard disk before power down
;
```

Appendix C - Sample .GEN and .PAR Files

```

; ----- CPSSLAVE.GEN (OSSLAIVE.SYS)-----
;
STDSLAVE      ; STANDARD NETWORKING SLAVE
PATCH        ; Include PATCH module
NETLOD        ; Network loader module
NETSVC        ; Network service module
RTCNUl        ; Null clock driver module
CPMSUP        ; CP/M FUNCTION SUPPORT MODULE
NITCPS        ; CPS-MX hardware initialization
;CON192       ; 19.2K BAUD CONSOLE DRIVER
CON96         ; CONSOLE DRIVER FOR 9600 BAUD TERMINAL
SPDCPS        ; CPS-MX Serial Drivers
;LSTPAR       ; Use parallel null driver (CPI-100 Centronics board)
;LSTCTS       ; Use list clear to send null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

; ----- CPSSLAVE.PAR (OSSLAIVE.SYS)-----
;
AUTUSR = 80      ; DEFAULT = User 0, Privileged (delete for LOGON function)
;
SRHDRV = OFF     ; Search System Disk for .COM Files
;
;----- If Using CB-80 V1.3 Only -----+
; Must be the same in CPZMASTR.PAR file      \
;COMPAT = OB8    ; If using CB-80 V1.3        \ "Don't forget
;CPMVER = 22     ; Inhibit CB-80 Record Locking  \ + the patches for
;----- ELSE using CB-80 V1.4 -----+      \ CB-80 V1.3"
; Must be the same in CPZMASTR.PAR file
COMPAT = OF8    ; File/Record Locking Flags
CPMVER = 30     ; Allow CB-80 Record Locking
;-----+
;
ATNCHR = "^@"   ; Use "BREAK" Key for Attention
RESKEY = "^\"   ; Define slave reset key
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-80
STOPBB = 44      ; Define 1 stop bit
;
LDCOLD = 000     ; Disable Cold start autoloa (change to OFF to enable)
LDWARM = 000     ; Disable Warm start autoloa (change to OFF to enable)
;
;LDCOLD must be enabled if you want to auto-init TurboDOS time
;and date function using the ICM CCB-100 Clock/Calendar board.
;
;COLDNFN = 0,"SLVCLK ","AUT" ;init system clock using ICM clock board.

```

Appendix C - Sample .GEN and .PAR Files

```

; ----- SLVBNK.GEN -----
;
;STDSLAVE      ; STANDARD NETWORKING SLAVE
PATCH        ; Include PATCH module
BNKMGR        ; Use bank switch manager for slave
BNKREQ        ; Bank Request Module
NETSVC        ; Network service module
RTCNUl        ; Null clock driver module
CPMSUP        ; CP/M FUNCTION SUPPORT MODULE
NITCPS        ; CPS-MX hardware initialization
;CON192       ; 19.2K BAUD CONSOLE DRIVER
CON96         ; CONSOLE DRIVER FOR 9600 BAUD TERMINAL
SPDCPS        ; CPS-MX Serial Drivers
;LSTPAR       ; Use parallel null driver (CPI-100 centronics board)
;LSTCTS       ; Use list clear to send null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
BNKCPS        ; Include slave bank switch module

; ----- SLVBNK.PAR -----
;
AUTUSR = 80    ; DEFAULT = User 0, Privileged (delete for LOGON function)
;
SRHDRV = OFF   ; Search System Disk for .COM Files
;
;----- If Using CB-80 V1.3 Only -----+ \
; Must be the same in CPZMASTR.PAR file      \ "Don't forget
;COMPAT = OB8  ; If using CB-80 V1.3         + the patches for
;CPMVER = 22   ; Inhibit CB-80 Record Locking / CB-80 V1.3"
;----- ELSE using CB-80 V1.4 -----+ /
; Must be the same in CPZMASTR.PAR file
COMPAT = OF8   ; File/Record Locking Flags
CPMVER = 30   ; Allow CB-80 Record Locking
;-----+
ATNCHR = "^@" ; Use "BREAK" Key for Attention
;RESKEY = "^\" ; Define slave reset key
;
CURBNK = 1    ; default to bank 1 (TPA bank)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-80
STOPBB = 44     ; Define 1 stop bit
;
LDCOLD = 000    ; Disable Cold start autoload (change to OFF to enable)
LDWARM = 000    ; Disable Warm start autoload (change to OFF to enable)
;LDCOLD must be enabled if you want to auto-init TurboDOS time
;and date function using the ICM CCB-100 Clock/Calendar board.
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock using ICM clock board.

```

D. Appendix D - Printers on Slaves Sample .GEN's and .PAR's

Intercontinental Micro Systems, Corp. 01-24-84
 TurboDOS System Example

T O P O L O G Y

```
-----
Module Name                Printer Assignment
Master ..... Printer "A"
Slave-1 ..... Printer "B"
Slave-2 ..... Printer "C"
Slave-3 ..... Printer (none)
-----
```

CPZMASTR.GEN file (OSMASTER.SYS)

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH module
FASLOD        ; Use fast disk loader module
MSGFMT        ; Delete if not SPOOLING with SLAVES
NETREQ        ; Delete if not SPOOLING with SLAVES
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-4800X hardware initialization
SPDCPZ        ; CPZ-4800X Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Centronics Parallel port printer
RTCCPZ1       ; CPZ-4800X real time clock driver
MSTRCLK       ; ICM ccb board drv to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MCDPCS        ; CPZ-4800X / CPS-16 Master Circuit Driver
-----
```

Appendix D - Printers on Slaves Sample .GEN's and .PAR's

CPZMASTR.PAR file (OSMASTER.SYS)

```

SRHDRV = OFF          ; Search system disk for command files
COMPAT = OF8         ; Record/File lock compatibility flags
;
NMBUFS = 0A          ; Default number of Disk Buffers (hex)
BUFSIZ = 03          ; Default disk buff size (log2(size/128))
MEMRES = (1000)      ; Reserve memory for dynamic allocations
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
SSTCSA = "1234"      ; O/S suffix table for CPS-MX
;
AUTUSR = 80          ; Auto Log-on to user one, privileged
;
PTRAST = 00,LSTDRA,81,(1),82,(2) ; List assignment TABLE
QUEAST = 00,(0),81,(1),82,(2)    ; Queue assignment TABLE
DSPPAT = 1,2,3              ; 3 printers
;
ATNCHR = "^@"             ; New attention character
;
;MPAGE = 02              ; Use memory above slave address for Turbo-disk
;
DRV TBL = 41,41,41,41    ; 6ms step rate, tandon bit set
;
;following defines floppy disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,OFF,DSKDRA,OFF,DSKDRA ;Floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;hard disk
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0) ;and floppies
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),02,DSKDRB
;-----

```

Slave-1 GEN file (OSSLAVE1.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETLOD       ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNUL        ; allow consistent printing with de-spooler
DSPOOL        ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
;-----

```

Slave-1 PAR file (OSSLAVE1.SYS)

```

SRHDRV = OFF  ; Search System Disk for .COM Files
COMPAT = OF8  ; File/Record Locking Compatibility Flags
;
;CPMVER = 022 ; Inhibit CB-80 Record Locking
;
ATNCHR = "^@" ; Use "BREAK" Key for Attention
RESKEY = "^\" ; Reset key function
AUTUSR = 80   ; DEFAULT = User 0, Privileged
;
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44        ; define 1 stop bit on console
STOPBA = 44        ; define 1 stop bits on printer
;
PTRAST+3 = 00,LSTDRA ;1 local, rest remote printers
QUEAST+3 = 00,(0)   ;1 local, rest remote queues
DSPPAT = 1,2,3     ; assign printers
QUEPTR = 2         ; assign as printer A
PRTMOD = 1         ;1=spooled, 0=direct
;
LDCOLD = 000       ; Disable Cold start autoload
LDWARM = 000       ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SIVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

Slave-2 GEN file (OSSLAWE2.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETLOD       ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNUL        ; allow consistent printing with de-spooler
DSPPOOL       ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
;-----

```

Slave-2 PAR file (OSSLAWE2.SYS)

```

SRHDRV = OFF  ; Search System Disk for .COM Files
COMPAT = OF8  ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@" ; Use "BREAK" Key for Attention
RESKEY = "^\" ; Reset key function
AUTUSR = 80   ; DEFAULT = User 0, Privileged
;
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44        ; define 1 stop bit on console
STOPBA = 44        ; define 1 stop bits on printer
;
PTRAST+6 = 00,LSTDRA ;2 remote, 1 local printer
QUEAST+6 = 00,(0)   ;2 remote, 1 local queue
DSPPAT = 1,2,3     ;assign number of printers
QUEPTR = 3         ;assign this printer as "C"
PRTMOD = 1         ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.
;-----

```

Slave-3 GEN file (OSSLAVE3.SYS)

```

STD SLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETLOD       ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNUl        ; allow consistent printing with de-spooler
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
;LSTCTS       ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

Slave-3 PAR file (OSSLAVE3.SYS)

```

SRHDRV = OFF   ; Search System Disk for .COM Files
COMPAT = OF8   ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"  ; Use "BREAK" Key for Attention
RESKEY = "^\"  ; Reset key function
AUTUSR = 80    ; DEFAULT = User 0, Privileged
;
CURBNK = 1     ; Default bank = TPA if 1 (and banked slave)
; Packets (Simple Slave)
;
;CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44    ; define 1 stop bit on console
;
LDCOLD = 000   ; Disable Cold start autoload
LDWARM = 000   ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

Intercontinental Micro Systems, Corp.
TurboDOS System

T O P O L O G Y

Module Name	Printer Assignment
Master	Printer "C"
Slave-1	Printer "A"
Slave-2	Printer "B"
Slave-3	Printer (none)

CPZMASTR.GEN file (OSMASTER.SYS)

```

STDMASTR      ; Standard networking master
PATCH        ; Include PATCH module
FASLOD        ; Include fast disk loader
MSGFMT        ; Delete if not SPOOLING with SLAVES
NETREQ        ; Delete if not SPOOLING with SLAVES
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-4800X hardware initialization
SPDCPZ        ; CPZ-4800X Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Centronics Parallel port printer
RTCCPZ1       ; CPZ-4800X real time clock driver
MSTRCLK       ; ICM ccb board drv to set TurboDOS date/time
DSKCPZ1       ; CPZ-16 Floppy disk driver module
DSK58I        ; 8"/5" TurboDOS disk format tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-4800X / CPS-16 Master Circuit Driver
    
```

CPZMASTR.PAR file (OSMASTER.SYS)

```

SRHDRV = OFF          ; Search system disk for command files
COMPAT = OF8         ; Record/File lock compatibility flags
;
NMBUFS = 0A          ; Default number of Disk Buffers (hex)
BUFSIZ = 03          ; Default disk buff size (log2(size/128))
MEMRES = (1000)      ; Reserve memory for dynamic allocations
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
SSTCSA = "1234"      ; O/S suffix table for CPS-MX
;
AUTUSR = 80          ; Auto Log-on to user one, privileged
;
PTRAST = 80,(1),81,(2),00,LSTDRA ; list assignment table
QUEAST = 80,(1),81,(2),00,(0) ; Queue assignment TABLE
DSPPAT = 1,2,3      ; 3 printers
;
ATNCHR = "^@"       ; New attention character
;
MPAGE = 02          ; Use memory above slave address for Turbo-disk
;
DRVTLB = 41,41,41,41 ; 6ms step rate, tandon bit set
;
;following defines floppy disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,OFF,DSKDRA,OFF,DSKDRA ;Floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;hard disk
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0) ;and floppies
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),02,DSKDRB
;-----

```

Slave-1 GEN file (OSSLAVE1.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETLOD       ; Use only if not using 128K banked slaves
NETSVC        ; Include Net service module
RTCNU         ; allow consistent printing with de-spooler
DSPPOOL       ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
;

```

Slave-1 PAR file (OSSLAVE1.SYS)

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST = 00,LSTDRA ; 1 local, rest remote printers
QUEAST = 00,(0)   ; 1 local, rest remote queues
DSPPAT = 1,2,3    ; assign printers
QUEPTR = 1        ; assign as printer A
PRTMOD = 1        ; 1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDNFN = 0,"SLVCLK " ,"AUT" ;init system clock function using
;CCB-100 clock board.

```

Slave-2 GEN file (OSSLAVE2.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETL0D       ; Use only if not using 128K banked slaves
NETSVC        ; Include Net service module
RTCNUl        ; allow consistent printing with de-spooler
DSP00L        ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

;

Slave-2 PAR file (OSSLAVE2.SYS)

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST+3 = 00,LSTDRA ;2 remote, 1 local printer
QUEAST+3 = 00,(0)   ;2 remote, 1 local queue
DSPPAT = 1,2,3     ;assign number of printers
QUEPTR = 2         ;assign this printer as "B"
PRTMOD = 1         ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

```

;-----
Slave-3 GEN file (OSSLAVE3.SYS)

STD SLAVE ; Standard NETWORKING SLAVE
PATCH ; Include PATCH module
;NETLOD ; Use only if not using 128K banked slaves
NETSVC ; Include Net service module
RTCNUL ; allow consistent printing with de-spooler
CPMSUP ; CP/M Function support module
NITCPS ; CPS-MX hardware initialization
CON192 ; 19.2K baud console Driver
;CON96 ; 9600 baud console Driver
SPDCPS ; CPS-MX Serial Drivers
;LSTCTS ; Use list clear to send null driver
;LSTPAR ; Use parallel null driver
SCDCPS ; CPS-MX Slave Circuit driver
RESCPS ; CPS-MX Slave reset detection
;-----
Slave-3 PAR file (OSSLAVE3.SYS)

SRHDRV = OFF ; Search System Disk for .COM Files
COMPAT = OF8 ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@" ; Use "BREAK" Key for Attention
RESKEY = "^\" ; Reset key function
AUTUSR = 80 ; DEFAULT = User 0, Privileged
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44 ; define 1 stop bit on console
;
LDCOLD = 000 ; Disable Cold start autoload
LDWARM = 000 ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLD FN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```


CPZMASTR.PAR file(OSMASTER.SYS)

```

SRHDRV = OFF          ; Search system disk for command files
COMPAT = OF8         ; Record/File lock compatibility flags
;
NMBUFS = 0A          ; Default number of Disk Buffers (hex)
BUFSIZ = 03          ; Default disk buff size (log2(size/128))
MEMRES = (1000)      ; Reserve memory for dynamic allocations
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
SSTCSA = "123"       ; O/S suffix table for CPS-MX
;
AUTUSR = 80          ; Auto Log-on to user one, privileged
;
PTRAST = 80,(1),81,(2) ; list assignment table
QUEAST = 80,(1),81,(2) ; Queue assignment TABLE
DSPPAT = 1,2         ; 2 printers
;
FLSRT = 01           ; 6ms Floppy step rate
ATNCHR = "^@"        ; New attention character
;
MPAGE = 02           ; Use memory above slave address for Turbo-disk
;
;following defines floppy disk drives
;
DSKAST = 000,DSKDRA,001,DSKDRA,OFF,DSKDRA,OFF,DSKDRA ;Floppies
;
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;hard disk
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0) ;and floppies
;          OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),02,DSKDRB
;-----

```

Slave-1 GEN file (OSSLAVE1.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
BNKMGR        ; If using banked 128K slave ONLY.
BNKREQ
;NETLOD       ; Use only if not using 128K slaves
NETSVC        ; Include Net service module
RTCNUl        ; allow consistent printing with de-spooler
DSPool        ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

Slave-1 PAR file (OSSLAVE1.SYS)

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CURBNK = 1        ; ONLY if using Banked 128K slaves (TPA = default)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST = 00,LSTDRA ;1 local, rest remote printers
QUEAST = 00,(0)   ;1 local, rest remote queues
DSPPAT = 1,2      ; assign printers
QUEPTR = 1        ; assign as printer "A"
PRTMOD = 1        ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDNFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

Slave-2 GEN file (OSSLAVE2.SYS)

```

STDSLAVE      ; Standard NETWORKING SLAVE
BNKMGR        ; If using banked 128K slave ONLY.
BNKREQ
;NETLOD       ; Use only if not using 128K slaves
NETSVC        ; Include Net service module
RTCNUl        ; allow consistent printing with de-spooler
DSPOOL        ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
;

```

Slave-2 PAR file (OSSLAVE2.SYS)

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CURBNK = 1        ; ONLY if using Banked 128K slaves (TPA = default)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST+3 = 00,LSTDRA ;1 remote, 1 local printer
QUEAST+3 = 00,(0)   ;1 remote, 1 local queue
DSPPAT = 1,2       ;assign number of printers
QUEPTR = 2         ;assign this printer as "B"
PRTMOD = 1         ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

```

;-----
Slave-3 GEN file (OSSLAVE3.SYS)

STD SLAVE      ; Standard NETWORKING SLAVE
PATCH        ; Include PATCH module
;NETLOD       ; Use only if not using 128K slaves
NETSVC        ; Include Net service module
RTCNUl        ; allow consistent printing with de-spooler
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
;LSTCTS       ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection
;-----

Slave-3 PAR file (OSSLAVE3.SYS)

SRHDRV = OFF   ; Search System Disk for .COM Files
COMPAT = OF8   ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"  ; Use "BREAK" Key for Attention
RESKEY = "^\"  ; Reset key function
AUTUSR = 80    ; DEFAULT = User 0, Privileged
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44    ; define 1 stop bit on console
;
LDCOLD = 000   ; Disable Cold start autoloaD
LDWARM = 000   ; Disable Warm start autoloaD
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLD FN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.
;-----

```

NOTES:

E. Appendix E - Patches for WordStar Ver. 3.0 and 3.3

Install WordStar using the supplied install program first, then use the monitor command to make further enhancements. Use only the next page if running WordStar with the Random House Thesaurus. These are patches for VER 3.0.

```
OA>MONITOR <cr>
*L WS.COM <cr>
O100-3EFF
*E 1D2B <cr>
1D2E 3A=CD <cr>
1D2F BA=EO <cr>
1D30 O2=<esc>
*E O2EO <cr>
O2E0 00          3A <cr>
O2E1 00          43 <cr>
O2E2 00          36 <cr>
O2E3 00          B7 <cr>
O2E4 00          CA <cr>
O2E5 00          F4 <cr>
O2E6 00          02 <cr>
O2E7 00          3A <cr>
O2E8 00          40 <cr>
O2E9 00          03 <cr>
O2EA 00          3C <cr>
O2EB 00          3C <cr>
O2EC 00          32 <cr>
O2ED 00          40 <cr>
O2EE 00          03 <cr>
O2EF 00          CA <cr>
O2F0 00          F4 <cr>
O2F1 00          02 <cr>
O2F2 00          F1 <cr>
O2F3 00          AF <cr>
O2F4 00          C9 <cr>
O2F5 00          3A <cr>
O2F6 00          BA <cr>
O2F7 00          02 <cr>
O2F8 00          C9 <cr>
O2F9 00          <esc>
*S WS.COM <cr>
O100-3EFF
*Q <cr>
```

Appendix E - Patches for WordStar Ver. 3.0 and 3.3

DO NOT FURTHER ENHANCE

These patches are for Ver 3.0
and may be useful in Ver 3.3 but it has not been tested yet.

LABEL	ADDRESS	OLD VALUE	NEW VALUE	DESCRIPTION
DELCUS:	02AEH	0A	01	Delays executed after various terminal functions.
DELMIS:	02AFH	05	01	similar to DELCUS: function
DEL1:	02CFH	03	02	controls short delay for such functions as cursor blink during replace command (^QA).
DEL2:	02DOH	09	05	Similar to DEL1: function.
DEL3:	02D1H	19	04	Controls medium-long delay.
DEL4:	02D2H	40	04	Controls long delay for such functions as time sign-on remains on screen, time "new file" message remains on screen, etc.
DEL5:	02D3H	09	03	Controls delay used for a full screen redisplay during horizontal scrolling. It is the amount of time to wait after a keystroke to refresh the screen.
NMOFUS:	02D8H	01	20	The number of users on the system. Setting the value higher than the actual number of users on the system is okay.
NMOFUS:+1	02D9H	01	20	Must be set to the same value as NMOFUS:.
TCKFLG:	02DAH	00	FF	Set to FF in TurboDOS environment.
ITHELP:	0360H	03	02	Sets initial "help" level. Set to level 2 (02) if you are experienced with the Wordstar program.
ITITOG:	0362H	FF	00	Zero to come up with insert off, FF = insert on.
ITDSDR:	0363H	FF	00	Zero to initially not display the directory, FF to display.
HAVBSY:	0718H	00	FF	Set to FF in TurboDOS environment.

Appendix E - Patches for WordStar Ver. 3.0 and 3.3

These patches are for Ver 3.3

The symbolic patcher in Version 3.3 can be found by typing a + sign at the main menu.

028E = 01 {DELCUS = 1}
028F = 01 {DELMIS = 1}

029A = C3 {NOTE INSTALLING THESE THREE WILL ENABLE PATCH, BUT
029B = E0 WILL ALSO DISABLE SPELLSTAR 3.3}
029C = 02

02B1 = 04 {DEL3}
02B2 = 08 {DEL4}

02E0 = 21 {PATCH AREA}

02E1 = EF
02E2 = 02

02E3 = 34 {The turboDOS MONITOR command is ideal for making
02E4 = CB this patch. Use the 'L' directive to load WS.COM
02E5 = 6E into RAM, use the 'E' directive to make changes,
02E6 = 3E and use the 'S' directive o save the patched version
02E7 = 00 in a new .COM file.}
02E8 = C8
02E9 = 77

02EA = 0E
02EB = 0B
02EC = C3
02ED = 05
02EE = 00
02EF = 00

0717 = 00 {CSWTCH = 0}
0718 = FF {HAVBSY = FF}

;To suppress signon

3CD0 - REPLACE THE JUMP WITH 3 NOPS
3CF4 - REPLACE THE JUMP WITH 3 NOPS
3CF7 - REPLACE THE JUMP WITH 3 NOPS
3D12 - REPLACE THE JUMP WITH 3 NOPS

Note: A jump = C3 and a NOP = 0

Appendix F - Monitor Dynamics Controller Heads/Cly Values

NOTES:

Appendix F - Monitor Dynamics Controller Heads/Cly Values

F. Appendix F - Monitor Dynamics Controller Heads/Cly Values

A LIST OF COMMON DRIVES THAT INTERFACE WITH
MONITOR DYNAMICS, INC. HARD DISK CONTROLLER

Manufacturer	Model	# Heads	# Cyl's	Formatted Capacity
Atasi	3033	5	645	29.72 MB
Atasi	3046	7	645	41.61
Ampex/Rodime	P7/R201	2	320	5.90
Ampex/Rodime	P13/R202	4	320	11.80
Ampex/Rodime	P20/R203	6	320	17.70
Ampex/Rodime	P27/R204	8	320	23.60
CMI	5412	4	306	11.28
CMI	5619	6	306	16.92
CMI	6426	4	640	23.59
CMI	6640	6	640	35.39
IMI	5006H	2	306	5.64
IMI	5012H	4	306	11.28
IMI	5018H	6	306	16.92
TULIN	213	2	640	11.80
TULIN	226	4	640	23.59
TULIN	240	6	640	35.40
TANDON	501	2	306	5.64
TANDON	502	4	306	11.28
TANDON	503	6	306	16.92
MEMOREX	512	3	961	26.57
MEMOREX	513	5	961	44.28
MEMOREX	514	7	961	62.0
SEAGATE	ST506	4	153	5.64
SEAGATE	ST412	4	306	11.28
SEAGATE	ST419	6	306	16.92
SHUGART	SA1002	2	256	4.72
SHUGART	SA1004	4	256	9.44
SYQUEST	SQ306R	2	306	5.64
MAXTOR	XT1065	7	918	59.22
MAXTOR	XT1140	15	918	126.90
MINI SCRIBE	2016	2	612	11.29
MINI SCRIBE	2012	4	1224	45.12
MSI	HH612	4	306	11.28
MEMOREX	MRX101	4	244	8.99
MEMOREX	MRX102	8	244	17.99
CDC WREN	9415-5	5	697	32.12
QUANTUM	Q2020	4	512	18.87
QUANTUM	Q2040	8	512	37.75
QUANTUM	Q2080	7	1172	75.61

Appendix G - Sample Drive Characteristics

NOTES:

Appendix G - Sample Drive Characteristics

G. Appendix G - Sample Drive Characteristics

This is an example of the drive specifications of a TurboDOS single sided double density 8" floppy diskette. This is the format of the distribution diskette and all future updates.

OA}DRIVE

Disk drive characteristics, drive A: .

Maximum data capacity : 612K
Allocation block size : 2K
Number of directory entries: 128

Physical sector size : 1024
Physical sectors per track : 8
Physical tracks per disk : 77
Number of reserved tracks : 0

Media is removable

This is an example of the drive specifications of a TurboDOS double sided double density 8" floppy diskette. This is the most common format used on production systems because of added storage capabilities.

OA}DRIVE B:

Disk drive characteristics, drive B: .

Maximum data capacity : 1224K
Allocation block size : 4K
Number of directory entries: 256

Physical sector size : 1024
Physical sectors per track : 8
Physical tracks per disk : 77
Number of reserved tracks : 0

Media is removable

Appendix G - Sample Drive Characteristics

This is an example of the drive specifications of a CP/M format single sided single density 8" floppy diskette. This is the most common format used on all CP/M compatible systems because it is an industry standard.

OA}DRIVE B:

Disk drive characteristics, drive B: .

Maximum data capacity : 241K
Allocation block size : 1K
Number of directory entries: 64

Physical sector size : 128
Physical sectors per track : 26
Physical tracks per disk : 77
Number of reserved tracks : 2

Media is removable

This is an example of the drive specifications of a single 256KBM memory board being used as a high speed TURBO-DISK.

OA}DRIVE B:

Disk drive characteristics, drive B: .

Maximum data capacity : 254K
Allocation block size : 2K
Number of directory entries: 64

Physical sector size : 1024
Physical sectors per track : 4
Physical tracks per disk : 64
Number of reserved tracks : 0

Media is fixed

Appendix H - Baud Rate Table

H. Appendix H - Baud Rate Table

All patches to do with baud rates end with the letters BR.
(ie. CTSBR, XONBR, CONBR, ETXBR)

The patch value is composed of two bytes:

The first is a 6 if using the LSTCTS driver otherwise a 0.

The second is taken from the table below:

0 for 38400 baud	8 for 1800 baud
1 for 75 baud	9 for 2000 baud
2 for 110 baud	A for 2400 baud
3 for 134.5 baud	B for 3600 baud
4 for 150 baud	C for 4800 baud
5 for 300 baud	D for 7200 baud
6 for 600 baud	E for 9600 baud
7 for 1200 baud	F for 19200 baud

Examples:

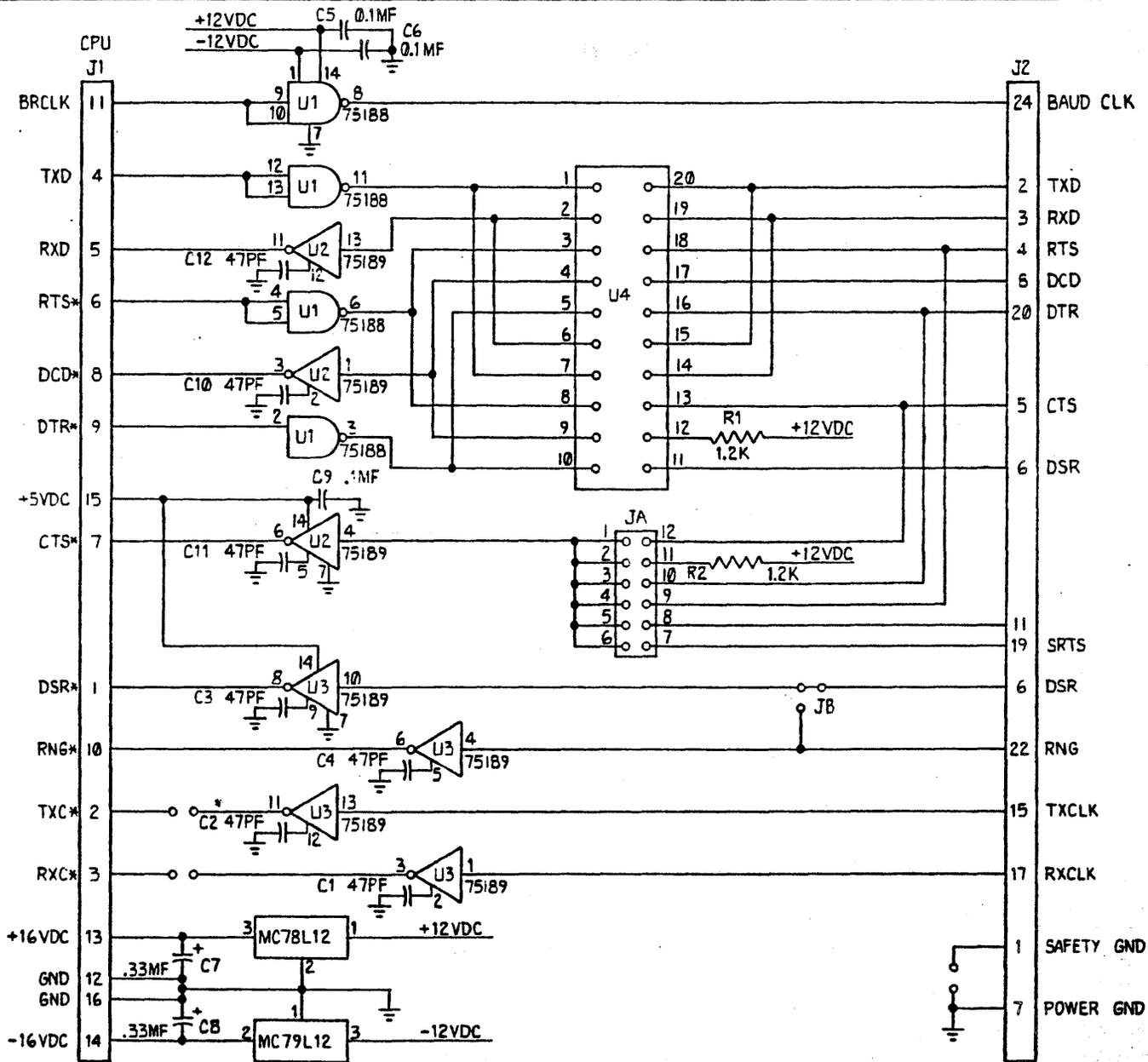
- A 1200 baud Clear-To-Send printer with a DTR handshake on pin 20 would have the patch CTSBR = 67.
- A 9600 baud Clear-To-Send printer with a DTR handshake on pin 20 would have the patch CTSBR = 6E.
- A 9600 baud Xon-Xoff printer would have the patch XONBR = 0E.
- A 1200 baud Xon-Xoff printer would have the patch XONBR = 07.

A specialized situation can develop with the console drivers CON96 and CON192 in which a CTS handshake is required with the terminal in order to avoid losing characters. If this applies to you, the first byte is composed of the two characters 0C immediately followed by the baud rate code.

Examples of consoles using CTS handshaking:

- A 1200 baud console for modem connection, CONBR = 0C7.
- A 9600 baud console for handshaking connection, CONBR = 0CE.

T-Function 37 of the TurboDOS Programmer's Guide provides further information about setting Baud Rates.



H-2

APPLICATION NOTES

I. APPLICATION NOTES

Intercontinental Micro Systems Application note.

AP-note: #1
Subject: TurboDOS Floppy Formats
Date: 01-24-84
Hardware: CPZ-4800X, CPZ-48004, CPZ-48006

APPLICATION NOTES

I.1. AP-note - TurboDOS Floppy Formats

Intercontinental Micro Systems Application note.

AP-note: #1
Subject: TurboDOS Floppy Formats
Date: 01-24-84
Hardware: CPZ-4800X, CPZ-48004, CPZ-48006

This AP-NOTE describes the changes to the Disk controller software for use under the TurboDOS operating system.

The disk controller software (DSKCPZ.REL) now provide both 8" and 5" floppy drive support with limitations on the CPZ-4800x version CPU board used. Below is a list of the limitations:

1. CPZ-4800X 8" or 5" drives. (not both together.)
2. CPZ-48004 8" and 5" drives may be run together.
3. CPZ-48006 8" and 5" drives may be run together.

The DSKCPZ.REL file, and DSKFMT8.REL file have been modified to handle the changes necessary to support 8" and 5" drives. They are therefore not compatible with releases before Jan. 24, 1984. Three (3) new disk format specification tables have now been provided to support the 5" drives from Intercontinental Micro Systems. These files are listed below:

1. DSK48M.REL 40 trk, 1/2 sided 1024 bytes double density.
2. DSK96M.REL 80 trk, 1/2 sided 1024 bytes double density.
3. TLV803.REL 40 trk, 2 sided Televideo 803/TPC-I format.
4. ICM48M.REL 40 trk, 2 sided 512 Byte ICM format.
5. ICM96M.REL 80 trk, 2 sided 512 Byte ICM format.
6. STD8IN.REL Software 2000 8" Floppy disk Standard.

The 6 files listed above each contain a GLOBAL entry point for the benefit of the GEN.COM program during linking together of the Operating System. Below is the GLOBAL name used in each file:

File	Global Name
1. DSK48M.REL	DSK48M
2. DSK96M.REL	DSK96M
3. TLV803.REL	TLV803
4. ICM48M.REL	ICM48M
5. ICM96M.REL	ICM96M
6. STD8IN.REL	STD8IN

These GLOBAL names are used to tell the operating system which physical drive select (0, 1, 2, 3) of the floppy controller on the CPZ-4800X board to use. Because the on-board disk controller can access a maximum of 4 drives, a GLOBAL pointer table has been added to DSKCPZ.REL so that both 8" and 5" drives may work together. (see restrictions listed above on CPZ-4800X boards).

APPLICATION NOTES

As an example, you could have 3 8" drives and 1 5" drive attached at once on the system, or 1 8" drive and 3 5" drives if you wish. You can also mix the 5" drive types if you wish. (1 could be 5" 80 track, 1 could be 5" 40 track, and 1 could be 5" TeleVideo format.)

Below is a couple of examples of .GEN and .PAR files:

```
*****
* N O T E: DSKPTR (in DSKCPZ.REL module) is defaulted to 8" drives. *
*****
```

```
CPZDOS or CPZMASTR.GEN file
[ Using only 8" drives ]
-----
```

(rest of .GEN file)

```
.
DSKCPZ           ; 8" and 5" disk driver module
DSKFMT8         ; 8" TurboDOS drive module
;DSK48M         ; 40 track TurboDOS drive module
;DSK96M         ; 80 track TurboDOS drive module
;TLV803        ; TeleVideo 40 track drive module
```

(rest of .GEN file)

```
CPZDOS or CPZMASTR.PAR file
[ Using only 8" drives ]
-----
```

(rest of .PAR file)

```
.
;DSKPTR = DSK48M,DSK96M,DSK96M,TLV803 ;if using 5" drives only
;
DSKAST = 000,DSKDRA,001,DSKDRA,002,DSKDRA,003,DSKDRA ;drvs A:,B:,C:,D:
          OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; E:,F:,G:,H:
          OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; I:,J:,K:,L:
          OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; M:,N:,O:,P:
;
```

(rest of .PAR file)

APPLICATION NOTES

* N O T E: DSKPTR (in DSKCPZ.REL module) is defaulted to 8" drives. *

CPZDOS or CPZMASTR.GEN file
[Using 8" & 5" drives]

•
(rest of .GEN file)

•
DSKCPZ ; 8" and 5" disk driver module
DSKFMT8 ; 8" TurboDOS drive module
DSK48M ; 40 track TurboDOS drive module
DSK96M ; 80 track TurboDOS drive module
TLV803 ; TeleVideo 40 track drive module

•
(rest of .GEN file)

•
CPZDOS or CPZMASTR.PAR file
[Using 8" & 5" drives]

•
(rest of .PAR file)

•
DSKPTR+2 = DSK96M,DSK48M,TLV803 ;using 8" and 5" drives together
;
DSKAST = 000,DSKDRA,011,DSKDRA,012,DSKDRA,013,DSKDRA ;drvs A:,B:,C:,D:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; E:,F:,G:,H:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; I:,J:,K:,L:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; M:,N:,O:,P:

++++
Please note that the 011,DSKDRA,012,DSKDRA, and 013,DSKDRA
each have bit 4 set. This is how the DSKCPZ driver knows it is
dealing with a 5" drive. It must be set to 1 (bit 4), before 5"
operation will work.
++++

•
(rest of .PAR file)

APPLICATION NOTES

* N O T E: DSKPTR (in DSKCPZ.REL module) is defaulted to 8" drives. *

CPZDOS or CPZMASTR.GEN file
[Using only 5" drives]

•
(rest of .GEN file)

•
DSKCPZ ; 8" and 5" disk driver module
;DSKFMT8 ; 8" TurboDOS drive module
DSK48M ; 40 track TurboDOS drive module
DSK96M ; 80 track TurboDOS drive module
TLV803 ; TeleVideo 40 track drive module

•
(rest of .GEN file)

•
CPZDOS or CPZMASTR.PAR file
[Using only 5" drives]

•
(rest of .PAR file)

•
DSKPTR = DSK96M,DSK96M,DSK48M,TLV803 ;using 5" drives only.
;
DSKAST = 010,DSKDRA,011,DSKDRA,012,DSKDRA,013,DSKDRA ;drvs A:,B:,C:,D:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; E:,F:,G:,H:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; I:,J:,K:,L:
OFF,(0000),OFF,(0000),OFF,(0000),OFF,(0000) ; M:,N:,O:,P:

++++
Please note that the 010,DSKDRA,011,DSKDRA,012,DSKDRA, and
013,DSKDRA each have bit 4 set. This is how the DSKCPZ driver
knows it is dealing with a 5" drive. It must be set to 1 (bit 4),
before 5" operation will work.
++++

•
(rest of .PAR file)

•
New formats will be added as they are created from other
manufacturers.

APPLICATION NOTES

Intercontinental Micro Systems, Corp.
TurboDOS System Example

T O P O L O G Y

Module Name	Printer Assignment
Master	Printer "A"
Slave-1	Printer "B"
Slave-2	Printer "C"
Slave-3	Printer (none)
Floppies	2-8", 2-5" drives

CPZMASTR.GEN file

```
STDMASTR      ; Standard networking master
PATCH        ; Include PATCH module
FASLOD        ; Use fast disk loader module
MSGFMT        ; Delete if not SPOOLING with SLAVES
NETREQ        ; Delete if not SPOOLING with SLAVES
CPMSUP        ; CP/M function support module
CONREM        ; Use remote console module
;CON192       ; Null 19.2 Kbaud Console Driver
;CON96        ; Null 9600 Baud Console driver
NITCPZ        ; CPZ-4800X hardware initialization
SPDCPZ        ; CPZ-4800X Serial and Parallel I/O
LSTCTS        ; TI810 CTS Driver (LSTDR@ assigned to LSTDRA)
;LSTPAR       ; Centronics Parallel port printer
RTCCPZ1       ; CPZ-4800X real time clock driver
MSTRCLK       ; ICM ccb board drv to set TurboDOS date/time
DSKCPZ        ; CPZ-4800X floppy disk driver
DSKFMT8       ; Disk specification tables for 8-INCH diskettes
DSK48M        ; Include 40 Track drive spec tables
DSK96M        ; Include 80 Track drive spec tables
;MD131DRV     ; Monitor Dynamics Model #1013 with 1 drive
;MD132DRV     ; Monitor Dynamics Model #1013 with 2 drive
;TURBO        ; Turbo-Disk driver module
;TURDSK       ; Turbo-Disk definition module
MDCDCPS       ; CPZ-4800X / CPS-16 Master Circuit Driver
```

APPLICATION NOTES

CPZMASTR.PAR file

```

SRHDRV = OFF ; Search system disk for command files
COMPAT = OF8 ; Record/File lock compatibility flags
;
NMBUFS = 0A ; Default number of Disk Buffers (hex)
BUFSIZ = 03 ; Default disk buff size (log2(size/128))
MEMRES = (1000) ; Reserve memory for dynamic allocations
;
PATCSA = 7F,7E,7D,7C ; Status port table for CPS-MX
SSTCSA = "1234" ; O/S suffix table for CPS-MX
;
AUTUSR = 80 ; Auto Log-on to user one, privileged
PTRAST = 00,LSTDRA,81,(1),82,(2) ; List assignment TABLE
QUEAST = 00,(0),81,(1),82,(2) ; Queue assignment TABLE
DSPPAT = 1,2,3 ; 3 printers
;
FLSRT = 01 ; 6ms Floppy step rate
ATNCHR = "^@" ; New attention character
;
;MPAGE = 02 ; Use memory above slave address for Turbo-disk
;
;+++++
DSKPTR+4 = DSK48M,DSK96M ;Drv C:=40 Track drv, Drv D:= 80 Track
;
;where DSKPTR defaults to 8" drives unless overlaid with Mini
;Floppy pointers as shown above. Bit 4 must be set in the drive
;spec setup as shown below so that mini-floppies will select OK.
;Mini Floppy pointer names are as follows:
;DSK48M = 40 track drive disk spec pointer.
;DSK96M = 80 track drive disk spec pointer.
;TLV803 = TeleVideo 803/TPC-I disk spec pointer.
;
;following defines floppy disk drives [ 8" and 5" drvs ]
;
DSKAST = 000,DSKDRA ;8" Floppy Disk
         001,DSKDRA ;8" Floppy Disk
         012,DSKDRA ;5" 40 Track mini floppy
         013,DSKDRA ;5" 80 Track mini floppy
;
;+++++
;the following defines floppies + Monitor Dynamics Hard Disk
;with bootup from 1st Monitor Dynamics hard disk.
;
;DSKAST = 01,DSKDRB,00,DSKDRA,01,DSKDRA,02,DSKDRA ;hard disk
; OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0) ;and floppies
; OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),OFF,(0),02,DSKDRB

```

APPLICATION NOTES

Slave-1 GEN file

```

STDSLAVE      ; Standard NETWORKING SLAVE
BNKMGR        ; ONLY if using BANKED 128K Slave.
BNKREQ
;NETLOD      ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNUL        ; allow consistent printing with de-spooler
DSPPOOL       ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96       ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR      ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

Slave-1 PAR file

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CURBNK = 1        ; Default bank = TPA if 1 (and banked slave)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST+3 = 00,LSTDRA ;1 local, rest remote printers
QUEAST+3 = 00,(0)  ;1 local, rest remote queues
DSPPAT = 1,2,3    ; assign printers
QUEPTR = 2        ; assign as printer A
PRTMOD = 1        ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDNFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

APPLICATION NOTES

Slave-2 GEN file

```

STDSLAVE      ; Standard NETWORKING SLAVE
BNKMGR        ; ONLY If using BANKED 128K Slave.
BNKREQ
;NETLOD       ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNU         ; allow consistent printing with de-spooler
DSPOOL        ; include de-spool module
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96        ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
LSTCTS        ; Use list clear to send null driver
;LSTPAR       ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

Slave-2 PAR file

```

SRHDRV = OFF      ; Search System Disk for .COM Files
COMPAT = OF8      ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"     ; Use "BREAK" Key for Attention
RESKEY = "^\"     ; Reset key function
AUTUSR = 80       ; DEFAULT = User 0, Privileged
;
CURBNK = 1        ; Default bank = TPA if 1 (and banked slave)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44       ; define 1 stop bit on console
STOPBA = 44       ; define 1 stop bits on printer
;
PTRAST+6 = 00,LSTDRA ;2 remote, 1 local printer
QUEAST+6 = 00,(0)   ;2 remote, 1 local queue
DSPPAT = 1,2,3     ;assign number of printers
QUEPTR = 3         ;assign this printer as "C"
PRTMOD = 1         ;1=spooled, 0=direct
;
LDCOLD = 000      ; Disable Cold start autoload
LDWARM = 000      ; Disable Warm start autoload
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLDFN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

APPLICATION NOTES

Slave-3 GEN file

```

STD SLAVE      ; Standard NETWORKING SLAVE
BNKMGR        ; ONLY if using BANKED 128K Slave.
BNKREQ
;NETLOD      ; Use network load module (if not banked slave)
NETSVC        ; Include Net service module
RTCNUL        ; allow consistent printing with de-spooler
CPMSUP        ; CP/M Function support module
NITCPS        ; CPS-MX hardware initialization
CON192        ; 19.2K baud console Driver
;CON96       ; 9600 baud console Driver
SPDCPS        ; CPS-MX Serial Drivers
;LSTCTS      ; Use list clear to send null driver
;LSTPAR      ; Use parallel null driver
SCDCPS        ; CPS-MX Slave Circuit driver
RESCPS        ; CPS-MX Slave reset detection

```

Slave-3 PAR file

```

SRHDRV = OFF   ; Search System Disk for .COM Files
COMPAT = OF8   ; File/Record Locking Compatibility Flags
;
ATNCHR = "^@"  ; Use "BREAK" Key for Attention
RESKEY = "^\"  ; Reset key function
AUTUSR = 80    ; DEFAULT = User 0, Privileged
;
CURBNK = 1     ; Default bank = TPA if 1 (and banked slave)
;
CONAST = 01,CONDRA ; Console on port 1 of CPS-MX
STOPBB = 44    ; define 1 stop bit on console
;
LDCOLD = 000   ; Disable Cold start autoloader
LDWARM = 000   ; Disable Warm start autoloader
;
;LDCOLD must be set to OFF if you want to auto-load a file
;
;COLD FN = 0,"SLVCLK ","AUT" ;init system clock function using
;CCB-100 clock board.

```

;------

*

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