

**1000's Tech Notes
& Jumper Manual
Volume 1**

1000's Tech Notes & Jumper Manual Volume 1

Copyright 1993, Micro Systems
Copyright 1993, Lightwave Productions

All Rights Reserved. This book may not be reproduced in any form without permission in writing from the publisher.

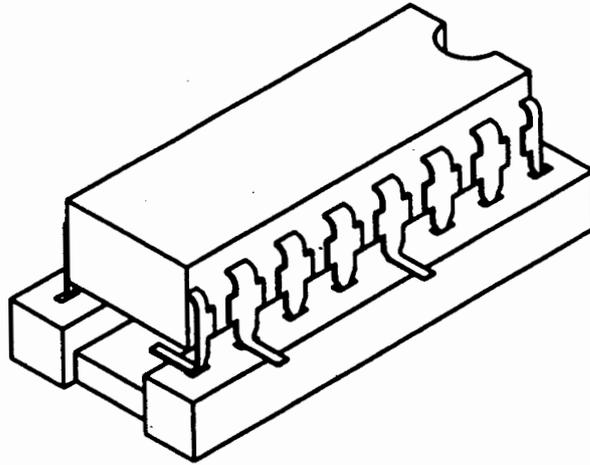
Tandy is a trademark of Tandy Corp. All trademarks are registered with their respective companies.

Micro Systems and/or Lightwave Productions is not connected in any way with Tandy Corp. or Radio Shack and are independent companies. All information in this book is provided "AS IS", without warranty of any kind either expressed or implied, including, but not limited to the implied warranty of fitness for a particular purpose. The entire risk of using the information provided within this book is with you. Micro Systems and/or Lightwave Productions and/or its employees will not assume responsibility or liability for any inaccuracies, errors or omissions, loss, damage caused or alleged to be caused directly or indirectly by this book or any information within this book.

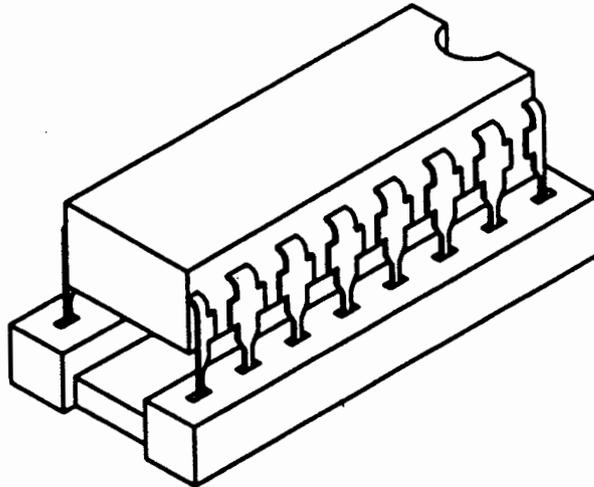
Table Of Contents**Page**

Introduction.....	1
Quick Look At Memory Addressing.....	3
Expanded and Extended Memory.....	5
Original DOS Version Chart.....	7
BIOS ROM Chart.....	8
BIOS ROM Information.....	9
1000, 1000A, 1000HD.....	9
1000EX.....	10
1000HX.....	10
1000RL and 1000RL-HD.....	10
1000RLX and 1000RLX-HD.....	10
1000RLX-B and 1000RLX-B-HD.....	10
1000RSX.....	11
1000SL.....	11
1000SL/2.....	12
1000SX.....	12
1000TL.....	12
1000TL/2.....	13
1000TL/3.....	13
1000TX.....	13
CPU Speed and Power Supply Chart.....	14
Math Co-Processor Chart.....	15
Expansion Slot Chart.....	16
Base Memory and Total Memory Chart.....	17
Speed Upgrade Chart.....	19
286 Express Board Information.....	20
Built-In Video Chart.....	22
Monitor Type Chart.....	23
Standard Floppy Drives & Number Of Drive Bays Chart	24
High Density Floppy Drive Information.....	25
Power In Floppy Drive Cable Chart.....	26
Built-In Floppy Controller and IDE Interface Chart.	28
Serial/Parallel/Other Ports Charts.....	30
Systems With Special Setup Programs Chart.....	32
Clock Chip Installation Chart.....	33
Clock Chip Software.....	35
SLCLK Software.....	35
SMWCLOCK Software.....	36
Tandy 1000 Interrupts.....	37
I/O Addresses.....	38
Serial and Parallel Port Addresses.....	38
Hardware Interrupts.....	39
Hard Drives and Hard Card Information.....	40
Floppy Drive Information.....	42
High Density Floppy Drive Setup Information.....	43
Serial Ports and Modems.....	45
VGA Information.....	46
Keyboards.....	46
Mice and Trackballs.....	47
Turning Off The ROMs.....	50

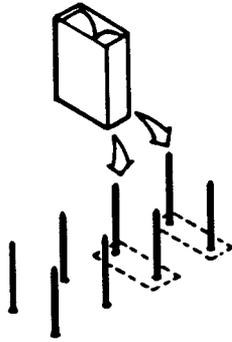
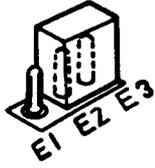
Upgrading To DOS 5 or DOS 6.....	51
DoubleSpace Information.....	52
DEFRAG Command.....	53
Using 720K Floppy Drives.....	53
MSD - Microsoft Diagnostic Program.....	54
Installing DOS 5 or DOS 6.....	54
Creating A Boot Recovery Disk.....	58
VSAFE Information.....	61
ISA 8 Bit Expansion Slot Pin Out.....	63
1000 (25-1000).....	64
Pin Outs.....	69
1000A (25-1000A).....	71
Pin Outs.....	77
1000HD (25-1001).....	79
Pin Outs.....	83
1000EX (25-1050).....	85
Pin Outs.....	89
1000HX (25-1053).....	92
Pin Outs.....	98
1000RL (25-1450)	
1000RL-HD (25-1451).....	101
Pin Outs.....	108
1000RLX (25-1452)	
1000RLX-HD (25-1453).....	110
Pin Outs.....	117
1000RLX-B (25-1452B)	
1000RLX-B-HD (25-1453B).....	120
1000RSX (25-1454)	
1000RSX-HD (25-1455).....	122
Pin Outs.....	127
1000SL (25-1401).....	130
Pin Outs.....	134
1000SL/2 (25-1402).....	137
Pin Outs.....	142
1000SX (25-1051).....	144
Pin Outs.....	148
1000TL (25-1201).....	150
Pin Outs.....	155
1000TL/2 (25-1602).....	158
Pin Outs.....	163
1000TL/3 (25-1603).....	166
Pin Outs.....	173
1000TX (25-1600).....	176
Pin Outs.....	181
Tech Bulletins For The 1000's.....	184



Incorrect Chip Installation



Proper Chip Installation



Sample Jumper Installations

Tech Notes & Jumper Guide For The 1000's Vol. 1

Welcome to the Tech Notes & Jumper Guide. This is volume 1 in this series. This book is to serve as a reference guide to the 1000's and to provide you with the technical information you will need when upgrading your 1000. Since Tandy introduced the 1000, they have produced over 15 models of the 1000. Please be sure you know exactly which model you have before you start upgrading your system. Please understand this book will give you the technical information and jumper and switch settings when installing upgrades. If you want "how to" information on installing upgrades into the 1000's, check out our video, "Secret's of the 1000's. Vol 1". It will show you how to install upgrades into your system.

The information contained in the video and this book has been gathered over the years from working with the 1000's day in and day out. For some of you, if you find the information contained in this book too technical, give it time. As you learn by watching the videos and reading this book, it will all come together for you.

As we began to write this book we quickly found out that we would need to split it up into two volumes. This volume will deal primarily with the computer system and motherboard information. Volume 2 will deal more in-depth with the add-on parts such as hard cards, hard drives, more in-depth on floppy drives, modems, video cards, etc. If there is anything that you find incorrect, please drop us a line, with a copy of the page and a note on what may be incorrect. We will include it in future printings of the book.

How To Use This Book

This book contains a section on each of the 1000's and also contains many quick reference charts. Some information is not listed under the individual computer, but under the quick reference charts or under a specific topic. There is a lot of information that is only listed under the quick reference charts, so be sure to read the notes section under each quick reference chart.

On the following pages we will be referencing several hard drive and floppy drive models. These models may or may not be in production. Many of the model numbers have been changed. We have included the model number just for reference.

Over the years you probably have heard comments like:

"That requires a trained technician to install it" or
"You can't run that large of a hard drive in your system" or
"There is no way to speed-up your system" or
"You can't install a high density drive in your 1000" or
"You have a 1000, we don't carry parts for that system" or

The list of excuses go on and on. The truth is, there is a lot of upgrades that you can do to your 1000!

There are hundreds of third party products that are made especially for the 1000's! Everything from high density drives to 500+ meg hard drives to speed upgrades to memory upgrades and many more items.

Well then, why do the sales people make up these excuses? It could be that they don't supply products for your system, so they will tell you that it can't be done. Then they will introduce you to a new computer that they say is fully expandable. The truth is, yours is expandable too! You're just not shopping at the right place. You need to check what's really available for your system by calling someone who deals in add-on products for your 1000!

A Quick Look At The Tandy 1000 Series Of Computers.

The first model was the 1000, then came the 1000A. Since then Tandy has produced the 1000SX, EX, HX, TX, AX, SL, SL/2, TL, TL/2, TL/3, RL, RLX and the RSX. They also produced several other models for Wal-Mart and other stores.

The following 1000 models have the 8088 or 8086 chip:
1000, 1000A, SX, EX, HX, SL, SL/2, AX and RL.

The following 1000 models have the 80286 chip:
1000 TX, TL, TL/2, TL/3, and RLX.

The 1000 RSX has the 80386 chip.

The 1000PC and 1000AX were some of the computers that Tandy made for other companies. The 1000PC is like 1000SL and the 1000AX is like the 1000SX.

A Quick Look At Memory Addressing

The amount of memory that a computer can address is determined by the number of address lines for each processor.

8088/8086	20 address lines	1 Meg Address Limit
-----------	------------------	---------------------

80286	24 address lines	16 Meg Address Limit
80386	32 address lines	4 Gigabyte Limit
80486	32 address lines	4 Gigabyte Limit

As you can see, the 8088/8086 processor can address up to 1 meg of memory and the 80286 can address up to 16 megs. So all systems can address up to 1 meg of memory.

If I Can Address At Least 1 Meg Of Memory, Then Why Am I Stuck With Just 640K.

Historically, DOS was designed around the earlier 8088/8086 systems with the 1 megabyte address limit. When the systems were being designed, they needed to reserve some address space for the BIOS ROM, Video ROM, Video RAM, and for other items, with the remainder of the address space for RAM memory. This RAM memory is where your programs load and execute from. This is the area from 0 to 640k. This is called conventional or user memory. The address area from 640k to 1024K (1 meg) is the reserved area. This 384k of reserved area is often referred to as upper memory or system memory and is not directly accessible by the user.

The area between 640K and 768K is for the video RAM on some of the 1000's. On most PC compatibles, the video card in the system will contain video RAM that will sit up in the address space between 640K and 1 meg. However, on the 1000's, there is no video RAM, so the system will steal some of the user memory between 0 - 640k for its video RAM. Leaving you without a full 640k to work with. The exception to this is, if you have one of the TL's, RL's, or TX and have installed extra 128k memory upgrade. This memory upgrade is used ONLY for the video. It is not extended or expanded memory. It simply gives the system 128K of video RAM so the video will move out of the lower 640k, freeing you up some memory in the lower 640k. This is something we recommend you install as long as you don't have another video card in you system. Remember, this 128k upgrade is not available on all of the 1000's, just the TX, TL's and RL's.

If you have a 1000RSX, this system came with 256K of video RAM already built-in and is expandable to 512K

If you have installed a video card (i.e., VGA or EGA card) into your 1000 it will contain its own video RAM and you don't need to add the extra 128k of memory.

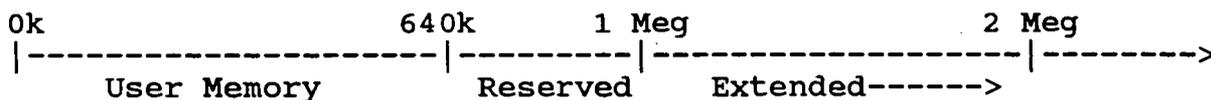
My 1000 Has A 286 Processor, Does This Mean I Can Address More Than A Meg Of Memory?

No. The 80286 processor has two modes of operation, the real mode and the protected mode. When in the real mode, the 80286 chip emulates the 8088/8086 processor and is limited to 1 meg of addressing. In the protected mode, the processor can address up to 16 megs of memory. In the 1000's that have the 80286 processor, the processor is set to run only in the real

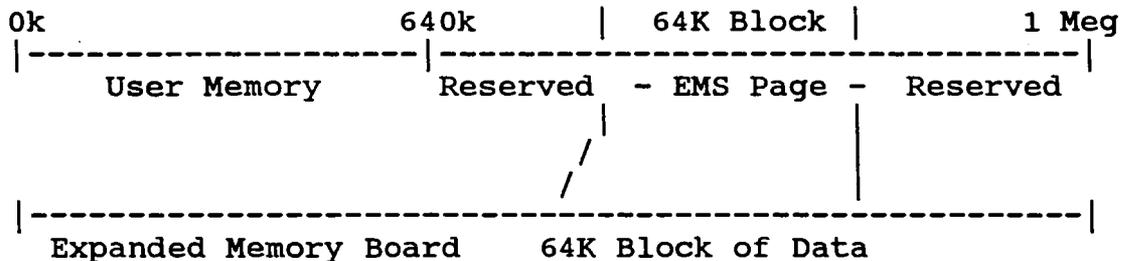
mode and therefore can only address up to 1 meg of memory. The TX, TL's & RL's are not an AT type system. For the most part, the TX, TL's & RLX is treated as an 8088/8086 type system, but with a 80286 processor, because it is set to emulate the 8088/8086 processor. These 1000's only have 8 bit expansion slots, 8088/8086 memory addressing, 8 bit video, etc. When you are working with DOS 6.0 and Windows, you will have to treat the TX's, TL's and RL's as if they are an 8088/8086 system (XT type system). This is also true if you install a 386 or 486 speed upgrade module. True, your system now has a 386 or 486 chip, however due to the design of the motherboard, you don't have the address lines to address more than 1 meg of memory. Your only option is to install expanded memory.

What Is The Difference Between Expanded and Extended Memory?

Extended Memory is the memory that is beyond 1 megabyte. Only the 80286, 80386 and 80486 systems can address this memory. These systems have enough address lines to address beyond the 1 megabyte boundary. (Remember the TL's, TX and RLX are running the 80286 as an 8088/8086, so it can only address 1 megabyte).



Expanded Memory. Lotus/Intel/Microsoft (LIM) came up with a way for adding memory to PC systems. The LIM Expanded Memory Specification (EMS) bypasses the memory limits with expanded memory cards that contain 16K pages of RAM that must be enabled or disabled by software. This memory is not addressed by the processor, instead each page is mapped into an empty 64k address space located between 640k - 1 Meg. Remember this is the reserved address space in your system. The EMS software will move data in 64k blocks, each made up of four 16k pages, in and out of this reserved address space. Programs must be specifically written to use expanded memory.



The software will keep switching 64k blocks of data in and out of the expanded memory through this 64k window.

If I Install A 2 Meg EMS Board (Expanded Memory Board) In My System, Will I Be Able To Load DOS 6.0 Into Higher RAM Like Advertised?

No, to load DOS into higher memory you have to have EXTENDED Memory, not Expanded. Since none of the 1000's (except the 1000RSX) support Extended Memory this can't be done. If you have a 2500, 3000, or 4000 series computer, you can load DOS in high memory, if you have enough. For those of you who have the 1000RLX computer, see the section on the RLX for a way to load DOS high on your system.

There is an expanded memory board called the Invisible EMS Board that will allow you to load device drivers and TSR programs up high, even on the 1000's! This board comes with all the software to enable it to load high, even with other DOS versions. You cannot load the command.com file up high, because that requires extended memory. If you use QRAM with this board you can even free up more memory to load programs high.

If you have the Micro Mainframe EMS board, you will need the 4.0 driver to work properly with DOS 6. Although this board does NOT let you load any programs high, you can still use this board with some of the DOS 6 programs.

Original DOS Version Chart

Computer	Catalog Number	DOS Version	DOS In ROM
1000	25-1000	2.11	
1000A	25-1000A	2.11	
1000HD	25-1001	2.11	
1000EX	25-1050	2.11	
1000HX	25-1053	2.11	X
1000RL	25-1450	3.30	X
1000RL-HD	25-1451	3.30	X
1000RLX	25-1452	3.30	X
1000RLX	25-1452B	5.00	X
1000RLX-HD	25-1453	3.30	X
1000RLX-HD	25-1453B	5.00	X
1000RSX	25-1455	5.00	X
1000RSX-HD	25-1454	5.00	X
1000SL	25-1401	3.30	X
1000SL/2	25-1402	3.30	X
1000SX	25-1051	3.20	
1000SX	25-1052	3.20	
1000SX	25-1054	3.20	
1000TL	25-1601	3.30	X
1000TL/2	25-1602	3.30	X
1000TL/3	25-1603	3.30	X
1000TX	25-1600	3.20	

NOTE: This chart just shows which version DOS the computer was shipped with from the factory. You can, however, run a higher version of DOS on your system. We have run all versions up to DOS 6.0 on all of the above computers.

If your system has the DOS in ROM, as indicated above, you will need to disable the ROMs by running the setup program for that computer. For more information see the section under your specific computer.

BIOS ROM Chart

Computer	Catalog Number	BIOS Ver	Notes
1000	25-1000	01.00.00 01.01.00	
1000A	25-1000A	01.01.00	
1000HD	25-1001	01.01.00	
1000EX	25-1050	01.02.00	
1000HX	25-1053	02.00.00	
1000RL	25-1450	02.00.00 02.00.01	
1000RL-HD	25-1451	02.00.00 02.00.01	
1000RLX	25-1452	02.00.00	
1000RLX	25-1452B	02.00.00	
1000RLX-HD	25-1453	02.00.00	
1000RLX-HD	25-1453B	02.00.00	
1000RSX	25-1455	01.10.00	
1000RSX-HD	25-1454	01.10.00	
1000SL	25-1401	See Text	
1000SL/2	25-1402	01.04.04	
1000SX	25-1051	01.02.00	
1000SX	25-1052	01.02.00	
1000SX	25-1054	01.02.00	
1000TL	25-1601	See Text	
1000TL/2	25-1602	02.00.00	
1000TL/3	25-1603	02.00.00	
1000TX	25-1600	01.03.00	

BIOS ROM Information

The information on the BIOS ROMs is as accurate as we have been able to obtain. It is not necessary for you to run out and upgrade your BIOS unless you're having trouble with your system and a BIOS upgrade will fix it. We have received many calls from customers that want to run high density drives in their 1000's and they think or have been told that you need to upgrade the BIOS in order to run high density drives. That's simply not the case. The BIOS on the 1000's is not what is stopping you from running high density drives. Most of the 1000's have only a low density controller built-in to the motherboard. For more information on running high density drives, check out the section on high density drives on the "Secrets Of The 1000's, Vol 1" video tape. It will show you how to install and use high density drives in your 1000. Also check in this book under "Standard Drives and Drive Bay Chart".

1000, 1000A, 1000HD

Version	Comments
01.00.00	Original BIOS ROM for 1000 (25-1000)
01.01.00	Original BIOS ROM for 1000A and 1000HD. This version is also the upgrade version for the 1000 (25-1000) listed above

The 01.01.00 corrects an extended write cycle that can cause some hard drive controllers to fail. The new version also corrects long printer strobe signals. If you have one of our newer IDE controllers, we have programmed our ROM on the controller card to work around the extended write cycle with the 01.00.00 ROM. This way you don't need to upgrade to the newer ROMs.

NOTE: There are two versions of the 01.00.00 ROM, a single chip version and a dual chip version. If you have the single chip version, simply replace the 01.00.00 ROM with the newer 01.01.00 ROM. If you have the two chip version, you will also need to upgrade the PAL chip.

Part Number	Version	Chip	Socket
MXP-0081	01.01.00		U9

1000EX

Version	Comments
01.02.00	Latest version ROM. Same ROM that is used in the 1000SX computer.

There are two revisions of the 1000EX motherboard. Both use the same BIOS ROM, however, the ROM socket locations are different.

Part Number	Version	Chip Socket	
MXP-0005	01.02.00	U17	First Revision
MXP-0005	01.02.00	U44	Revision D motherboard

1000HX

Version	Comments
02.00.00	Latest version

Part Number	Version	Chip Socket
MXP-0493	02.00.00	U12

1000RL & 1000RL-HD

Version	Comments
02.00.00	Original version
02.00.01	Corrects mouse port problem

If your Deskmate randomly locks up when using the PS/2 style mouse with the RL or RL-HD, then change the ROM to the 02.00.01 version. There is a compatibility problem between the mouse driver in the ROM and Deskmate. The new ROM has a revised mouse driver.

Part Number	Version	Chip Socket
MXP-0810	02.00.01	U30

1000RLX (25-1452) & 1000RLX-HD (25-1453)

Version	Comments
02.00.00	Original version

Part Number	Version	Chip Socket
MXP-0890	02.00.00	U32

1000RLX (25-1452B) & 1000RLX-HD (25-1453B)

Version	Comments
02.00.00	Original version

Part Number	Version	Chip Socket
MXP-0953	02.00.00	U13

1000SL/2

Version	Comments
01.04.04	Original ROM
02.00.01	Announced version that contains Deskmate 3.5 may not be available. Noted here for informational purposes.

It was announced that Deskmate 3.5 would be available for the SL in a ROM upgrade.

Part Number	Version	Chip Socket	
MXP-0202	01.04.04	SU3	Sharp ROM, Even
MXP-0203	01.04.04	SU4	Sharp ROM, Odd
70C-1360	02.00.01	May not be available yet.	

1000SX

Version	Comments
01.02.00	Original and current version

This is the same ROM that it used in the 1000EX

Part Number	Version	Chip Socket
MXP-0005	01.02.00	U41

1000TL

Version	Comments
01.04.00	Original ROM, referred to as Sharp 1 or Sharp 2, type 32
01.04.01	Sharp ROM 4, type 41
01.04.02	Sharp ROM 6, type 47
02.00.01	Announced version that contains Deskmate 3.5 may not be available. Noted here for informational purposes.

Like the 1000SL, in the 1000TL there were three different manufacturers BIOS types that were used. They were Tandy, Sharp and Hitachi. To determine which BIOS manufacturer you have, switch to the ROM's drive letter and at the prompt type:

TYPE V <enter>

It will respond back with a number. Look at the following chart to see which ROM you have.

32	Sharp 1	41	Sharp 4
32	Sharp 2	47	Sharp 6
		79	Tandy

It was announced that Deskmate 3.5 would be available for the SL in a ROM upgrade. We have not seen this available yet.

Part Number	Version	Chip Socket	
MXP-0695	01.04.02	U55	Even ROM
MXP-0694	01.04.02	U57	Odd ROM
70B-1360	02.00.01	May not be available yet.	

1000TL/2

Version	Comments
02.00.00	Original ROM
02.00.01	Announced version that contains Deskmate 3.5 may not be available. Noted here for informational purposes.

It was announced that Deskmate 3.5 would be available for the SL in a ROM upgrade.

Part Number	Version	Chip Socket	
MXP-0731	02.00.00	U45	
70A-1360	02.00.01	May not be available yet.	

1000TL/3

Version	Comments
02.00.00	Current version of the ROM

Part Number	Version	Chip Socket	
MXP-0854	02.00.00	U31	

1000TX

Version	Comments
01.03.00	Original Version - Current

The TX BIOS ROM is made up of two chips. One is marked odd the other is marked even. Each chip has its own part number.

Part Number	Version	Chip Socket	
MXP-0494	01.03.00	U38	Even Chip
MXP-0516	01.03.00	U39	Odd Chip

CPU Speed and Power Supply Size Chart

Computer	Catalog Number	CPU Speed Mhz High/Low	Power Supply Watts
1000	25-1000	4.77	54
1000A	25-1000A	4.77	54
1000HD	25-1001	4.77	54
1000EX	25-1050	7.16 / 4.77	28
1000HX	25-1053	7.16 / 4.77	28
1000RL	25-1450	9.44 / 4.77	25
1000RL-HD	25-1451	9.44 / 4.77	25
1000RLX	25-1452	10 / 5	25
1000RLX	25-1452B	10 / 5	25
1000RLX-HD	25-1453	10 / 5	25
1000RLX-HD	25-1453B	10 / 5	25
1000RSX	25-1455	25 / 8	25
1000RSX-HD	25-1454	25 / 8	25
1000SL	25-1401	8 / 4.77	67
1000SL/2	25-1402	8 / 4.77	67
1000SX	25-1051	7.16 / 4.77	67
1000SX	25-1052	7.16 / 4.77	67
1000SX	25-1054	7.16 / 4.77	67
1000TL	25-1601	8 / 4.77	67
1000TL/2	25-1602	8 / 4.77	67
1000TL/3	25-1603	10 / 5	67
1000TX	25-1600	8 / 4.77	67

Note: There are ways to speed up most of the 1000's. See the section on speed upgrades.

Math Co-Processor Chart

Computer	Math Co	Speed	Chip Location
1000	N/A		
1000A	8087	5 Mhz	U29
1000HD	8087	5 Mhz	U29
1000EX	N/A		
1000HX	N/A		
1000RL	N/A		
1000RL-HD	N/A		
1000RLX	N/A		
1000RLX-HD	N/A		
1000RSX	80387SX	25 Mhz	U10
1000SL	8087-2	8 Mhz	U21
1000SL/2	8087-2	8 Mhz	U21
1000SX	8087-2	8 Mhz	U33
1000TL	80287	8 Mhz +	U60
1000TL/2	80287	8 Mhz +	U43
1000TL/3	80287	10 Mhz +	U9
1000TX	80287	8 Mhz +	U15

Notes:

N/A = Not Available. Some 1000's do not have a math co-processor socket.

The 1000TL, TL/2, TL/3, and TX can use the 80287-XL math co-processor.

You can always use a faster speed math co-processor than what is called for, it will simply slow down to the CPU's speed.

It is also possible to use a slower speed math co-processor. What you will be doing is pushing the math co-processor. This generally works as long as you are close to the CPU's speed. For example, a 8 Mhz 80827 will work in a 10 Mhz CPU.

Expansion Slot Chart

Computer	Catalog Number	# of Expansion Slots	Type
1000	25-1000	3	8
1000A	25-1000A	3	8
1000HD	25-1001	3	8
1000EX	25-1050	N/A (1)	
1000HX	25-1053	N/A (1)	
1000RL	25-1450	1	8
1000RL-HD	25-1451	1	8
1000RLX	25-1452	1	8
1000RLX	25-1452B	1	8
1000RLX-HD	25-1453	1	8
1000RLX-HD	25-1453B	1	8
1000RSX	25-1455	2	16
1000RSX-HD	25-1454	2	16
1000SL	25-1401	5	8
1000SL/2	25-1402	5	8
1000SX	25-1051	5	8
1000SX	25-1052	5	8
1000SX	25-1054	5	8
1000TL	25-1601	5	8
1000TL/2	25-1602	4	8
1000TL/3	25-1603	4	8
1000TX	25-1600	5	8

Notes:

(1) The 1000 EX and HX has a 62 pin expansion connector that is on the motherboard. If you attach the memory board to this connector you will have an additional 1 or 2 slots depending on the manufacturer of the memory board. There are also companies that supply a slot adapter where you can install 8 bit XT style cards into the EX and HX. It is recommended that you have the memory board installed first before using one of these adapters.

The expansion slots in all of the 1000's are only 10" long. The standard XT style expansion slots are 13" long. Be careful when purchasing expansion boards and hard disk cards. They have to be less than 10" long.

Base Memory & Total Memory Chart

This chart shows the standard amount of memory that each system came with. It also shows the maximum amount of memory that it can be expanded to on the motherboard. It should be noted that you can expand the memory beyond the maximum amount on the motherboard by adding special expanded memory boards to the system. These boards will plug into one of the expansion slots.

Computer	Catalog Number	Base Memory	Total Memory
1000	25-1000	128K	640K (1)
1000A	25-1000A	128K	640K (1)
1000HD	25-1001	128K	640K (1)
1000EX	25-1050	256K	640K (2)
1000HX	25-1053	256K	640K (2)
1000RL	25-1450	512K	768K
1000RL-HD	25-1451	512K	768K
1000RLX	25-1452	512K	1 Meg
1000RLX	25-1452B	512K	1 Meg
1000RLX-HD	25-1453	1 Meg	1 Meg
1000RLX-HD	25-1453B	1 Meg	1 Meg
1000RSX	25-1455	1 Meg	9 Meg
1000RSX-HD	25-1454	1 Meg	9 Meg
1000SL	25-1401	384K	640K
1000SL/2	25-1402	512K	640K
1000SX	25-1051	384K	640K
1000SX	25-1052	384K	640K
1000SX	25-1054	384K	640K
1000TL	25-1601	640K	768K
1000TL/2	25-1602	640K	768K
1000TL/3	25-1603	640K	768K
1000TX	25-1600	640K	768K

Notes: See Next Page.

Notes:

- (1) The 1000, 1000A and 1000HD are not expandable on the motherboard. They require a special memory board that has a DMA chip. A standard XT type memory board will not work in these systems. For more information on these boards, check the section for the 1000.

- (2) The 1000EX and 1000HX are not expandable on the motherboard. They require a special memory board that has the DMA chip on board. This is NOT the same memory board that the 1000, 1000A, 1000HD uses. The EX and HX computer does not take expansion boards with card edge connectors, they use a 62 pin connector instead. For more information on this board, check the section for the 1000EX and HX.

Speed Upgrade Chart

Computer	Catalog Number	Type Of Upgrade
1000	25-1000	V-20
1000A	25-1000A	V-20
1000HD	25-1001	V-20
1000EX	25-1050	V-20
1000HX	25-1053	V-20
1000RL	25-1450	
1000RL-HD	25-1451	
1000RLX	25-1452	
1000RLX	25-1452B	
1000RLX-HD	25-1453	
1000RLX-HD	25-1453B	
1000RSX	25-1455	
1000RSX-HD	25-1454	
1000SL	25-1401	V-30
1000SL/2	25-1402	V-30
1000SX	25-1051	V-20
1000SX	25-1052	V-20
1000SX	25-1054	V-20
1000TL	25-1601	386 or 486 CPU Module
1000TL/2	25-1602	386 or 486 CPU Module
1000TL/3	25-1603	
1000TX	25-1600	386 or 486 CPU Module

Some of the 1000's you can speed up the computers operation by replacing the CPU with a different type.

- V20 - Replaces the 8088 CPU, 10 to 50% speed increase, does not change the clock speed. This is an optimized CPU chip.
- V30 - Replaces the 8086 CPU, 10 to 50% speed increase, does not change the clock speed. This is an optimized CPU chip.

386/486 CPU Module - There is a 386 and 486 CPU module by Improve Technologies that will allow you to replace the 286 CPU in the above listed systems. The 386 CPU will double the clock speed from 8 to 16 Mhz. The 486 CPU module will also double the clock speed from 8 to 16 Mhz, plus the on-board cache will increase the speed another 50 to 100%.

The speed increase that you will see can vary from program to program. Once the programs are loaded into memory, they will execute faster. If your programs seem to take a long time to load from the hard disk, a speed upgrade may not help. You may need a hard drive with a faster data transfer rate. For more information on this, see the Hard Drive and Hard Card section.

There was a company named PC Technology that made a 286 upgrade board. This board was also sold by Tandy. The company has been out of business for quiet a while now. This board is still available on the used market.

286 Express Board

Part Number 25-1035 (Discontinued)

The 286 Express Board is an 286 card that was designed to work with the 1000, 1000A, 1000HD and 1000SX computers. The 286 Express board has been discontinued for quite awhile now, however, they have been showing up on the used market.

The 286 Express board kit required an expansion slot and contains a main expansion card, a daughter board and software to activate the board. There is also a math co-processor socket for installing a 80287. The board will work with either a 5MHz or 8MHz 80287. However, we recommend that you use the 8MHz version for best performance. The 286 Express board was sold with the daughter board for the 1000A, 1000HD, and 1000SX computers. If you have one of the original Tandy 1000's, (25-1000) you will need a different daughter board, part number AXX-7130. We have been informed that this special daughter board is no longer available. If you happened to pick up a used 286 Express board, check to see which daughter board you're getting or which computer the express board came out of. Also, make sure you get the software you need to run the board.

We have found that some programs will not run correctly if the board is in the 286 mode. For example, the smart clock chip software requires the 286 Express board to be put into the 8088 mode before you can read the clock chip. To change the mode of the express board, you would type:

```
PCT 88 <--- Puts the board in the 8088 mode
PCT 286 <--- Puts the board in the 80286 mode
```

There is a 10 position dip switch found on the board. These switches set the clock speed for the math co-processor, the computer model and memory limits for caching. The switch settings are as follows:

SW1	SW2	SW10	Math Co-processor Setting
ON	OFF	OFF	8MHz 80287 math co-processor installed
OFF	ON	ON	5MHz 80287 math co-processor installed
OFF	OFF	OFF	No math co-processor

SW3 Computer Model Setting

ON Board is installed in a 1000SX
OFF Board is installed in a 1000, 1000A or 1000HD

SW4 SW5 SW6 SW7 Memory Limits For Caching, Use Default

OFF	OFF	OFF	OFF	64K	
OFF	OFF	OFF	ON	128K	
OFF	OFF	ON	OFF	192K	
OFF	OFF	ON	ON	256k	<- Default setting
OFF	ON	OFF	OFF	320K	
OFF	ON	OFF	ON	384K	
OFF	ON	ON	OFF	448K	
OFF	ON	ON	ON	512K	
ON	OFF	OFF	OFF	576K	
ON	OFF	OFF	ON	640K	

SW8 Not Used

OFF <----MUST be set to OFF

SW9 Boards I/O Address

ON Board uses I/O address 3E0h
OFF Board uses I/O address 100h

Built In Video Chart

Computer	Catalog Number	Built In Video
1000	25-1000	CGA / Mono Composite
1000A	25-1000A	CGA / Mono Composite
1000HD	25-1001	CGA / Mono Composite
1000EX	25-1050	CGA / Mono Composite
1000HX	25-1053	CGA / Mono Composite
1000RL	25-1450	CGA / Hercules Mono TTL
1000RL-HD	25-1451	CGA / Hercules Mono TTL
1000RLX	25-1452	VGA
1000RLX	25-1452B	VGA
1000RLX-HD	25-1453	VGA
1000RLX-HD	25-1453B	VGA
1000RSX	25-1455	VGA 1024x768
1000RSX-HD	25-1454	VGA 1024x768
1000SL	25-1401	CGA / Hercules Mono TTL
1000SL/2	25-1402	CGA / Hercules Mono TTL
1000SX	25-1051	CGA / Mono Composite
1000SX	25-1052	CGA / Mono Composite
1000SX	25-1054	CGA / Mono Composite
1000TL	25-1601	CGA / Mono TTL
1000TL/2	25-1602	CGA / Mono TTL
1000TL/3	25-1603	CGA / Mono TTL
1000TX	25-1600	CGA / Mono Composite

NOTES

You can install VGA in all of the 1000's, except the 1000, 1000A and 1000HD. The built-in CGA in these systems cannot be disabled.

The CGA that Tandy built into the 1000's, is capable of displaying 16 colors, whereas standard CGA displays only 4 colors.

Monitor Chart

Model	Catalog #	Type	Resolution	Dot Pitch
VM-1	26-5111	Mono/TTL	720x384	
VM-2	26-3211	Mono/Composite		
VM-3	25-3010	Mono/TTL	720x384	
VM-4	26-1020	Mono/Composite	640x200	
VM-5	25-3011	Mono/TTL	720x384	
VM-5 *	25-3012	Mono/TTL	720x384	
CM-1	26-5112	CGA	640x400	
CM-2	26-3212	CGA	640x200	
CM-4	25-1021	CGA	320x200	
CM-5	25-1023	CGA	320x200	
CM-5 *	25-1043	CGA	320x200	
CM-8 *	26-3512	CGA/Analog	640x192	
CM-10	25-1022	CGA	640x200	
CM-11	25-1024	CGA	640x200	
EGM-1	25-4035	EGA	640x350	
VGM-100	25-4040	VGA/Mono	640x480	
VGM-150	25-4090	VGA/Mono Full Page		
VGM-200	25-4041	VGA/Color	640x480	.42
VGM-220	25-4044	VGA/Color	640x480	.52
VGM-300	25-4042	VGA/Color	640x480	.31
VGM-340	25-4047	SVGA/Color	1024x768	.39
VGM-390	25-4091	SVGA/Color	1024x768	.39
VGM-440	25-4046	SVGA/Color	1024x768	.28
VGM-441	25-4048	SVGA/Color	1024x768	.28
VGM-450	25-4049	SVGA/Color	1024x768	.28

*** Monitor Notes:**

CM-5, Tandy produced 2 models of the CM-5. The model 25-1023 was the first of the two models of the CM-5 monitors to be made.

VM-5, Tandy produced 2 models of the VM-5. The model 25-3011 was the first of the two models of the VM-5 monitors to be made.

CM-8 is a 13" analog monitor with a built-in speaker for the Color computers. It will display up to 80x24 in text mode and 640x192 in graphics mode.

Standard Floppy Drives & Number of Drive Bays Chart

Computer	Catalog Number	Standard Drives	Number Of Drive Bays
1000	25-1000	5.25 360K	2 (2)
1000A	25-1000A	5.25 360K	2 (2)
1000HD	25-1001	5.25 360K/10 Meg HD	2 (2)
1000EX	25-1050	5.25 360K	1
1000HX	25-1053	3.5 720K	2 (3)
1000RL	25-1450	3.5 720K	2 (3)
1000RL-HD	25-1451	3.5 720K/20 Meg HD	2 (3)
1000RLX	25-1452	3.5 1.44Meg	2 (3)
1000RLX	25-1452B	3.5 1.44Meg	2 (3)
1000RLX-HD	25-1453	3.5 1.44Meg/40 Meg HD	2 (3)
1000RLX-HD	25-1453B	3.5 1.44Meg/40 Meg HD	2 (3)
1000RSX	25-1455	3.5 1.44Meg	2 (3)
1000RSX-HD	25-1454	3.5 1.44Meg/52 Meg HD	2 (3)
1000SL	25-1401	5.25 360K	2 (2)
1000SL/2	25-1402	3.5 720K	2 (4)
1000SX	25-1051	2 - 5.25 360K	2 (2)
1000SX	25-1052	1 - 5.25 360K	2 (2)
1000SX	25-1054	2 - 5.25 360K	2 (2)
1000TL	25-1601	3.5 720K	3 (5)
1000TL/2	25-1602	3.5 720K	3 (5)
1000TL/3	25-1603	3.5 720K (1)	3 (5)
1000TX	25-1600	3.5 720K	2 (2)

NOTES:

360K drives = low density
 720K drives = low density

1.2 meg drives = high density
 1.44 meg drives = high density

- (1) The TL/3 has a built-in hi-density floppy controller even though it only came with a low-density drive.
- (2) These units have 2 - 5.25" drive bays
- (3) These units have 2 - 3.5" drive bays
- (4) This unit has one 3.5" drive bay and one 5.25" drive bay

(5) These units have 2 - 3.5" drive bays and one 5.25" drive bay.

High Density Drive Information

If your system has a built-in high density controller, there is no problem with you using high density drives. If your system only has a built-in low density controller, IT IS POSSIBLE to install a high density drive kit into your system. Just read on.

Despite what you may have been told you CAN run a high density drive in your system even though your system may only have a low density controller! You will need a special high density controller card, a high density drive and software. Please note that a standard high density controller card will not work.

"I was told that I can't run high density drives in my system, but you are telling me I can"

YES! There are many third party products (products not produced by Tandy themselves) that are available to you. One of these items is a high density disk drive kit. Even though you may have been told you can't do that, you really can! Sometimes sales people that do not supply third party products for your system will tell you it can't be done, especially if they don't sell it themselves!

"Why can't I just change my BIOS ROM to let me run high density drives"

The problem is not in the system's BIOS ROM, but with the built-in controller. You see a low density drive transfers data to and from the controller at the rate of 250K per second. While the high density drive transfers data at the rate of 500K per second.

Therefore, when you connect a high density drive up to the low density controller, the low density controller CANNOT transfer the data as fast as the high density drive is requiring it to. You will then get a general failure error message.

With most high density controllers, you can transfer data at both rates of 250K and 500K, This way you can run either a low density drive or a high density drive from a high density controller.

Power In Floppy Drive Cable Chart

Computer	Catalog Number	Power In Floppy Cable	Drives Using Power In The Floppy Cable
1000	25-1000		
1000A	25-1000A		
1000HD	25-1001		
1000EX	25-1050		
1000HX	25-1053	Yes	Both 3.5" drives
1000RL	25-1450	Yes	3.5" floppy drives
1000RL-HD	25-1451	Yes	3.5" floppy drives
1000RLX	25-1452	Yes	3.5" floppy drives
1000RLX	25-1452B	Yes	3.5" floppy drives
1000RLX-HD	25-1453	Yes	3.5" floppy drives
1000RLX-HD	25-1453B	Yes	3.5" floppy drives
1000RSX	25-1455	Yes	3.5" floppy drives
1000RSX-HD	25-1454	Yes	3.5" floppy drives
1000SL	25-1401		
1000SL/2	25-1402	Yes	Only 3.5" drive A:
1000SX	25-1051		
1000SX	25-1052		
1000SX	25-1054		
1000TL	25-1601	Yes	Only 3.5" floppies
1000TL/2	25-1602	Yes	Only 3.5" floppies
1000TL/3	25-1603	Yes	Only 3.5" floppies
1000TX	25-1600	Yes	Only 3.5" drive A:

Notes: See Next Page.

Notes:

On the systems where the power to the 3.5" floppy drive is supplied through the flat ribbon cable, you will need a special floppy drive that has been designed to pull the power through the flat ribbon cable. If you try to use a standard 3.5" floppy drive in one of these systems, you will not only damage the floppy drive but also damage the motherboard.

In all other systems where power DOES NOT come through the flat ribbon cable most standard floppy drives will work. You may, however, need a longer floppy drive cable for a proper fit.

TECH TIP:

If you are installing a 3.5" floppy drive into your system, did you know that you can install a 1.44 meg floppy drive and have it work as a 720K floppy? You can! It works perfectly! When you buy a 720K floppy drive, see if you can get a 1.44 floppy drive, this way if you ever upgrade to a new system, you can pull out the 3.5" floppy drive and install it into a new system and it will work as a 1.44 drive! We recommend TEAC floppy drives, as we have had the best success with this brand.

Built-In Floppy Controller & IDE Interface Chart

Computer	Catalog Number	Floppy Controller	IDE Interface
1000	25-1000	Low	
1000A	25-1000A	Low	
1000HD	25-1001	Low	
1000EX	25-1050	Low	
1000HX	25-1053	Low	
1000RL	25-1450	Low	XT
1000RL-HD	25-1451	Low	XT
1000RLX	25-1452	High	XT
1000RLX	25-1452B	High	XT
1000RLX-HD	25-1453	High	XT
1000RLX-HD	25-1453B	High	XT
1000RSX	25-1455	High	AT
1000RSX-HD	25-1454	High	AT
1000SL	25-1401	Low	
1000SL/2	25-1402	Low	
1000SX	25-1051	Low	
1000SX	25-1052	Low	
1000SX	25-1054	Low	
1000TL	25-1601	Low	
1000TL/2	25-1602	Low	XT
1000TL/3	25-1603	High (1)	XT
1000TX	25-1600	Low	

Notes:

Despite what you may have been told, you CAN run a high density drive in your system even though your system may only have a low density controller! You will need a special high density controller card, a high density drive and software. Please note that a standard high density controller card will not work.

(1) The TL/3 has a built-in high density controller, however the computer came from the factory with only a low density drive installed.

Low - This means the system only has a low density controller built-in. This low density controller will only control 360K or 720K capacity drives.

High - This means the system has a high density controller built in. This controller will support 360K, 720K, 1.2 Meg and 1.44 Meg floppy drives without an additional controller.

XT - These systems have an XT IDE hard disk interface.

AT - These systems have an AT IDE hard disk interface.

Note: Even though the XT and AT hard disk interface may physically look the same, they are not electrically the same. DO NOT connect an AT interface drive to the XT interface and like wise DO NOT connect an XT interface drive to an AT interface.

High Density Drive Information

If your system has a built-in high density controller, there is no problem with you using high density drives. If your system only has a built-in low density controller, IT IS POSSIBLE to install a high density drive kit into your system. Just read on.

Despite what you may have been told you CAN run a high density drive in your system even though your system may only have a low density controller! You will need a special high density controller card, a high density drive and software. Please note that a standard high density controller card will not work.

"I was told that I can't run high density drives in my system, but you are telling me I can"

YES! There are many third party products (products not produced by Tandy themselves) that are available to you. One of these items is a high density disk drive kit. Even though you may have been told you can't do that, you really can! Sometimes sales people that do not supply third party products for your system will tell you it can't be done, especially if they don't sell it themselves!

"Why can't I just change my BIOS ROM to let me run high density drives"

The problem is not in the system's BIOS ROM, but with the built-in controller. You see a low density drive transfers data to and from the controller at the rate of 250K per second. While the high density drive transfers data at the rate of 500K per second.

Therefore, when you connect a high density drive up to the low density controller, the low density controller CANNOT transfer the data as fast as the high density drive is requiring it to. You will then get a general failure error message.

With most high density controllers, you can transfer data at both rates of 250K and 500K, This way you can run either a low density drive or a high density drive from a high density controller.

Serial/Parallel/Other Ports Chart

Computer	Catalog Number	Serial	Printer	Other
1000	25-1000		Card Edge	Light Pen/Joystick
1000A	25-1000A		Card Edge	Light Pen/Joystick
1000HD	25-1001		Card Edge	Light Pen/Joystick
1000EX	25-1050		Card Edge	Joystick
1000HX	25-1053		Card Edge	Joystick
1000RL	25-1450	DB-9	DB-25	PS2 Mouse/Joystick
1000RL-HD	25-1451	DB-9	DB-25	PS2 Mouse/Joystick
1000RLX	25-1452	DB-9	DB-25	PS2 Mouse/Joystick
1000RLX	25-1452B	DB-9	DB-25	PS2 Mouse/Joystick
1000RLX-HD	25-1453	DB-9	DB-25	PS2 Mouse/Joystick
1000RLX-HD	25-1453B	DB-9	DB-25	PS2 Mouse/Joystick
1000RSX	25-1455	DB-9	DB-25	PS2 Mouse
1000RSX-HD	25-1454	DB-9	DB-25	PS2 Mouse
1000SL	25-1401	DB-9	Card Edge	Joystick
1000SL/2	25-1402	DB-9	Card Edge	Joystick
1000SX	25-1051		Card Edge	Light Pen/Joystick
1000SX	25-1052		Card Edge	Light Pen/Joystick
1000SX	25-1054		Card Edge	Light Pen/Joystick
1000TL	25-1601	DB-9	Card Edge	Joystick
1000TL/2	25-1602	DB-9	Card Edge	Joystick
1000TL/3	25-1603	DB-9	Card Edge	Joystick
1000TX	25-1600	DB-9	Card Edge	Joystick

NOTES:

DB-9 The systems marked with a DB-9 under the serial port means that it has a 9 pin serial port built-in to the system.

DB-25 The systems marked with a DB-25 under the printer port means that it has an IBM style 25 pin printer port connection.

Card Edge The systems marked with Card Edge under the printer port means that these systems use a 34 pin card edge connector as the printer port connection. This is not a standard way of connecting a printer to a computer, however, Tandy used this method for several years.

Light Pen Some of the earlier 1000's had a light pen port. This should not be confused with a serial port, even though

it may look like one. There was a company that had made a light pen for the 1000's, however, we don't recall seeing it available on the market for any length of time.

Joystick The systems that are marked with a joystick port use a Tandy style joystick. These are not standard type joysticks and they connect to the system with a 6 pin DIN plug. A standard joystick uses a 15 pin DB-15 style plug.

PS2 Mouse Some of the latter 1000's came equipped with a PS/2 style mouse port. This mouse port requires a PS/2 mouse not a serial mouse. We have noted that some software will not work with the PS/2 mouse on these systems, even though the software has the PS/2 style mouse as an option. We have noted also that not all manufacturers PS/2 mice are compatible with the 1000's PS/2 mouse port.

Systems With Special Setup Programs

Computer	Catalog Number	Setup Program File Name
1000	25-1000	
1000A	25-1000A	
1000HD	25-1001	
1000EX	25-1050	
1000HX	25-1053	SETUPHX
1000RL	25-1450	SETUPRL
1000RL-HD	25-1451	SETUPRL
1000RLX	25-1452	SETUPRLX
1000RLX	25-1452B	SETUPRLX
1000RLX-HD	25-1453	SETUPRLX
1000RLX-HD	25-1453B	SETUPRLX
1000RSX	25-1455	SETUPRSX
1000RSX-HD	25-1454	SETUPRSX
1000SL	25-1401	SETUPSL
1000SL/2	25-1402	SETUPSL2
1000SX	25-1051	
1000SX	25-1052	
1000SX	25-1054	
1000TL	25-1601	SETUPTL
1000TL/2	25-1602	SETUPTL2
1000TL/3	25-1603	SETUPTL3
1000TX	25-1600	

NOTES:

Not all of the 1000's have a setup program. This setup program is used to configure the system for floppy drives, color or mono monitor, primary boot device ROM or disk, etc.

For the systems that don't have the setup program, when your system boots, it looks to see what kind of floppy drives you have and what kind of monitor.

It should be noted that in all of the 1000's (EXCEPT the 1000RSX) you do not need to run setup when installing the hard drive or hard card. The system will look for one and use the BIOS ROM on the hard drive or hard card controller to configure itself during bootup.

Clock Chip Installation Chart

Computer	Catalog Number	Socket Location	Clock Software
1000	25-1000	U-10	(1)
1000A	25-1000A	U-51	(1)
1000HD	25-1001	U-10	(1)
		or U-51	(1)
1000EX	25-1050	U-44	(1)
1000HX	25-1053	U-12	(1)
1000RL	25-1450	U-28	(2)
1000RL-HD	25-1451	Built In	
1000RLX	25-1452	Built In	
1000RLX	25-1452B	Built In	
1000RLX-HD	25-1453	Built In	
1000RLX-HD	25-1453B	Built In	
1000RSX	25-1455	Built In	
1000RSX-HD	25-1454	Built In	
1000SL	25-1401	U-13	(3)
1000SL/2	25-1402	U-13	(3)
1000SX	25-1051	U-41	(1)
1000SX	25-1052	U-41	(1)
1000SX	25-1054	U-41	(1)
1000TL	25-1601	Built In	
1000TL/2	25-1602	Built In	
1000TL/3	25-1603	Built In	
1000TX	25-1600	U-39	(4)

Notes:

If you have a hard card in your system and are having trouble getting the hard card to work once you have installed the clock chip, make sure that the hard card is fully seated back into the expansion slot. This problem is most common with the TX. The clock chip sits up high enough that it prevents the hard card from being properly seated back into the expansion slot. You may want to move the hard card to another slot, providing you have another one free.

There is an alternative way to install a clock chip into your computer if you have a hard drive or hard card. You can install the clock chip under the ROM chip on the controller card the same way you would on the motherboard. Simply check the controller card for a ROM chip that has the same number of pins

that the clock chip has. Also make sure that ROM chip is in a socket and not soldered onto the controller card.

If you are using the Delkin Devices clock chip, the most popular clock chip out there, then follow these instructions on using the software. If you are using another brand clock chip, follow the instructions that came with that clock chip.

- (1) Use the DDCLOCK and DDINIT software that came with the clock chip for setting the date/time and recalling the date/time. See below on how to use the DDCLOCK and DDINIT.
- (2) On the 1000RL and 1000RL-HD, simply install the clock then just set the date and time by using the DATE command and TIME command from the DOS prompt. With the clock installed, the system will automatically detect it and when you issue the DATE and TIME command it will automatically set the date and time in the clock chip.
- (3) On the 1000SL and 1000SL/2, DO NOT use the DDCLOCK and DDINIT software that came with the clock chip. Instead use the SLCLK.COM program found on your original DOS disks. See below on how to use the SLCLK program.
- (4) On the 1000TX if you are having problems using the DDCLOCK and DDINIT, then use the SMWCLOCK program that came on your original DOS disk. See below on how to use the SMWCLOCK program.

Using the Clock Software

DDCLOCK and DDINIT

After you have installed the clock chip, follow these steps for installing the software.

1. Copy the DDCLOCK and DDINIT programs to your hard disk or your boot floppy disk.
2. Add the command DDCLOCK to your autoexec.bat file on your hard disk or boot floppy disk.
3. Next, at the DOS prompt type in: TIME to set the time
 then: DATE to set the date.
4. Now you have to initialize the clock chip. At the DOS prompt type in:

```
DDINIT <enter>
DDINIT <enter>
```

You MUST run the DDINIT twice! The first time you run DDINIT it may display a strange date and time. When you run it the second time it should display the proper date and time.

NOTE: If you have a 286 Express Board installed in your 1000, you will need to add the following lines to your autoexec.bat file:

```
PCT 88     <- turn off the 286 express board
DDCLOCK    <- read the clock chip for the date & time
PCT 286    <- turn the 286 express board back on
```

Only add the PCT 88 and PCT 286 lines to your autoexec.bat file only if you have the PCT 286 express board.

SLCLK Software (1000SL and 1000SL/2)

After you have installed the clock chip, follow these steps for installing the software.

1. Copy the SLCLK program to your hard disk or your boot floppy disk.
2. Add the command SLCLK S to your autoexec.bat file on your hard disk or boot floppy disk.

3. Next, at the DOS prompt type in: SLCLK S
next: TIME to set the time
then: DATE to set the date.

4. Now initialize the clock chip. At the DOS prompt
type in:
SLCLK C <enter>

Reboot the computer and the correct date and time should be displayed.

SMWCLOCK Software (1000TX)

After you have installed the clock chip, follow these steps for installing the software.

1. Copy the SMWCLOCK program to your hard disk or your boot floppy disk.
2. Add the command SMWCLOCK S to your autoexec.bat file on your hard disk or boot floppy disk.
3. Next, at the DOS prompt type in: SMWCLOCK S
next: TIME to set the time
then: DATE to set the date.
4. Now initialize the clock chip. At the DOS prompt
type in:
SMWCLOCK C <enter>

Reboot the computer and the correct date and time should be displayed.

Tandy 1000 Interrupts

A hardware interrupt is a signal that is sent to the microprocessor signaling that a device needs attention. Some interrupts are shareable with other devices, it is then possible to have two devices using interrupt 5 or IRQ 5. IRQ is the abbreviation for interrupt.

Depending on which computer you have, you may find that some boards or mice will NOT share an interrupt line with another device. For example, COM 1 and COM 3 both use IRQ 4. If you have a mouse on COM 1 and tried to install a modem on COM 3, the modem would not function properly due to an interrupt conflict. They are both trying to use IRQ 4. Most mouse software will not allow another device to use the same IRQ that the mouse is on.

On the original 1000, 1000A and 1000HD, we have found that most interrupts are NOT shareable. Therefore, you will need to be extra careful when installing cards into these systems. For example, when we install a high density floppy controller into one of these three models, we have to use IRQ 3 or IRQ 4, depending on which one is not being used, as it will not share IRQ 6 where we normally assign it.

The rest of the 1000's seem to share interrupts without too much problem. You will still have the same interrupt problem when it comes to mice and modems. However, you can run a second printer port on IRQ5 with the hard drive sharing that same interrupt or install the high density controller into the system sharing IRQ 6.

It should also be noted that on the original 1000, 1000A, and 1000HD, that the video and hard drive interrupts are reversed from the way that they are normally found in a PC computer. Tandy modeled the interrupts after the IBM PC Jr. It wasn't until the SX and TX came out that Tandy then would give you the option of setting the computer in the PC Jr mode or a standard XT mode, as far as the interrupts where concerned. Most people didn't know that they could set the 1000SX or TX into the standard XT mode. If you have ever bought one of our hard drives or hard cards, you were instructed to turn switch #2 on the motherboard opposite of the other three DIP switches. What we were having you do is set you computer into the standard XT mode, as far as the interrupts were concerned.

When the computer is in the PC Jr mode, the video and hard disk interrupts are reversed as shown below:

1000, 1000A, 1000HD, PC Jr
IRQ 2 = Hard Drive
IRQ 5 = Video

The standard XT mode is as follows:

IRQ 2 = Video
IRQ 5 - Hard Drive

We want to point out that some OLDER software, mainly games, for the original 1000, would only work if the video interrupt was IRQ 5. These games have long been discontinued or updated so this should not be a concern anymore. However, if you still have some of this old software they may not work on the newer systems.

Hard drive controllers for the original 1000, 1000A and 1000HD, need to be modified so the hard drive interrupt will be in IRQ 2. These modifications can be anything from moving some jumpers on the card, to cutting traces and soldering. The extent of the modification will depend on the brand of the controller and model/revision of the card. Check the "Tech Notes & Jumpers Vol 2" manual for details on how to modify the controllers.

Some video boards, when installed into the 1000's, (except 1000, 1000A and 1000HD) may need the DIP switch #2 changed as if you were installing a hard drive into the system.

I/O Addresses

Each device you add into one of the expansion slots requires an I/O address or you will have an address conflict. An easy way to explain I/O addresses is to think of your expansion slots (also called the expansion bus) as the street that you live on. Think of each device as a house on your street and each house has its own house number or street address. Imagine the problem the mailman would have delivering mail if two or more houses would have the same house number. The computer would have the same problem if two boards were using the same address. This is why each expansion card you install must have its own address.

Remember the section on interrupts? We stated that two devices can share the same interrupt, that is because each device using that interrupt will have its own address. But remember to be careful when sharing interrupts.

Serial and Parallel Port Addresses

Serial Ports	Port Address
COM 1	03F8
COM 2	02F8
COM 3	03E8
COM 4	02E8

Parallel Port	Port Address
LPT 1	03BC
LPT 2	0378
LPT 3	0278

Tandy 1000, 1000A, 1000HD Hardware Interrupts

IRQ 0	System	Note: Interrupts (IRQ's) are not shareable on the early 1000, 1000A and 1000HD with most other expansion cards. If an IRQ is free, then you can use it.
IRQ 1	Keyboard	
IRQ 2	Hard Drive	
IRQ 3	COM 2	
IRQ 4	COM 1	
IRQ 5	Video Vertical Sync	
IRQ 6	Floppy Drives	
IRQ 7	Printer LPT 1	

All Other 1000's

IRQ 0	System
IRQ 1	Keyboard
IRQ 2	Video Vertical Sync
IRQ 3	COM 2 / COM 4
IRQ 4	COM 1 / COM 3
IRQ 5	Hard Drive / Printer LPT 2
IRQ 6	Floppy Drives
IRQ 7	Printer LPT 1

1000RSX and 1000RSX-HD

IRQ 0	System
IRQ 1	Keyboard
IRQ 2	Route to interrupts 8 to 15
IRQ 3	COM 2 / COM 4
IRQ 4	COM 1 / COM 3
IRQ 5	Printer LPT 2
IRQ 6	Floppy Drives
IRQ 7	Printer LPT 1
IRQ 8	Real Time Clock
IRQ 9	Reserved
IRQ 10	Available
IRQ 11	Available
IRQ 12	Available
IRQ 13	Math Co-processor
IRQ 14	Hard Drive Controller
IRQ 15	2nd Hard Drive Controller

Hard Drives and Hard Disk Cards

What is the difference between a hard drive and hard card for the 1000's? Nothing really. It's just how they are mounted into the system. The hard cards are made up of a hard disk and controller card, the same two main components that is used for installing a hard drive. They are just mounted together on a special bracket so they plug into one of the expansion slots. The hard drive on the other hand, will require the use of a drive bay and the controller card will use an expansion slot. On some of the 1000's you only have 2 drive bays and if you have two floppy drives installed, this will mean you will have to give up one of your floppy drives. We recommend the hard cards, to save your drive bay. If you have a 3.5" hard drive in your system now and you want to turn it into a hard card, give us a call, we have hard card brackets available, along with an instructional video showing you how to assemble it. It is really very easy to do.

In some systems, such as the RL, RLX and RSX you must use a hard drive. There is not enough room to install a hard card.

Most people think that the speed of the hard drive or hard card lies only with the access time. Companies are selling you on how fast the access time is on the hard drive or hard card. What is more important than the access time is the data transfer rate.

For those of you who are not sure what the access time or data transfer rate is, let us explain it this way. Let's say it takes you 15 seconds to walk to your mail box from the front door. That is your access time. Now it takes you 10 minutes to read the mail. That is your data transfer rate. With a hard drive, the access time is how long it takes the head in the hard drive to move to the location on the disk. The data transfer rate is how fast it can read the data.

You can have a hard disk with a slow 40ms access time, but a fast 500,000 bytes per second transfer, that out performs fast 12ms access time, but a slow 100,000 bytes per second data transfer rate.

What you want is a hard drive system or hard card with a fast access time, 28ms or faster (the lower the number, the faster the drive) and a high data transfer rate (above 400,000 bytes per second).

If you are using an older MFM or RLL drive, you are slowing your system down. These hard drives only had a 30,000 to 170,000 bytes per second data transfer rate. You can buy a program called SpinRite, that will optimize the data transfer rate, but top data transfer rate will be about 170,000.

The newer IDE hard drives or hard cards, have a 400,000 to 500,000 bytes per second data transfer rate. The next time you are using your system, watch to see how long it takes to load that program or data file. Think how much faster it could be with a high transfer rate.

Larger Hard Drives and Hard Cards

Despite what you may have been told, you can run any size hard drive in your system. You are not limited to the 20 or 40 meg that Tandy sold. Also, don't worry, your power supply will handle the larger hard drives and hard cards. Today the newer IDE hard drives and hard cards use less power than hard drive and hard cards made just a few years ago.

Hard Disk Cards must be under 9.5" in length in order to fit inside any of the 1000's. Make sure you buy your hard card from someone who makes them for the 1000's. Don't try to use just any hard card, it won't fit. They are generally 13" long.

The Seagate ST11M (MFM controller) and ST11R (RLL controller) can be used in most of the 1000's without modification. If you want to use this card in the original 1000, 1000A or 1000HD, you have to modify the card. Watch "Secrets of the 1000's, Vol 2" to see the modification being done.

If you are installing this card in the 1000TX or SX, you must change the DIP switch to enable IRQ 5 to be used for the hard drive. See the 1000TX or SX section for more information on setting the switches.

The Western Digital WD1004 card can also be used in all of the 1000's, except the 1000SL and SL/2. The jumpers on the card must be set for a standard XT system. If you are installing this card in the 1000TX or SX, you must change the DIP switch to enable IRQ 5 to be used for the hard drive. See the 1000TX or SX section for more information on setting the switches.

If this card is being used in a 1000, 1000A or 1000HD you must install a jumper onto position W27 to set the hard drive interrupt to IRQ 2.

The Western Digital WD1004 card can be used in the SL and SL/2 with a modification done to the card. This requires a capacitor to be soldered onto the back of the controller card. Watch "Secrets of the 1000's, Vol 2" to see the modification being done.

The older Western Digital WD1002 controller can also be used in the 1000's. See the Tech Notes and Jumper Manual Vol 2 for exact jumper setting. This controller is becoming hard to find. Also this card, depending on the revision, may also need a solder modification and controller ROM change.

If you are planning on using one of the above mentioned controller cards in the original 1000, model 25-1000, you will need to upgrade the BIOS ROM to 01.01.00. THIS ONLY APPLIES TO THE ORIGINAL 1000, MODEL 25-1000!

IDE drives can be installed in all of the 1000's. You will need a Silicon Valley controller card, with a Tandy BIOS ROM. This controller card will work with most AT style IDE hard drives. This card is the most versatile controller we have found. If this controller card is being used in one of the 1000's that have a built-in IDE port, you will need to put a jumper on position E2 of the controller card. For all other systems, no jumpers should be installed.

If you want to use this controller card to run a second hard drive, you will need to place a jumper on E2.

The IDE controller DOES NOT require you to update the BIOS ROM on the original 1000, model 25-1000, like you do with the Seagate or Western Digital controllers.

The Seagate ST01 SCSI controller could be used in all the 1000's, except the TL3, RL, RLX, RSX, original 1000, A and 1000HD. Most smaller SCSI drives have been discontinued for awhile.

NOTE: Some hard drive controllers will not work in the 1000's. We recommend you stick with one of the above cards we have listed. In volume 2, we will have complete jumper setting on hard drive controllers. This volume is more on the systems themselves.

For more information on hard drives, look under the section on your specific 1000.

Floppy Drives

Some of the floppy drives in the 1000's draw power through the floppy drive cable. If you look under the "Power In Floppy Drive Cable Chart" you will see which system and which drives do this. The drives that pull the power through the flat ribbon cable will need to be special drives or specially modified floppy drives. DO NOT try to use a standard 3.5" floppy drive as a replacement or as an additional drive.

The 1000, A, SX and SL can all use a 3.5" 720K floppy drive. For more information on this, please see the section for your computer. NOTE: Some systems may require a longer floppy drive cable for an easier fit. The SL will need a special, longer floppy drive cable. This cable has to be modified so the power will not run through the cable. See the video "Secrets of the 1000's Volume 2" to see how to make this cable.

Adding a 5 1/4" floppy drive can be done on most 1000's. The 1000EX, HX, RL, RLX and RSX will require an external floppy drive. All other systems will use a standard 360K floppy drive. NOTE: Some systems may require a longer floppy drive cable for an easier fit.

External floppy drives can be added to most 1000's. The EX and HX models do require a special external floppy drive. Make sure if you are ordering an external drive for the EX or HX, that it is the proper one for your system.

An external floppy drive can be added to the other 1000's by adding a Micro Solutions Backpack drive. This floppy drive comes as a high density 1.2 meg or 1.44 meg unit. Connect to the this drive system's printer port. If your computer has a 34 pin card edge connector, simply add a second printer port card to your system and run the external floppy drive from this card.

If you have a 1000RL, RLX, RSX or TL/3, you can use the system's main printer port. Make sure you run the setup program for you computer and set the parallel port for Bi-Directional. NOTE: 1000RL owners, see the 1000RL section for a modification that will need to be done.

High Density Floppy Drives

Can't I just change my BIOS ROM to let me run high density drives? No. The problem is not in the system's BIOS ROM, but with the built-in controller. A low density drive transfers data to and from the controller at the rate of 250K per second. The high density drive transfers data at the rate of 500K per second.

Therefore, when you connect a high density drive up to the low density controller, the low density controller CANNOT transfer the data as fast as the high density drive is requiring it to. You will then get a general failure error message. The exception to this is with a 3.5" high density drive. This drive will simply act as a 720K floppy drive. NOTE: If you purchase a 1.44 meg floppy drive now and use it as a 720k floppy drive, later if you buy a new system, all you need to do is remove the 1.44 meg floppy drive from your 1000 and install it into your new computer, and then start using it as a 1.44 meg drive. For the last few years all of the 720K floppy drives that we have been sending out are really 1.44 meg. They work perfectly as a 720K.

This little trick with the high density drives ONLY works with the 1.44 meg drive and WILL NOT work with a 1.2 meg floppy.

Most high density controllers can transfer data at both rates of 250K and 500K. This way you can run either a low density drive or a high density drive from a high density controller.

The 1000TL/3, 1000RLX and 1000RSX support high density drives using the built-in controller. All you need is a high density drive and you're all set. NOTE: The TL/3 came with a 720K drive as A:, even though it can use high density drive.

If you have any of the other 1000's you can still install a high density floppy drive into the 1000's. You will need a Micro Solutions Compaticard II and Compaticard software, a Teac high density floppy drive and a AT style floppy drive cable.

Connect the floppy drive cable to the Compaticard II. Then set the jumpers on the card as follows:

JP1 to position A
JP2 to position A

Interrupt to 6 (if you have a 1000, A or HD use interrupt 3 or 4, whichever one is not being used by something in your system.)

Both DMA jumpers to 1

Install the Compaticard into one of the expansion slots.

The Teac 1.44 meg needs no modification.

The Teac 1.2 meg drive will need a jumper to be placed on the bottom of the drive on jumpers pins I. Depending on how you look at the jumper pins, it may look like an H. This will allow the drive to read/write both high and low density disk.

The Teac Dual Media Drive, is a floppy drive that has both a 1.44 meg and 1.2 meg drive built in to 1 - 5 1/4" drive unit. You will need to solder the two contacts together at position I on the bottom of the drive. This will allow the drive to read/write both high and low density disks.

When connecting the flat ribbon cable to any of the above drives mentioned, you must use the last connector on the flat ribbon cable. This will be the connector with the twist in the cable right at the connector.

Copy the Compaticard software to your hard disk, hard card or boot floppy disk. Then, add one of the following lines to your config.sys file.

```
DEVICE=CCDRIVER.SYS /12,7,3 DMA1 IRQ6 <-- for 1.44 meg
```

```
DEVICE=CCDRIVER.SYS /12,3,3 DMA1 IRQ6 <-- for 1.2 meg drive
```

```
DEVICE=CCDRIVER.SYS /12,3,3 /13,7,3 DMA1 IRQ6 <-- dual media  
floppy drive
```

After you have added one of the above lines to the config.sys file, reboot your system and watch for a message about the Compaticard II loading a driver and assigning the high density drive a drive letter. It will become the last drive in the system.

NOTE: If you have the 1000, 1000A or 1000HD, please change the IRQ6 in the above lines to whichever IRQ that you have the card set to.

Serial Ports and Modems

Modems come in two flavors, internal and external. If you are installing an external modem, you will need a serial port for the external modem to be connected to. You can check the Serial/Parallel Port Chart to see if your system came with a serial port built-in. If your system does not have a serial port and you want to use the external modem, you will need to add a serial port to your system. You may want to add a dual serial port board, this way if you ever want to connect a mouse to the system you will have the extra serial port available.

If you're installing an internal modem, then all you will need is a free expansion slot.

When installing a serial port or modem into your system, make sure that it does not conflict with another serial port that may in be your system. Each serial port or modem has to be set to a specific COM port, such as COM1 or COM2. If you have a modem in your system, make sure you check to see which COM port it is assigned to before you install the serial board. Then set the serial port to a different COM port setting.

There are two main COM ports that can be installed into your system, COM 1 and COM 2. Each COM port is assigned to one of the system's interrupts.

COM 1	=	IRQ 4
COM 2	=	IRQ 3
COM 3	=	IRQ 4
COM 4	=	IRQ 3

As you can see from the above list of COM ports, it is possible to also have a COM 3 and COM 4 installed into your system. It should be noted though, that COM 3 uses the same interrupt (IRQ) as COM 1, and COM 4 uses the same IRQ as COM 2. You must take care when installing more than two COM ports into your system that you don't run into interrupt conflicts.

For example, if you installed 4 serial ports into your system and then connected a mouse to COM 1, the mouse software

will not share the interrupt with another device. So therefore, since COM 3 shares the same interrupt as COM 1, COM 3 will not work correctly.

If you have one of the earlier 1000's and it has a light pen port, we want to point out that this CANNOT be used as a serial port. It has a 9 pin connector and that your mouse will plug into it, but it is not electrically wired the same. This seems to be a common misconception.

VGA Systems

You can run VGA in all of the 1000's, except the original 1000, 1000A and 1000HD. Yes, you can use VGA in the EX and HX. There are some third party manufacturers that supply VGA cards for the EX and HX.

For running VGA on the 1000's, you will need a VGA monitor, 8 bit VGA card or a VGA card that can run in an 8 bit mode and the VGA fix program. Sorry, your CM11 monitor will not work as a VGA monitor. Installation is easy, just plug the VGA card in and connect the VGA monitor to the connector on the back of the VGA card.

What is the VGA fix program?

It is a small program that you load into your autoexec.bat file so that it is executed every time you boot the system. Since the 1000's have built-in CGA, the video display code in memory is automatically set to CGA. Some programs look at the video display code to see if you are running CGA, EGA or VGA. The VGA fix program changes the video display code to read VGA instead of CGA. This program is available from several sources. We offer it on one of our utility disks.

NOTE: The 1000RLX and RSX have built-in VGA.

Keyboards

The earlier 1000's, such as the 1000, A, HD, SX, TX, came with a non-standard 90 key keyboard. You can use a 101 style keyboard on this system, however, you will need a special keyboard that has a built-in converter. Tandy sold a keyboard converter box, at one time, that would allow you to connect a standard keyboard to these systems, however, it has been discontinued for quite some time. You may be able to still find a used one.

DataDesk and Northgate make keyboards that are compatible with these earlier 1000's. They have the keyboard converter built right into the keyboard. DataDesk is no longer making the keyboards, however, you can still find some used ones. Northgate is still producing the keyboards.

If you have a 1000 that came standard with a 101 style keyboard, you can use most any standard keyboard as a replacement. Just make sure the keyboard is switchable between XT and AT. The 1000's will need it set for XT mode. The exception to this is the RSX, this computer will need it in the AT mode.

Mice and Trackballs

Adding a mouse (or trackball) to the 1000's is very simple. All that is required is a serial port, a mouse and a mouse driver program. Not all of the 1000's came with a serial port, so you may have to add one to your system. Check the chart "Serial/Parallel/Other Ports" to see if your system came with one.

Installing a mouse or trackball is very easy to do. After you install the serial board, simply connect the mouse to the serial port and install the mouse software. If your system already has a serial port built-in to it, then simply connect the mouse and install the mouse software.

With most mice, the mouse drivers will automatically install into either the config.sys or autoexec.bat file. If for some reason you are having a problem getting the mouse driver install program to work, try just switching to the drive letter that the mouse software disk is in and type: mouse <enter>. If the mouse driver loads and finds the mouse, simply copy the mouse.com file to the hard disk or boot floppy. Then you can add the mouse command to your autoexec.bat file.

Generally, by loading the mouse driver through the autoexec.bat file you will use less memory. So if you are short on memory, check to see if your mouse software is loading from the config.sys or autoexec.bat.

For those of you who have the Invisible EMS memory board and have it setup to allow you to load device drivers up high and you can't get your mouse driver to load up high, then try another version of the driver. This has happened to us on several occasions and all we did was to use a different version mouse driver. Take a look on your original DOS disk to see if you have an older mouse driver. Tandy supplied an older mouse driver on DOS 3.2 and 3.3.

We want to point out that serial ports will either have a 25 pin connection or a 9 pin connection. If your mouse has a 9 pin connection and your serial port has a 25 pin connection, don't worry, you can buy a 9 to 25 pin adapter. The same holds true if the connections are just the opposite.

If you are installing a serial port in your system, make sure that it does not conflict with another serial port or modem that may be in your system. Each serial port or modem has to be set to a specific COM port, such as COM1 or COM2. If you have a modem in your system, make sure you check to see which COM port it is assigned to before you install the serial board. Then set the serial port to a different COM port setting.

There are two main COM ports that can be installed into your system, COM 1 and COM 2. Each COM port is assigned to one of the system's interrupts.

COM 1 = IRQ 4
COM 2 = IRQ 3

COM 3 = IRQ 4
COM 4 = IRQ 3

As you can see from above the list of COM ports, it is possible to also have a COM 3 and COM 4 installed into your system. It should be noted though, that COM 3 uses the same interrupt (IRQ) as COM 1 and COM 4 uses the same IRQ as COM 2. You must take care when installing more than two COM ports into your system, that you don't run into interrupt conflicts.

For example, if you installed 4 serial ports into your system and then connected a mouse to COM 1, the mouse software will not share the interrupt with another device. So therefore, since COM 3 shares the same interrupt as COM 1, COM 3 will not work correctly.

If you have one of the earlier 1000's and it has a light pen port, we want to point out that this CANNOT be used as a serial port. It has a 9 pin connector that your mouse will plug into, but it is not electrically the same. This seems to be a common misconception.

Some of the later 1000's came equipped with a PS/2 style mouse port. This mouse port requires a PS/2 mouse not a serial mouse. We have noted that some software will not work with the PS/2 mouse on these systems, even though the software has the PS/2 style mouse as an option. If you have a 1000RL and you are having problems with it, check under the BIOS ROM section. There was a bug in the first BIOS ROM for the RL.

NOTES & PROBLEMS:

Over the years we've experienced different problems with mouse and trackball software. The main problem has been compatibility.

Microsoft mouse drivers and Microsoft mice or 100% Microsoft compatible mice, like the DEXXA mouse, seem to work the best. Logitech mice also work fairly good on the 1000's. Stay clear of some of the mice that are not Microsoft mouse compatible. One problem you may run into is getting updated drivers for the mouse. If the mouse is 100% Microsoft compatible, then any of the Microsoft mouse drivers will work.

We have seen some mouse driver software that will not work with earlier versions of DOS, such as DOS 2.11. Check the box the mouse comes in to make sure it will work with your DOS version or upgrade your DOS. Yes, all of the 1000's will work fine with all of the DOS versions currently available.

We have also seen some situations where the mouse software driver would not work with a newer version of DOS or a newer version of an application program. When this happened, we started seeing random lockups. Once we removed the mouse driver from the config.sys or autoexec.bat file the lockups would disappear. By upgrading to a newer version of the mouse driver, solved the problem.

On one rare incident, when we upgraded our word processor to the latest version, it started randomly locking up. We traced the problem back to the mouse driver. We then upgraded to the latest version of the mouse software and we still had lockups. Finally, we used a lower version of the mouse software than what we were originally using and guess what? Everything worked perfectly. The mouse drivers we were using were MicroSoft mouse drivers with a Tandy serial mouse.

Another problem that we have seen, was some of the older mice that were not 100% MicroSoft mouse compatible, would not work with the newer drivers. What would happen is, whenever you move the mouse, the system would lockup.

If you ever start having strange problems, try removing the mouse driver and reboot your system. Then test your program to see if the problem has disappeared.

Turning Off The ROMS

This applies only to those of you who have DOS in ROM, check the chart "Systems With Special Setup Programs". If you want the system to bypass starting up in Deskmate or to bypass booting from the built-in ROM, you will need to run the setup program for your system. Once you have the setup menu on the screen, look for a setting that says:

Primary Startup Device	set it to DISK
Initial Startup Program	set it to DOS

You will now bypass booting up into Deskmate and booting off the ROMs. This setting will also allow you to install a higher DOS version, such as DOS 5 or 6.

Upgrading to DOS 5 and 6

PLEASE NOTE: We are not responsible for any loss of your data through the use of these instructions, these are informational only. Please backup your system before installing DOS 6.0

DOS 6 comes on high density disks (1.2 meg and 1.44 meg disks) from Microsoft. If you need them on low density disks (360K and 720K floppy disks), you will have to fill out the form in the back of the DOS 6 manual and mail it to Microsoft.

Should I Have One Large Hard Disk Partition or Leave My Hard Disk Partitioned As It Is? (Applies to drives over 33 Megs)

This is entirely up to you. We still have our hard disk partitioned. Why? Easier hard disk management for some of our systems. For example, in one of our systems, we have a 150 Meg hard disk. The first partition contains DOS, DOS utilities, our network software, and other management type files. The second partition, has Windows and Windows application software, such as Pagemaker, Publisher's Paint Brush, etc. The third partition contains our data base and related files. The fourth partition contains our communication programs, word processing, our fax software, etc. The fifth partition contains our junk files, these are all the programs that don't fall under any of the other categories. The way we have the disk setup makes it easier for us to manage.

One thing you should know about when creating partitions is how it will effect the cluster size. What's a cluster? A cluster is the smallest amount of hard disk space allocated to each file and depending on the partition size you may end up with a 2k (2048 bytes) or 4k (4096 bytes) cluster.

A cluster is made up of 4 or 8 sectors, each sector is 512 bytes long.

0	512	1024	1536	2048	2K Cluster made up of
-----	-----	-----	-----		4 sectors.

A 4K cluster would be double this size.

Let's say you wrote a short note to a friend and it was only 800 characters long, you would use 1 cluster (2048 bytes) of hard disk space to store this 800 byte (character) file. If your disk was using 4K clusters you would use 4096 bytes of hard disk space to store this 800 byte file. You can see that you can waste a lot of hard disk space with small files and a large cluster size.

The table below shows you what partition size uses which cluster size:

1 to 15 megs uses a 4k cluster	
16 to 127 megs uses a 2k cluster	<---- Best choice.
128 to 200 megs uses a 4k cluster	

As you can see the best partition size is 16 to 127 megs.

What Is DoubleSpace and Should I Use It?

This is a disk compression program. What it does is it will compress programs in size when it writes to the disk and uncompress them when it reads them from the disk. By compressing the size of the program you will be able increase the storage capacity of your hard drive. DoubleSpace will also work on floppy disks too. So you can increase the amount of storage space on each floppy disk. The one draw back to doubling your floppy drive space is that the disk will only be readable on your system or another system that is also running DoubleSpace. Disk compression is not for everyone. Some people love it, while others hate it. If you should use DoubleSpace, make sure you have a good backup of your hard disk before you run this program. If you find yourself running out of hard drive space and need a little more space, this may be what you're looking for.

NOTE: If you are running Windows (1000RSX Owners), we don't recommend using DoubleSpace. We have had problems with it along with hearing many other users reporting problems with it.

There are two options that you can use with DoubleSpace that we want you to be warned about. The first one is the /delete option. Use this with extreme caution. This will delete a DoubleSpace drive and all the files that are stored on the compressed drive!

The other option is the /format option. With DOS 6 you can recover your files from a drive that had been formatted, however, once you format a DoubleSpace drive all the files are gone forever!

SPECIAL NOTES:

- * Don't run DoubleSpace from Windows or DOSSHELL.
- * A hard drive must have at least 1 meg free space if it is going to be compressed.
- * A floppy disk must have at least 200K if it is going to be compressed.

The DEFRAG command.

This program will allow you to defragment your hard disk, thus increasing performance. When a hard drive has become too fragmented it means that the files are broken up into small pieces and stored at various locations on the hard disk. When you need to access one of these fragmented files, the hard disk has to run to all different locations on the hard drive reading each little piece. This slows down the hard drive access time. If the file was defragmented, the file would be stored as one large piece so the hard disk would just go to one location and read the entire file, thus speeding up hard disk access time.

SPECIAL NOTES:

- * Before you run DEFRAG, it is always advisable to make a backup.
- * Do not run DEFRAG from within Windows or DOSSHELL.
- * It is advisable to run DEFRAG about once a month.

If you have 3.5" 720K floppy drives on your 1000.

DOS 6 on the 1000's will assume that all floppy drives are 360K. If you have a 720K 3.5" floppy drive, you will need to add a line to your config.sys file. If not, it will format your 720K floppy disks to just 360K.

We have had some reports of the drivparm not working correctly. We have not had any problems here, so give it a try.

If the 720K is an A: drive then use this line:

```
drivparm /d:0
```

If the 720K is a B: drive then use this line:

```
drivparm /d:1
```

Remember to reboot your system after you have added the above line to the config.sys file.

After you have rebooted try formatting a 720k floppy disk. It should format out to 720K.

If drivparm did not work for you, then try using the driver.sys command. We have never had any reports of it not working properly.

If the 720K is an A: drive then use this line:

```
device=c:\dos\driver.sys /d:0 /f:2
```

If the 720K is a B: drive then use this line:

```
device=c:\dos\driver.sys /d:1 /f:2
```

Remember to reboot your system after you have added the above line to the config.sys file.

When using driver.sys, when you boot the system up, watch on the screen for the system to report that it is loading an external device driver and it will assign it a drive letter like E: or F:. Remember this letter, as you will need to call your 720K drive by this letter for formatting a disk.

Example: Let's say your drive B: is a 720K floppy drive. When you boot the system up it is loading an external device driver call E:. Whenever you want to format a 720K floppy drive in B: you will now call it E:. Like this: FORMAT E: What this does is it tells DOS 6 that this is to be formatted as a 720K floppy drive, if you tried to run FORMAT B:, it will only format to 360K. Remember that DOS 6 thinks all of your floppy drives are 360K.

MSD - Microsoft Diagnostic Program

MSD is a diagnostic type program. It will report the type of computer, BIOS, memory, video, network, com ports, printer ports, game ports, IRQ settings, device drivers, and much more.

When you run MSD, it can take several minutes for it to look around your system, so be patient. If for some reason, the system should hang, try running MSD /I, this will not do a hardware scan. We have found that we have to use the /I option on some of the 1000's, depending on how we have them configured.

If you have a monochrome monitor you will need to run MSD /B this will disable the color in MSD.

Installing DOS 6.0

SPECIAL NOTE:

Before you start to load DOS 6.0, if you have a 1000 TL, TL/2, TL/3, SL, SL/2, RL, RLX, HX or any other Tandy computer that can boot out of ROM, you will need to make the following changes in your system's setup. (NOTE: If you do not have one of the systems listed above you can skip to the next section. Remember there are over 14 models of the 1000, make sure you know which model you have.)

Run your setup program for your system and make sure you have the system set for:

Booting (or startup) from DISK, Not ROM
Startup Program should be DOS, Not Deskmate

The above wording will vary from system to system, but this is close. If you are not sure of how to run your setup program, PLEASE READ YOUR MANUAL. Don't just go prancing around in your system setup file, you may accidentally change something you did not want to change.

If you are a current user of Deskmate out of ROM, you will need to get the updated stand-alone version of Deskmate. The latest version is 3.5. When you load DOS 6.0 into your system, it can turn off the ROMS and disable Deskmate.

Running SETUP

The SETUP program installs DOS 6.0 onto floppies or your hard disk. You must install DOS 6 from either A: or B: drive. If your system has an add-on 1.44 meg or 1.2 meg floppy drive and is not labeled as drive A or B you will need to obtain DOS 6 on low density. (NOTE: See Other Ways To Install DOS 6, at the end of this paper). There are several options that can be used when installing DOS 6.0 with the setup program.

SETUP	Does a standard installation.
SETUP /I	This cause DOS 6 to skip the hardware detection. 1000 owners, this may be needed with some systems. We have had to use the /I option on several 1000's when loading DOS 6. Try to load without the /I first, if you run into a problem try running SETUP with the /I option.
SETUP /F	Installs DOS 6 onto floppy disks. This will create a bootable set of floppy disks.
SETUP /B	For installing with a monochrome monitor.

There are several other options, however, these are the ones most likely needed by the 1000 owner.

The first thing you need to do is to know which version DOS you are currently using. Boot your system and watch the screen as it boots up, it will tell you the version DOS during the boot-up.

Now go to one of the following sections:

If you have a hard disk that is 33 megs or LESS, go to INSTALLING DOS 6.0.

If you are using DOS 3.2 and you have more than 33 megs of hard disk space go to the DOS 3.2 SECTION now!

If you are using DOS 2.11, 3.3, 4.01 or 5.0 regardless of your hard disk size go to INSTALLING DOS 6.0.

NOTE: We are going to have you install DOS onto the hard disk first, then create a bootable floppy. Why are we doing it this way? Several people have called us and said that they some how made a mistake and ruined one of the installation disks when trying to create a bootable floppy. This may seem like the long way to do it, but it has proven to be a safer way for a lot of people.

INSTALLING DOS 6.0

1. Run the setup program for your system, if it has one, and make sure you set the startup device to be DISK and the startup program to be DOS.
2. Boot your system and get to the C> prompt.
3. Backup your system now, if you want to. Once you are done backing up your system, insert the DOS 6.0 Disk 1 into drive A:.
4. Type in A:SETUP and follow the instructions on your screen. Remember, if you are having trouble getting SETUP to run properly, try using one of the SETUP options we discussed earlier.
5. Once you have completed installing DOS 6.0, if you are going to change the partition size skip to REPARTITIONING WITH DOS 6.
6. If you are NOT going to change the partition size, you are now done, skip to CREATE A BOOT RECOVERY DISK. Just remember, if you have Deskmate in ROM, it is now disabled.

DOS 3.2 SECTION (SX & TX owners mainly)

This is for users that have DOS 3.2 and hard drives LARGER than 33 megs. If your hard drive is NOT larger the 33 megs then go back up to the Installing DOS 6.0 section.

You are going to have to remove the partition that was created with Tandy's MLPART program. DOS 6.0 does not see this as a valid partition. You will need to remove it with MLPART and then recreate it with FDISK after you have installed DOS 6.0.

1. Backup all your data now!
2. Run the MLPART program from you hard disk or DOS 3.2 Supplemental disk.
3. When you run the MLPART program you will be greeted with a menu. Select option number 2 Delete DOS2 partition. Warning:

you are about to lose all the data on the D: partition of the hard drive. Make sure you have backed it up.

You will be asked if you are sure, if you are press Y. If not press N and go back-up that data.

After you press Y, the system may pause for a second. Then follow the instructions on the screen. You will need to reboot the system when you are done, so remember to remove any disks that may be in drive A.

3. Boot your system and get to the C> prompt.

4. Insert the DOS 6.0 Disk 1 into drive A: and type in A:SETUP and follow the instructions on your screen.

5. Once you have completed installing DOS 6.0, if you are going to change the partition size (i.e., make just one large partition) skip to CREATE A BOOT RECOVERY DISK and then to REPARTITIONING WITH DOS 6.

If you just want to leave the partitions alone, then you will need to reboot now and run FDISK to put back the D partition that you removed with MLPART.

6. At the C> prompt, type FDISK. A menu will be displayed.

- A. Select Option Number 1 Create DOS Partition
- B. Another menu comes up.
- C. Select Option Number 2 Create Extended Partition
- D. You will be asked to enter the partition size, press ENTER.
- E. You will see a message "Extended DOS partition created", then press ESC.
- F. FDISK will now ask you to define the logical disk drives.
- G. You will be asked to enter the logical drive size, press ENTER.
- H. A message will come up telling you that "All available space in the Extended DOS Partition is assigned to logical drives". Press ESC to return to the main menu. Press ESC to exit FDISK. You will need to reboot your system now.
- I. When you are back at the C> prompt, type FORMAT D: and press enter. Confirm that you want to format D by pressing Y and enter. You are now formatting the D partition. When you are done, you can restore your backup onto the D drive. Your old DOS 3.2 has been saved on your C drive, it is in the directory OLD_DOS. You will need the restore command from there to restore your data.

You are now done, please continue to CREATE A BOOT recovery DISK.

CREATE A BOOT RECOVERY DISK.

Since the DOS 6.0 upgrade package is non-bootable, you should create a system boot disk and add some of the DOS 6.0 programs listed below to allow you to correct or recover from any mistake you may make. You can also create a complete set of bootable disks by using the SETUP /F command, instead of installing it onto your hard disk. The way we are about to show you, we feel is a little faster and easier.

1. Put a blank disk in drive A.
2. At the C> prompt, type `FORMAT A: /S /U` to format the disk.
3. Once the format is complete copy the following files from the hard disk to this disk. ie. `COPY C:\DOS\FDISK.EXE A:`

FDISK.EXE	FORMAT.COM	SYS.COM
DEBUG.EXE		

Depending on the size of your floppy disk, you will also want to copy the following files:

UNFORMAT.COM	UNDELETE.COM	RECOVER.EXE
BACKUP.EXE	RESTORE.EXE	CHKDSK.EXE
XCOPY.EXE		

With all of these files on your boot recovery disk, if you should some how delete or mess up your hard drive so it will not boot anymore, you will have this disk that you can boot from to get back to the hard disk. With some of the commands such as UNFORMAT (when used in conjunction with MIRROR) and UNDELETE, you should be able to recover most files you may have lost. Please read up on these commands in your DOS manual, now, before you need to use them.

This boot recovery disk is also needed when repartitioning the hard disk. Please make one now. After you have made this disk, make sure you can boot off of it. If you can, then make a couple of copies and store them in a safe place.

REPARTITIONING WITH DOS 6.0

If you want to change the partition size of the hard drive you will first need to load DOS 6.0, then create a boot recovery disk. This disk will have the FDISK and FORMAT programs on it that are needed in order to repartition the drive. If you want just one partition or to change the size of your partitions you will need to backup your entire hard disk.

1. After you have backed up your entire hard disk, then from the boot recovery disk and at the A> prompt type `FDISK <enter>`.
2. From the FDISK menu, select option 3 Delete partition.
3. A second menu will come up. You must delete partitions in the following order, Delete Logical DOS Drives, then Delete Extended DOS Partition, and then Delete Primary DOS Partition. You now should select option 3 Delete Logical DOS Drives. You will be asked to enter the Volume Label. Look at the top part of the screen where it gives you information about the drives. It will list the Volume Label here, if there is one. If the drive does not have one, just press ENTER.

You will need to delete each logical drive, one at a time, starting with the last drive letter. For example, let's say you have a drive that has four partitions, C:, D:, E:, and F:. You will need to delete F: first, then E:, then D:. Then you would delete the Extended Partition. Then you would delete the Primary Partition.

4. After you have deleted the Logical Partition(s), you will then need to press ESC. This will take you back to the main menu.
5. Again select option 3 Delete Partition.
At the next menu select option 2 Delete Extended DOS Partition. You are then asked if you want to delete the extended partition, press Y and then ENTER.
Then press ESC to return to the main menu.
6. From the main menu press 3 Delete Partition
This time select 1 Delete Primary DOS Partition
When it asks you which partition to delete press 1.
It will then ask you for the Volume Label, look on the top part of the screen and see if anything is listed under Volume Label. If so, enter the volume label, if not, just press ENTER.

You will then be asked if you want to delete the partition, answer Y. Then press ESC to get back to the main menu.

7. After you have deleted all the partitions, you may want to select option 4 Display Partition Information, to make sure everything is deleted.
8. Now press ESC to exit the FDISK menu. DO NOT create your new partitions yet. It is really best to reboot the system BEFORE creating any new partitions, use your Boot Recovery Disk to boot from. We have had a few systems do weird things when you delete a partition and then re-create one without rebooting. So to be safe, reboot.
9. After you have booted and are back at the A> prompt, run FDISK again. When the menu comes up select option 1 Create

A DOS Partition.

If you are going to have just one big partition, then follow these next steps. If you are going to have more than one partition, skip down to MULTIPLE PARTITIONS.

If you are going to create just one partition for the entire hard drive then do the following steps:

At the C> prompt, type FDISK. A menu will be displayed.

- A. Select Option Number 1 Create DOS Partition.
- B. Another menu comes up.
- C. Select Option Number 1 Create Primary DOS Partition.
- D. You will be asked if you want to use the maximum size and make it active, answer Y and press ENTER.
- E. The system will pause for a few seconds, then you will be instructed to reboot the system, use your Boot Recovery Disk to boot from.
- F. When you are back at the A> prompt, type FORMAT C: /S and press enter. Confirm that you want to format by pressing Y and enter. You are now formatting the C partition.
- G. When you are done, install the DOS 6.0 upgrade again and then you can restore your backups.

YOU ARE DONE.

MULTIPLE PARTITIONS

If you are going to create more than one partition, then follow these steps: (NOTE: The system may pause for a few seconds after each selection, this is normal).

At the A> prompt, type FDISK. A menu will be displayed.

- A. Select Option Number 1 Create DOS Partition.
- B. Another menu comes up.
- C. Select Option Number 1 Create Primary DOS Partition.
- D. You will be asked if you want to use the maximum size and make it active, answer N and press ENTER.
- E. The system will pause for a few seconds, then you will be asked to specify the size of the partition in either megabytes or percentages. If you enter just a number, FDISK will interpret this as megabytes. To enter a percentage, type the percent symbol (%) after the number.
- F. Then press ESC to return to the main menu.
- G. You will notice a message now on the screen saying that there is no partition that is active. At this time select option 2 Set Active Partition.
- H. Select partition 1 to make active. If you don't, your system will not boot off of the hard disk. Press ESC to exit.

- I. Back at the main menu, select option 1 Create DOS Partition. At the next menu, select option 2 Create Extended DOS Partition.
- J. FDISK will automatically calculate the size of the extended partition and display it. Just press ENTER to accept this.
- K. Press ESC, the system will pause and state that there are no logical drives defined. After another pause, it will display the logical drive size using the entire extended partition.
- L. Enter the size you want the D partition to be and press ENTER.
- M. Continue entering the sizes of each partition that you want until you have used up all of the space in the extended partition.
- N. When you are done, press ESC to exit to the main menu.
- O. Select option 4 Display Partition Information and make sure everything is correct. Press ESC to return to the menu.
- P. If everything is okay, press ESC to exit FDISK. If you need to make any changes, delete the partitions and start again.
- Q. Reboot your system with the boot recovery disk. At the A>, type `FORMAT C: /S` then press ENTER. Press Y to confirm that you wish to format the hard disk.
- R. Now type in `FORMAT D:` and press ENTER. Repeat this step for each of the partitions that you have created.
- S. When you have completed formatting all of the partitions, load your DOS 6.0 upgrade on the hard disk.

YOU ARE DONE.

MORE MLPART NOTES: DOS 3.2 owners only.

If you had DOS 3.2 on your system and the hard drive was over 33 megs then you would have had a line in your config.sys file that looked like this: `device=mlpart.sys c: PLEASE` remove this line from your config.sys file while you are using DOS 6.0

VSAFE

This is an anti-virus program that we recommend EVERYONE run. You would be surprised at how many people have a program on their disk that has been infected by a virus. We receive many calls each day from customers who think that there is a problem with their hardware, when it is really a virus. Systems won't boot, they may get read/write errors, strange video problems, and more. Please, run this program.

OTHER WAYS TO INSTALL DOS 6

Here are two methods of loading DOS 6 that have been reported to us.

The first one is, if you have a high density drive, either a 1.2 or 1.44 meg, that is not the A or B drive, then try running the SETUP /F option to install to the floppies first. Since you will be installing these onto a low density floppy disk you will need a lot of them. Manually install to the hard disk from the low density disks that you just made.

Second, if you again have a 1.2 or 1.44 floppy drive that is not A or B drive, then make a directory on the disk called DOS60. Copy the files from the floppies to the directory on the hard disk called DOS60. After all the floppies are copied, then switch to the hard disk and change into the DOS60 directory and run SETUP /I.

ISA 8 bit Expansion Slot

Below lists the pin outs for a standard 8 bit bus. Most of the 1000's conform to this standard.

A1	-	NMI	B1	-	Ground
A2	-	SD7	B2	-	Reset
A3	-	SD6	B3	-	+ 5 volts
A4	-	SD5	B4	-	IRQ 2
A5	-	SD4	B5	-	- 5 VOLTS
A6	-	SD3	B6	-	DRQ 2
A7	-	SD2	B7	-	-12 VOLTS
A8	-	SD1	B8	-	N/A
A9	-	SD0	B9	-	+12 VOLTS
A10	-	IOCHRDY	B10	-	GROUND
A11	-	AEN	B11	-	SMEMW
A12	-	SA19	B12	-	SMEMR
A13	-	SA18	B13	-	SIOW
A14	-	SA17	B14	-	SIOR
A15	-	SA16	B15	-	DACK3
A16	-	SA15	B16	-	DRQ3
A17	-	SA14	B17	-	DACK1
A18	-	SA13	B18	-	DRQ1
A19	-	SA12	B19	-	REFRESH
A20	-	SA11	B20	-	SYS CLOCK
A21	-	SA10	B21	-	IRQ7
A22	-	SA9	B22	-	IRQ6
A23	-	SA8	B23	-	IRQ5
A24	-	SA7	B24	-	IRQ4
A25	-	SA6	B25	-	IRQ3
A26	-	SA5	B26	-	DACK2
A27	-	SA4	B27	-	TC
A28	-	SA3	B28	-	BALE
A29	-	SA2	B29	-	+ 5 VOLTS
A30	-	SA1	B30	-	OSC
A31	-	SA0	B31	-	GROUND

Tandy 1000

Catalog Number 25-1000

CPU Type : 8088
CPU Speed : 4.77 Mhz
Math Co-proc : N/A
Standard Memory: 128K, on motherboard
Total Memory : 640k, requires special memory cards
Video Memory : N/A
Expansion Slots: 3 - 8 bit XT slots (10" long)
Video Output : CGA & Composite Monochrome
Power Supply : 54 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 5 1/4" 360K came standard
Drive Bays : 2 - 5 1/4" drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Light Pen Port - DB 9
: Composite Video - RCA connector
: Audio Output - RCA connector

DOS Version : MSDOS 2.11
Latest BIOS ROM: 01.01.00

1000 Motherboard Jumpers

E5-E6 connect clock to video logic
E8-E9 connect 8 Mhz clock to FDC clock divider
(this is the CPU speed)
E21-E22 select active drive ready signal constantly

Memory Boards

Tandy produces 3 different memory boards to be used in the 1000, 1000A and 1000HD. The catalog numbers are:

25-1004 25-1009 25-1011

Several third party manufacturers have also produced memory boards for the 1000's. Some of these memory boards were also multifunction boards. This means that they also would have a clock/calendar and/or serial port built onto the memory board. If you are in need of a memory board, try asking around on Compuserve or Prodigy. Also check out your local computer shows.

The DMA circuitry for the system is on the memory boards. The DMA chip will be one of the following chips:

8237A-5 8237AC-5 8237A-5P 8237AC-5P

25-1004 256K Memory Expansion Board

Expands system from 128K to 256K and from 256K to 384K.

This board came standard with 128K on it, with 2 rows of empty sockets for adding another 128K. This board only uses 64K x 1 drams. There are 4 jumper pins labeled E1 to E4. These jumpers are used to configure the memory board for the amount of memory and if there is a DMA chip present. The jumpers are located at the bottom of the memory board near the middle.

E1-E2	Off, indicates 128k of RAM on the board
E1-E2	On, indicates 256K of RAM on the board (Only install jumper if you have added the extra 128K to this board)
E3-E4	Off, indicates DMA chips is present. Do Not jumper these pins together on this board.

25-1009 2nd 128k Memory Expansion Board.

Expands system from 384K to 512K and from 512K to 640K.

This board came standard with 128K on it, with 2 rows of empty sockets for adding another 128K. This board only uses 64K x 1 drams. There are 4 jumper pins labeled E1 to E4. These jumpers are used to configure the memory board for the amount of memory. The jumpers are located at the bottom of the memory board near the middle. This board will not have a DMA chip.

E1-E2	Off, indicates 128k of RAM on the board
E1-E2	On, indicates 256K of RAM on the board (Only install jumper if you have added the extra 128K to this board)
E3-E4	ON, indicates no DMA chip is present. This must be jumpered at all times.

Remember the 25-1004 board must be installed first and have 256k of memory on it before adding the 25-1009 memory board. Each memory board will use a slot.

25-1011 Memory Plus Expansion Board

Expands system from 128K up to 640K.

This memory board will only use 1 slot to expand your system to 640K. The memory board can use 64K x 1 or 256K x 1 chips, depending on the jumper settings. The jumpers are located at the bottom of the memory board, in the center. This board has three configurations:

2 banks of 64k chips	E1-E2 OFF	
	E3-E4 Jumpered	for 256K total
1 bank of 256k chips	E1-F2 Jumpered	
	E3-E4 OFF	for 384K total
2 banks of 256k chips	E1-E2 OFF	
	E3-E4 OFF	for 640K total

This board also has a 62 pin connector located just above the card edge connector. This is also referred to as a Plus style connector. The reason for this connector was since the 1000, 1000A and 1000HD only had 3 expansion slots, this extra connector would give the customers a way to install more expansion cards. Tandy, along with other third party manufacturers, produced several boards such as a serial board, clock/calendar with Digi Mouse port, a 300 and 1200 baud modem and a network adapter that would fit onto this 62 pin plus connector.

CPU and Math Co-Processor Notes:

The CPU is an 8088 processor. You can replace this processor with a V-20 processor for improved performance. Check chart "Math Co-Processors" for CPU socket location.

Even though there is no math co-processor socket, there is a way to add a math co-processor. There is a Trionix 8087 adapter that is sold through Tandy Special Order Hardware.

1000 Floppy Disk Drives

5 1/4" 360K Floppy Drives

Teac FD-54B 5.25" 360k floppy disk drive (standard)

Teac FD-55B can also be used. Note a longer floppy drive controller cable may be needed. Tandy part number W-0124.

The floppy drives are selectable as A: or B: through jumper settings on the floppy drive.

DS0	=	A: drive
DS1	=	B: drive
DS2	=	N/A on this system
DS3	=	N/A on this system

Note: The on-board floppy controller will support a 720K floppy drive as A: or B:. Depending on the DOS version you may need to add a drivparm or driver.sys statement to your config.sys file. More information on installing a 5 1/4" floppy drive may be found on the "Secrets of the 1000's" video.

3.5" 720K Floppy Drives

You can add a 3.5" 720K floppy drive to your system. You will need the following:

- 3.5" Floppy Drive
- 5 1/4" Mounting Frame
- MSDOS 3.2 or Higher
- Longer Floppy Drive Cable (optional, but helpful)

You will need to configure the drive to be either drive A: or drive B: by changing the drive select jumpers, like above with the 5 1/4" drives.

You will also need to add one of the two following lines to your config.sys file.

```
drivparm=/D:0    <-- if the 3.5" drive is drive A:
```

```
drivparm=/D:1    <-- if the 3.5" drive is drive B:
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line, the system will think that it is only a 360k floppy.

NOTE: It is possible to install a 1.2 or 1.44 meg floppy drive into this system. See the section on High Density Floppy Drives.

Hard Drives

This system will handle a hard drive or hard card. Unless you are installing an IDE hard drive, you will need to have the BIOS upgraded to 01.01.00. To see if your system already has this BIOS ROM installed, boot the system and watch the screen to display the ROM BIOS version.

If you are installing an MFM or RLL hard drive or hard card into this system you will have to have the controller card modified to use IRQ2 as the hard drive interrupt. If you are installing an

IDE hard drive or hard card, just make sure it has a Tandy BIOS on the controller.

Serial Ports

This system does not have a built-in serial port, one can be added though. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Info

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location.

Keyboard Notes:

The 1000, 1000A and 1000HD do not use a standard keyboard interface. It is possible to connect a 101 style keyboard to these 1000's. You will either need a special keyboard converter Tandy part number 25-1030 (has been discontinued for awhile) or a keyboard with the converter built-in. Tandy produced a keyboard, model 25-4038 with a converter built-in.

There are also a couple of third party manufacturers that have made keyboards for the 1000's, they are Datadesk and Northgate. When connecting up the Northgate keyboard, you will need to change the DIP switch setting found under the name plate.

Video Notes:

The on-board video cannot be disabled. Therefore, optional video boards will not work in this system.

This system supports monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution		
4	320 x 200	2	640 x 200
16	320 x 200	4	640 x 200
16	160 x 200		

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA0	4	- Ground
5	- DATA1	6	- Ground
7	- DATA2	8	- Ground
9	- DATA3	10	- Ground
11	- DATA4	12	- Ground
13	- DATA5	14	- Not Connected
15	- DATA6	16	- Ground
17	- DATA7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- BUSY	26	- Not Connected
27	- Ground	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Auto Feed
33	- Ground	34	- Not Connected

Motherboard Power Connector

1	- +5 Volts
2	- +5 Volts
3	- +5 Volts
4	- Ground
5	- Ground
6	- Ground
7	- Ground
8	- -12 Volts
9	- +12 Volts

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

Light Pen Port (DB 9)

1	- +5 volts
2	- Ground
3	- Light Pen IN
4	- Light Pen Switch
5	- Not Connected
6	- Not Connected
7	- Not Connected
8	- Not Connected
9	- Not Connected

Keyboard Connector

1	- Keyboard Data
2	- Keyboard Busy
3	- Ground
4	- Keyboard Clock
5	- +5 Volts
6	- Keyboard Reset
7	- Multi Data
8	- Multi Clock

RGB Port (CGA Video)

1	-	Ground	6	-	Intensity
2	-	Ground	7	-	+12 volts
3	-	RED	8	-	Horizontal Sync
4	-	Green	9	-	Vertical Sync
5	-	Blue			

Floppy Drive Port

1	-	Ground	2	-	Not Connected
3	-	Ground	4	-	Not Connected
5	-	Ground	6	-	Not Connected
7	-	Ground	8	-	Index
9	-	Ground	10	-	Drive 0 Select
11	-	Ground	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	Ground	30	-	Read Data
31	-	Ground	32	-	Disk Side Select
33	-	Ground	34	-	Drive Ready/Disk Change

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Hard Disk (Video On IBM)
3	Com Port 2
4	Com Port 1
5	Video (Hard Disk On IBM)
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller

Tandy 1000A

Catalog Number 25-1000A

CPU Type : 8088
CPU Speed : 4.77 Mhz
Math Co-proc : 8087
Standard Memory: 128K, on motherboard
Total Memory : 640k, requires special memory cards
Video Memory : N/A
Expansion Slots: 3 - 8 bit XT slots (10" long)
Video Output : CGA & Composite Monochrome
Power Supply : 54 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 5 1/4" 360K came standard
Drive Bays : 2 - 5 1/4" drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Light Pen Port - DB 9
: Composite Video - RCA connector
: Audio Output - RCA connector

DOS Version : MSDOS 2.11
Latest BIOS ROM: 01.01.00

This system is very similar to the 1000 (25-1000). The main differences are:

- Math co-processor socket
- Newer BIOS ROM, ver 01.01.00
- Fixed some technical problems found in the 1000.

1000A Motherboard Jumpers

E1-E2 connect clock crystal to circuit
E3-E4 select continuous floppy drive ready (wired jumper)
E6-E7 connect printer select to parallel port
E8-E9 indicates there is no co-processor installed
(remove E8-E9 when math co-processor is installed)

Note: E6-E7 should be removed to use of some IBM software and/or IBM compatible printers. This may be necessary for some IBM programs that uses the status line for printer control. If you have an earlier version of the 1000 (non 1000A) there is a tech mod that can be done by Tandy that is equivalent to this jumper.

Memory Boards

Tandy produces 3 different memory boards to be used in the 1000, 1000A and 1000HD. The catalog numbers are:

25-1004 25-1009 25-1011

Several third party manufacturers have also produced memory boards for the 1000's. Some of these memory boards were also multifunction boards. This means that they also would have a clock/calendar and/or serial port built onto the memory board. Currently none of them are producing memory boards for the early 1000's anymore. If you are in need of a memory board, try asking around on CompuServe or Prodigy. Also check out your local computer shows.

The DMA circuitry for the system is on the memory boards. The DMA chip will be one of the following chips:

8237A-5 8237AC-5 8237A-5P 8237AC-5P

25-1004 256K Memory Expansion Board

Expands system from 128K to 256K and from 256K to 384K.

This board came standard with 128K on it, with 2 rows of empty sockets for adding another 128K. This board only uses 64K x 1 drams. There are 4 jumper pins labeled E1 to E4. These jumpers are used to configure the memory board for the amount of memory and if there is a DMA chip present. The jumpers are located at the bottom of the memory board near the middle.

E1-E2	Off, indicates 128k of RAM on the board
E1-E2	On, indicates 256K of RAM on the board (Only install jumper if you have added the extra 128K to this board)
E3-E4	Off, indicates DMA chips is present. Do Not jumper these pins together on this board.

25-1009 2nd 128k Memory Expansion Board.

Expands system from 384K to 512K and from 512K to 640K.

This board came standard with 128K on it, with 2 rows of empty sockets for adding another 128K. This board only uses 64K x 1 drams. There are 4 jumper pins labeled E1 to E4. These jumpers are used to configure the memory board for the amount of memory. The jumpers are located at the bottom of the memory board near the middle. This board will not have a DMA chip.

1000 Floppy Disk Drives

5 1/4" 360K Floppy Drives

Teac FD-54B 5.25" 360k floppy disk drive (standard)

Teac FD-55B can also be used. Note: a longer floppy drive controller cable may be needed. Tandy part number W-0124.

The floppy drives are selectable as A: or B: through jumper settings on the floppy drive.

DS0	=	A: drive
DS1	=	B: drive
DS2	=	N/A on this system
DS3	=	N/A on this system

Note: The on-board floppy controller will support a 720K floppy drive as A: or B:. Depending on the DOS version you may need to add a drivparm or driver.sys statement to your config.sys file. More information on installing a 5 1/4" floppy drive may be found on the "Secrets of the 1000's" video.

3.5" 720K Floppy Drives

You can add a 3.5" 720K floppy drive to your system. You will need the following:

- 3.5" Floppy Drive
- 5 1/4" Mounting Frame
- MSDOS 3.2 or Higher
- Longer Floppy Drive Cable (optional, but helpful)

You will need to configure the drive to be either drive A: or drive B: by changing the drive select jumpers, like above with the 5 1/4" drives.

You will also need to add one of the two following lines to your config.sys file.

```
drivparm=/D:0    <-- if the 3.5" drive is drive A:
drivparm=/D:1    <-- if the 3.5" drive is drive B:
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line, the system will think that it is only a 360k floppy.

NOTE: It is possible to install a 1.2 or 1.44 meg floppy drive into this system. See the section on High Density Floppy Drives.

Hard Drives

This system will handle a hard drive or hard card.

If you are installing an MFM or RLL hard drive or hard card into this system you will have to have the controller card modified to use IRQ2 as the hard drive interrupt. If you are installing an IDE hard drive or hard card, just make sure it has a Tandy BIOS on the controller.

Serial Ports

This system does not have a built-in serial port, one can be added. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Info

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location.

Keyboard Notes:

The 1000, 1000A and 1000HD do not use a standard keyboard interface. It is possible to connect a 101 style keyboard to these 1000's. You will either need a special keyboard converter Tandy part number 25-1030 (has been discontinued for awhile) or a keyboard with the converter built-in. Tandy produced a keyboard, model 25-4038 with a converter built-in.

There are also a couple of third party manufacturers that have made keyboards for the 1000's, they are Datadesk and Northgate. When connecting up the Northgate keyboard, you will need to change the DIP switch setting found under the name plate.

Video Notes:

The on-board video cannot be disabled. Therefore, optional video boards will not work in this system.

This system supports monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow it to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA0	4	- Ground
5	- DATA1	6	- Ground
7	- DATA2	8	- Ground
9	- DATA3	10	- Ground
11	- DATA4	12	- Ground
13	- DATA5	14	- Ground
15	- DATA6	16	- Ground
17	- DATA7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- BUSY	26	- Not Connected
27	- Ground	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Auto Feed
33	- Ground	34	- Not Connected

Motherboard Power Connector

1	- +5 Volts
2	- +5 Volts
3	- +5 Volts
4	- Ground
5	- Ground
6	- Ground
7	- Ground
8	- -12 Volts
9	- +12 Volts

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

Light Pen Port (DB 9)

1	- +5 volts
2	- Ground
3	- Light Pen IN
4	- Light Pen Switch
5	- Not Connected
6	- Not Connected
7	- Not Connected
8	- Not Connected
9	- Not Connected

Keyboard Connector

1	- Keyboard Data
2	- Keyboard Busy
3	- Ground
4	- Keyboard Clock
5	- +5 Volts
6	- Keyboard Reset
7	- Multi Data
8	- Multi Clock

RGB Port (CGA Video)

1	-	Ground	5	-	Blue
2	-	Ground	6	-	Intensity
3	-	RED	7	-	+12 volts
4	-	Green	8	-	Horizontal Sync
			9	-	Vertical Sync

Floppy Drive Port

1	-	Ground	2	-	Not Connected
3	-	Ground	4	-	Not Connected
5	-	Ground	6	-	Not Connected
7	-	Ground	8	-	Index
9	-	Ground	10	-	Drive 0 Select
11	-	Ground	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	Ground	30	-	Read Data
31	-	Ground	32	-	Disk Side Select
33	-	Ground	34	-	Drive Ready/Disk Change

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Hard Disk (Video On IBM)
3	Com Port 2
4	Com Port 1
5	Video (Hard Disk On IBM)
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller

Tandy 1000HD

Catalog Number 25-1001

CPU Type : 8088
CPU Speed : 4.77 Mhz
Math Co-proc : 8087
Standard Memory: 256K, on motherboard
Total Memory : 640k, expandable on memory card
Video Memory : N/A
Expansion Slots: 3 - 8 bit XT slots (10" long)
Video Output : CGA & Composite Monochrome
Power Supply : 54 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 5 1/4" 360K came standard
Hard Drive : 1 - 10 Meg MFM hard disk
Drive Bays : 2 - 5 1/4" drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Light Pen Port - DB 9
 : Composite Video - RCA connector
 : Audio Output - RCA connector

DOS Version : MSDOS 2.11
Latest BIOS ROM: 01.01.00

This system is very similar to the 1000A (25-1000A). The main differences are:

- 10 Meg Hard Disk Installed
- MSDOS 2.11 with Hard Disk Utilities
- Came with the memory board 25-1011, that is expandable to 640K by changing the memory chips and jumper settings.

1000HD Motherboard Jumpers

E1-E2 connect clock crystal to circuit
E3-E4 select continuous floppy drive ready (wired jumper)
E6-E7 connect printer select to parallel port
E8-E9 indicates there is no co-processor installed
(remove E8-E9 when math co-processor is installed)

Note: E6-E7 should be removed to use of some IBM software and/or IBM compatible printers. This may be necessary for some IBM programs that uses the status line for printer control. If you have an earlier version of the 1000 (non 1000A) there is a tech mod that can be done by Tandy that is equivalent to this jumper.

Memory Boards

This system came standard with the memory board 25-1011. This board is expandable to 640K.

The DMA circuitry for the system is on the memory board. The DMA chip will be one of the following chips:

8237A-5 8237AC-5 8237A-5P 8237AC-5P

25-1011 Memory Plus Expansion Board

This memory board can use 64K x 1 or 256K x 1 chips, depending on the jumper settings. The jumpers are located at the bottom of the memory board, in the center. This board has three configurations:

2 banks of 64k chips	E1-E2 OFF	
	E3-E4 Jumpered	for 256K total
1 bank of 256k chips	E1-F2 Jumpered	
	E3-E4 OFF	for 384K total
2 banks of 256k chips	E1-E2 OFF	
	E3-E4 OFF	for 640K total

This board also has a 62 pin connector located just above the card edge connector. This was also referred to as a Plus style connector. The reason for this connector was since the 1000, 1000A and 1000HD only had 3 expansion slots, this extra connector would give the customers a way to install more expansion cards. Tandy, along with other third party manufacturers, produced several boards such as a serial board, clock/calendar with Digi Mouse port, a 300 and 1200 baud modem and a network adapter that would fit onto this 62 pin plus connector.

CPU and Math Co-Processor Notes:

The CPU is an 8088 processor. You can replace this processor with a V-20 processor for improved performance. The math co-processor is installed in the empty socket located next to the CPU. Once you have installed the math co-processor you must remove the jumper at E8-E9.

1000 Floppy Disk Drives

5 1/4" 360K Floppy Drives

Teac FD-54B 5.25" 360k floppy disk drive (standard)

Teac FD-55B can also be used. Note: A longer floppy drive controller cable may be needed. Tandy part number W-0124.

These floppy drives are selectable as A: or B: through jumper settings on the floppy drive.

DS0	=	A: drive
DS1	=	B: drive
DS2	=	N/A on this system
DS3	=	N/A on this system

Note: The on-board floppy controller will support a 720K floppy drive as A: or B:. Depending on the DOS version, you may need to add a drivparm or driver.sys statement to you config.sys file. More information on installing a 5 1/4" floppy drive may be found on the "Secrets of the 1000's" video.

3.5" 720K Floppy Drives

You can add a 3.5" 720K floppy drive to your system. You will need:

- 3.5" Floppy Drive
- 5 1/4" Mounting Frame
- MSDOS 3.2 or Higher
- Longer Floppy Drive Cable (optional, but helpful)

You will need to configure the drive to be either drive A: or drive B: by changing the drive select jumpers, like above with the 5 1/4" drives.

You will also need to add one of the two following lines to your config.sys file.

```
drivparm=/D:0    <-- if the 3.5" drive is drive A:
```

```
drivparm=/D:1    <-- if the 3.5" drive is drive B:
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line, the system will think that it is only a 360k floppy.

NOTE: It is possible to install a 1.2 or 1.44 meg floppy drive into this system. See the section on High Density Floppy Drives.

Hard Drives

This system will handle a hard drive or hard card.

If you are installing an MFM or RLL hard drive or hard card into this system you will have to have the controller card modified to use IRQ2 as the hard drive interrupt. If you are installing an

IDE hard drive or hard card, just make sure it has a Tandy BIOS on the controller.

Serial Ports

This system does not have a built-in serial port, one can be added. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Info

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location.

Keyboard Notes:

The 1000, 1000A and 1000HD do not use a standard keyboard interface. It is possible to connect a 101 style keyboard to these 1000's. You will either need a special keyboard converter Tandy part number 25-1030 (has been discontinued for awhile) or a keyboard with the converter built-in. Tandy produced a keyboard, model 25-4038 with a converter built-in.

There are also a couple of third party manufacturers that have made keyboards for the 1000's, they are Datadesk and Northgate. When connecting up the Northgate keyboard, you will need to change the DIP switch setting found under the name plate.

Video Notes:

The on-board video cannot be disabled. Therefore, optional video boards will not work in this system.

This system supports monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow it to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution.

Display Modes

80 lines by 25 lines
40 lines by 25 lines
16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA0	4	- Ground
5	- DATA1	6	- Ground
7	- DATA2	8	- Ground
9	- DATA3	10	- Ground
11	- DATA4	12	- Ground
13	- DATA5	14	- Ground
15	- DATA6	16	- Ground
17	- DATA7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- BUSY	26	- Not Connected
27	- Ground	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Auto Feed
33	- Ground	34	- Not Connected

Motherboard Power Connector

1	- +5 Volts
2	- +5 Volts
3	- +5 Volts
4	- Ground
5	- Ground
6	- Ground
7	- Ground
8	- -12 Volts
9	- +12 Volts

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

Light Pen Port (DB 9)

1	- +5 volts
2	- Ground
3	- Light Pen IN
4	- Light Pen Switch
5	- Not Connected
6	- Not Connected
7	- Not Connected
8	- Not Connected
9	- Not Connected

Keyboard Connector

1	- Keyboard Data
2	- Keyboard Busy
3	- Ground
4	- Keyboard Clock
5	- +5 Volts
6	- Keyboard Reset
7	- Multi Data
8	- Multi Clock

RGB Port (CGA Video)

1	- Ground	6	- Intensity
2	- Ground	7	- +12 volts
3	- RED	8	- Horizontal Sync
4	- Green	9	- Vertical Sync
5	- Blue		

Floppy Drive Port

1	-	Ground	2	-	Not Connected
3	-	Ground	4	-	Not Connected
5	-	Ground	6	-	Not Connected
7	-	Ground	8	-	Index
9	-	Ground	10	-	Drive 0 Select
11	-	Ground	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	Ground	30	-	Read Data
31	-	Ground	32	-	Disk Side Select
33	-	Ground	34	-	Drive Ready/Disk Change

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Hard Disk (Video On IBM)
3	Com Port 2
4	Com Port 1
5	Video (Hard Disk On IBM)
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller

Tandy 1000EX

Catalog Number 25-1050

CPU Type : 8088
CPU Speed : 4.77 Mhz / 7.16 Mhz Switchable
Math Co-proc :
Standard Memory: 256K, on motherboard
Total Memory : 640k, expandable on memory card
Video Memory : N/A
Expansion Slots: 1 Plus Style Connector
Video Output : CGA & Composite Monochrome
Power Supply : 28 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 5 1/4" 360K came standard
Hard Drive :
Drive Bays :
Floppy Ctrl : Low density
Ext Floppy Port: 1 - External floppy drive port for 360K or 720K

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Composite Video - RCA connector

DOS Version : MSDOS 2.11
Latest BIOS ROM: 01.02.00

There are two main motherboard revisions. Revision A and D

1000EX Motherboard

The EX has two main logic boards, revision A and D. The jumper settings are the same for both boards.

E1-E2 off: pulls up printer select line to +5V (standard)
on: connects printer select line to printer port

E1-E2 should be removed to use of some IBM software and/or IBM compatible printers. This may be necessary for some IBM programs that uses the status line for printer control.

System Memory

The EX computer comes with 256k of RAM on the motherboard and is expandable to 640K with the following memory board.

EX/HX Memory Plus Expansion Adapter part number 25-1062.
This board comes with 128K of memory on it and you can add a 256K memory kit to bring the total system memory up to 640K. There is a set of jumpers labeled

E1, E2 and E3 that selects the amount of RAM that is installed on the memory board. They are as follows:

- E1-E2 Jumpered, selects only 128k on the memory board. This brings the total memory up to 384K.

- E2-E3 Jumpered, selects that 128K and the 256K memory kit is on the memory board. This brings the total memory up to 640K.

The 128K memory that comes on the expansion board is made up of four (4) 64 x 4 150ns RAM chips. They plug into sockets U9 - U12 on the memory board.

The 256k memory kit for this board is made up of eight (8) 256 x 1 150ns RAM chips. They plug into sockets U1-U8 on the memory board.

There are several third party memory boards that will work in the 1000EX and 1000HX computers. These boards will take you to 640K and possibly beyond.

After installing the memory board, the system should boot up with either 384K or 640K memory, depending on how much memory was installed on the memory expansion board.

CPU and Math Co-Processor Notes:

The CPU is an 8088 processor. You can replace this processor with a V-20 processor for improved performance. There is not a math co-processor socket.

Floppy Drive Notes

1000EX FD55BV 5.25" 360k Floppy Disk Drive

These floppy drives are selectable as A: or B: through jumper settings on the floppy drive.

DS0	=	A: drive
DS1	=	B: drive
DS2	=	N/A on this system
DS3	=	N/A on this system

The drive select jumpers are located on the bottom of the floppy drive, near the card edge connector for the floppy drive controller cable. The floppy drive must be set for DS0 when installed inside the computer case.

It is possible to use a 3.5" 720K floppy drive in the EX as drive A. All you will need is a 3.5" drive, the 5 1/4" mounting frame, MSDOS 3.2 or higher and you may need a longer floppy drive cable. You have to make sure that the drive select jumper on the 720K floppy drive is set to DS0. Then add this line to your config.sys:

```
drivparm=/D:0
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line the system will think that it is only a 360k floppy.

Plus Style Expansion Connector.

The 1000EX and 1000HX do not have standard expansion slots, instead they use a 62 pin expansion connector. When you add a memory board to your system, it will plug onto this connector and the memory board will contain either 1 or 2 additional expansion connectors, depending on the memory board manufacturer.

The expansion boards you will use in this system are the Plus style expansion boards. Since they are not making any Plus style expansion cards anymore, several third party companies have come up with ways to connect a standard XT type expansion board into your system. This is usually done through an adapter. When using these adapters, the boards may fit in a little differently. However, the boards will work just fine, they just may install funny. When using these adapters, it may be best for you to leave the expansion slot cover on top of the computer off.

Hard Drives

Even though Tandy never brought out a hard drive for this system, many third party manufacturers did. Due to space limitations inside the system, the hard drive will have to be an external unit. You will need to have 384K of memory or higher and you will also need a hard disk controller card that has been setup for the EX or HX. You will also need to update your DOS version to DOS 3.2 or higher.

Some of the external hard drives will have a power supply in the hard drive case. This is only necessary when the external hard drive draws more power than the computer's power supply can handle. When using the newer 3.5" hard drives that are 1" high, it is possible to use the computer's power supply to run the hard disk, as these newer hard drives draw very little power.

You can use any brand hard drive, as long as you have the proper controller card. The controller must be designed for connection into the EX/HX. Also depending the type of controller card, you may need a special BIOS ROM on the hard disk controller.

Serial Ports

This system does not have a built-in serial port, one can be added. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Notes:

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location and software information.

Keyboard Notes:

The keyboard is built-in to the case of the computer and is not interchangeable.

Video Notes:

This system supports monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Not Connected
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Auto Feed
33	- Ground	34	- Not Connected

Audio Jack

1	- Ground
2	- Audio Out

Composite Video

Center	Video Out
Outside	Ground

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Floppy Drive Port - Internal

1	-	Ground	2	-	Not Connected
3	-	Ground	4	-	Not Connected
5	-	Ground	6	-	Not Connected
7	-	Ground	8	-	Index
9	-	Ground	10	-	Drive 0 Select
11	-	Ground	12	-	Not Connected
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	Ground	30	-	Read Data
31	-	Ground	32	-	Disk Side Select
33	-	Ground	34	-	Not Connected

Floppy Drive Port - External

1	-	+12 volt	2	-	+5 volt
3	-	+12 volt	4	-	+5 volt
5	-	Ground	6	-	+5 volt
7	-	Ground	8	-	+5 volt
9	-	Ground	10	-	Index
11	-	Ground	12	-	Track 0
13	-	Ground	14	-	Step
15	-	Side Select	16	-	Motor On
17	-	Direction	18	-	Ground
19	-	Write Protect	20	-	Ground
21	-	Read Data	22	-	Ground
23	-	Write Date	24	-	Ground
25	-	Write Enable	26	-	Ground
27	-	Not Connected	28	-	+12 volt
29	-	Ext Drive Select	30	-	+12 volt

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000HX

Catalog Number 25-1053

CPU Type : 8088
CPU Speed : 4.77 Mhz / 7.16 Mhz Switchable
Math Co-proc :
Standard Memory: 256K, on motherboard
Total Memory : 640k, expandable on memory card
Video Memory : N/A
Expansion Slots: 1 Plus Style Connector
Video Output : CGA & Composite Monochrome
Power Supply : 28 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive :
Drive Bays : 2 - 3.5" internal drive bays
Floppy Ctrl : Low density
Ext Floppy Port: 1 - External floppy drive port for 360K or 720K

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Composite Video - RCA connector

DOS Version : MSDOS 2.11 In ROM
Latest BIOS ROM: 02.00.00

1000HX Motherboard

The HX has only one jumper setting, that is:

E1-E2 off: pulls up printer select line to +5V (standard)
on: connects printer select line to printer port

E1-E2 should be removed to use of some IBM software and/or IBM compatible printers. This may be necessary for some IBM programs that uses the status line for printer control.

System Memory

The HX computer comes with 256k of RAM on the motherboard. It is made up of 8 - 64 x 4 DRAMs. The memory is expandable to 640K with the following memory board.

EX/HX Memory Plus Expansion Adapter part number 25-1062.
This board comes with 128K of memory on it and you can add a 256K memory kit to bring the total system memory up to 640K. There is a set of jumpers labeled E1, E2 and E3 that selects the amount of RAM that is

installed on the memory board. They are as follows:

- E1-E2 Jumpered, selects only 128k on the memory board. This brings the total memory up to 384K.

- E2-E3 Jumpered, selects that 128K and the 256K memory kit is on the memory board. This brings the total memory up to 640K.

The 128K memory that comes on the expansion board is made up of four (4) 64 x 4 150ns RAM chips. They plug into sockets U9 - U12 on the memory board.

The 256k memory kit for this board is made up of eight (8) 256 x 1 150ns RAM chips. They plug into sockets U1-U8 on the memory board.

There are several third party memory boards that will work in the 1000EX and 1000HX computers. These boards will take you to 640K and possibly beyond.

After installing the memory board, the system should boot up with either 384K or 640K memory, depending on how much memory was installed on the memory expansion board.

CPU and Math Co-Processor Notes:

The CPU is an 8088 processor. You can replace this processor with a V-20 processor for improved performance. There is not a math co-processor socket.

1000HX Sony 3.5" 720k Floppy Disk Drive, Model MFD-63W-70D

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to pull the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system.

Both power and control is handled through the flat ribbon cable that attaches to the floppy drive. DO NOT attempt to use a standard 3.5" 720K floppy drive in this system. They will not handle the power being supplied through the floppy controller cable.

The floppy drive model that was used is the Sony MP-F63-70D. Drive selection is through a slide switch on the side of the drive.

- DS0 = A: drive, slide switch positioned all way to the rear of the floppy drive.
- DS1 = B: drive, slide switch positioned second notch from the rear of the floppy drive.

NOTE: A modified Teac FD235-F and FD235HF can also be used. This drive has to be modified to handle the power through the flat ribbon cable.

Since this drive has been discontinued, several third party companies have come out with replacement drives. These drives are a modified version of a standard 3.5" floppy drive. These modified drives have been setup to accept power through the flat ribbon data cable. These third party drives are normally TEAC drives and you may find the face plate a little darker than the white case. However, these drives, when modified, fit and work just fine in the HX.

If you decide to use a higher version of MSDOS on the HX, you may need to add the drivparm line to your config.sys file.

```
drivparm=/D:0      <-- For drive A
drivparm=/D:1      <-- For drive B
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line, the system will think that it is only a 360k floppy.

Plus Style Expansion Connector.

The 1000EX and 1000HX do not have standard expansion slots, instead they use a 62 pin expansion connector. When you add a memory board to your system, it will plug onto this connector and the memory board will contain either 1 or 2 additional expansion connectors, depending on the memory board manufacturer.

The expansion boards you will use in this system are the Plus style expansion boards. Since they are not making any Plus style expansion cards anymore, several third party companies have come up with ways to connect a standard XT type expansion board into your system. This is usually done through an adapter. When using these adapters, the boards may fit in a little differently. However, the boards will work just fine, they just may install funny. When using these adapters, it may be best for you to leave the expansion slot cover on top of the computer off.

Hard Drives

Even though Tandy never brought out a hard drive for this system, many third party manufacturers did. You can install either an internal hard disk or an external hard disk. Generally the internal hard disks will cost less, therefore are more popular. When installing the hard disk internally, you will need to remove the B: floppy drive, as this is where the hard disk will fit. You will need to have 384K of memory or higher and you will also need a hard disk controller card that has been setup for the EX or HX. You will also need to update your DOS version to DOS 3.2 or higher.

You will need to run the SETUPHX program and set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

This way the hard drive and new DOS can bypass the built-in DOS and boot directly from the hard disk.

We recommend only using a 1" high 3.5" hard disk or smaller inside the HX. These hard drives draw very little power from the power supply. When you remove the B: floppy drive, you may be left with an open space where the B: floppy drive face plate was. An easy way to cover this opening is to get a piece of plastic from a hobby shop, paint it white, then glue it to the inside cover of the computer case.

You can use any brand hard drive, as long as you have the proper controller card. The controller must be designed for connection into the EX/HX. Also depending on the type of controller card, you may need a special BIOS ROM on the hard disk controller.

The HX Setup Program

This computer has part of MSDOS 2.11 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS prompt without having to insert a floppy disk into drive A.

Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

There is also an EEPROM in the system that contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPHX to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPHX program.

Check For Config.sys On Drive A	YES
Check For Autoexec.bat On Drive A	YES

Then create the config.sys and/or autoexec.bat file on a disk and leave it in the A: drive when booting. Also copy any files that are needed or called for in the config.sys or autoexec.bat to this floppy disk. The system will boot from ROM then read drive A: for the config.sys or autoexec.bat file.

Using A Higher Version DOS

You will need to boot the system with the old version DOS and run the SETUPHX program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

Serial Ports

This system does not have a built-in serial port, one can be added. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Notes:

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location and software information.

Video Notes:

This system supports monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Not Connected
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Auto Feed
33	- Ground	34	- Not Connected

Audio Jack

1	- Ground
2	- Audio Out

Composite Video

Center	Video Out
Outside	Ground

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Not Connected
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Not Connected

NOTE: Power is supply on the floppy drive controller cable.
These lines are normally ground lines.

Floppy Drive Port - External

1	-	+12 volt	2	-	+5 volt
3	-	+12 volt	4	-	+5 volt
5	-	Ground	6	-	+5 volt
7	-	Ground	8	-	+5 volt
9	-	Ground	10	-	Index
11	-	Ground	12	-	Track 0
13	-	Ground	14	-	Step
15	-	Side Select	16	-	Motor On
17	-	Direction	18	-	Ground
19	-	Write Protect	20	-	Ground
21	-	Read Data	22	-	Ground
23	-	Write Date	24	-	Ground
25	-	Write Enable	26	-	Ground
27	-	Not Connected	28	-	+12 volt
29	-	Ext Drive Select	30	-	+12 volt

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000RL
Tandy 1000RL-HD

Catalog Number 25-1450 (1000RL)
Catalog Number 25-1451 (1000RL-HD)

CPU Type : 8086
CPU Speed : 4.77 Mhz / 9.44 Mhz Switchable
Math Co-proc :
Standard Memory: 512K, on motherboard
Total Memory : 768K
Video Memory : 128K, when system is at 768K memory
Expansion Slots: 1 XT style, 10" long
Video Output : CGA & Monochrome
Power Supply : 25 Watt

Keyboard : 101 style keyboard, PS/2 connector
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive : 1 - 20 or 40 meg hard disk on RL-HD model only
Drive Bays : 2 - 3.5" internal drive bays
Floppy Ctrl : Low density
Ext Floppy Port:

Printer Port : DB-25, built-in to motherboard
Serial Port : DB-9
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone
: PS/2 Mouse Port

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 02.00.01

This system has part of DOS in ROM. Therefore, if your system only has floppy drives, you will have a drive C:, which is the ROM. If you system has a hard drive, drive D: or E: will be the ROM. If you are using a higher version of DOS than DOS 3.3 which came with the system, the ROM will be turned off.

WARNING: Do not turn the power off and then on right away. Due to the power draw by the hard drive, you may damage the power supply!

1000RL Motherboard
Jumper Settings

E12-E13 connects the video interrupt to IRQ5. This is for some of the older software that was written specifically for the original 1000. Note: This jumper setting may cause your video to roll if some other device is using this interrupt, such as some hard drive controllers.

E13-E14 connects the hard drive interrupt, IRQ5 to the IDE hard drive port. (Default Setting)

E14-E15 connects IRQ2 to the hard drive IDE port. It is really not recommended to use this setting. Not all software will run correctly on IRQ2.

E2-E3 connects SLCTIN (select interrupt) to the printer port.

E3-E4 disconnects SLCTIN from the printer port.

On some motherboards E12, E13, E14 and E15 may be labeled as:

```
VSYNC
IRQ5      <----| Jumper IRQ5 with HDIRQ   (default)
HDIRQ     <----|
IRQ2
```

There is another jumper setting on the small satellite board located at the top inside rear of the computer. There are three jumper pins, with the center being common. This is how they are marked and your choices are:

```
E6 Microphone Input  <----+
                       |
E7      Common Pin   <----+
                       |
E8 Line Audio Input  <----+
```

Place the jumper on either the common pin and the microphone input or the common pin and the line audio input.

Microphone Input: For connecting a microphone to the computer input.

Line Audio Input: Allows you to input line-level output from music keyboards, stereos and other audio equipment.

Main Logic Board Chips

U1 - Custom IC for floppy support
U3 - Character generator
U4 - Floppy controller
U6 - Video controller
U15 - Keyboard, PS/2 mouse interface, floppy interface, interrupt controller
U16 - Printer, sound, joystick and serial port controller
U17 - 8086 CPU
U18 - Setup EEPROM
U27 - DMA, DRAM controller
U28 - Clock chip socket
U29 - Real time clock on RL-HD only
U30 - ROM BIOS

System Memory

The RL and RL-HD computer comes with 512K of RAM on the motherboard and is expandable to 768K directly on the motherboard. You will need to install 2 - 256k x 4 dram chips into sockets U19 and U23.

This will provide you with a total memory of 768K. One important note is that the memory above 640k is used for video RAM. Before you installed the 256K memory upgrade, the video would use some of the 512k base memory for video RAM. By installing the extra 256k memory, you not only upgrade to 640k, but you stop the video from using any of the lower 640k since the video will have its own 128k of memory.

CPU and Math Co-Processor Notes:

The CPU is an 8086 processor and it is not changeable. There is not a math co-processor socket.

1000RL & RL-HD 3.5" 720K Floppy Drive, Teac FD235F-105U

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1

On some models of the Teac floppy drive, the D0 and D1 may be labeled as DS0 and DS1. Left pins of RY and DC should be jumpered. (connects ready input to pin 34 of ribbon cable signal, all other jumpers should be off. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive, as you will short out your system.

Teac is well known for changing the part numbers on their drives. The above listed model number is for the factory supply drive. There are other models of the Teac drives that will work in the RL and RL-HD. These drives are a modified version of a standard 3.5" floppy drive. These modified drives have been setup to accept power through the flat ribbon data cable. Make sure when you order an A: or B: drive for the RL and RL-HD that it has the correct eject button. Some third party companies will have you cut up your computer case in order to install their drives. The proper drive will have no face plate and have a blue eject button. The RL and RL-HD has the floppy drive face plate built-in to the case.

Hard Drives

The RL and RL-HD has a built-in IDE interface. It is an XT IDE interface, however it is not the same as the industry standard AT IDE interface. It looks like an AT IDE interface, but it is electrically different. The XT interface will only support a 20 or 40 meg XT IDE hard drive. DO NOT try to use an AT interface drive connected to the XT interface on the motherboard! The only three models recommended for this system are:

Seagate ST325X	20 Meg Hard Disk
Seagate ST351A/X	40 Meg Hard Disk
Seagate ST352A/X	40 Meg Hard Disk

The ST351A/X and ST352A/X are really the same drive. Both of these drives are XT and AT interface switchable by changing the jumper settings found on the side of the drive. For more information see Tech Notes & Jumper Manual Vol 2.

Tandy calls these hard drives "Smart Drives". It's their name for IDE Hard Drives. When you purchase one of these hard drives from Tandy, they will supply you a disk to partition the hard disk, format it, and install Deskmate. This process takes about an hour on the 40 meg hard drive.

If you purchase your hard drive from a third party company, they will usually come pre-formatted, so all you have to do is copy DOS onto the hard disk. In the worst case, you would have to partition the hard disk yourself and format it following their instructions. This should take no more than 10 minutes. Just remember, always follow the directions sent with the drive from the place you purchased it from!

NOTE: Never run HSECT or AUTOFORMAT on these hard drives. It can render them useless. We have a way to recover the drives though, we will have more instructions on that in Vol 2.

Let's say you want to install a larger than 40 meg hard drive into your system. You can! You will need a hard drive kit that has an IDE controller with a Tandy BIOS ROM.

Notes: Only 2 floppy disk drives or 1 floppy disk drive and 1 hard drive can be installed.

ST351A/X Jumper Setting

JP1 is toward the front of the drive, JP9 is closest to the rear of the drive.

JP1	1-2	Not jumpered
JP2	3-4	Jumpered
JP3	5-6	Not jumpered
JP4	7-8	Not jumpered

JP5	9-10	Jumpered
JP6	11-12	Not jumpered
JP7	13-14	Not jumpered
JP8	15-16	Not jumpered
JP9	17-18	Jumpered

The RL Setup Program

The SETUPRL program gives you access to the system's setup configuration. It is important to run this program when installing floppy disk drives, video options, startup boot options, configuration options, etc.

NOTE: SETUPRL /A option will give you additional setup information for video memory size, certain chip selects, network options, etc. Be careful when running the /A option.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPRL program.

Check For Config.sys On Drive	A	or	C
Check For Autoexec.bat On Drive	A	or	C

Select A drive if you only have floppy drives.
 Select C drive if you have a hard drive.

Using A Higher Version DOS

You will need to boot the system with the old version DOS and run the SETUPRL program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A: or from a hard disk.

Clock Chip Notes

The smartwatch or clock chip option is installed in the 28 pin socket at U28. You do not need any clock software to set the clock or run it. Simply install the clock then set the date and time by using the DATE command and TIME command from the DOS prompt. When a clock is installed the system will automatically detect it and when you issue the DATE and TIME command it will automatically set the date and time in the clock chip.

The RL-HD (25-1451), has a Lithium CMOS battery on the motherboard. This battery is also for the built-in Smartwatch on this model only. NOTE: This may not apply to all RL-HD models.

Power Supply

There is a 25 watt power supply in this system. The power supply is cooled by vents rather than a cooling fan. This is the same power supply used in the 1000 RL, RLX, RLX-B and RSX.

External Floppy Drive Support

The RL and RL-HD has the printer port set for uni-directional. The external floppy drive need the printer port set for bi-directional. Under the satellite board there are three solder pads labeled E2-E3-E4. You need to solder E2 to E3 to enable the printer port to work in bi-directional mode.

You will need to install the driver EXTDRV.RSYS in the config.sys file for the external drive to function.

Serial Port

The serial port has a 9 pin connector located on the back of the computer. You can change the serial port from COM 1 to COM 2 through the SETUPRL program.

Mouse Notes:

The RL and RL-HD use a PS/2 style mouse. If your Deskmate randomly locks up when using the PS/2 style mouse with the RL or RL-HD, then change the ROM to the 02.00.01 version. There is a compatibility problem between the mouse driver in the ROM and Deskmate. The new ROM has a revised mouse driver.

We have noted that some software will not work with the PS/2 mouse on RL and RL-HD, even though the software has the PS/2 style mouse as an option. If that happens, you will need to use a serial mouse.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, whereas the TGA mode will allow you to display up to 16 colors.

The RL and RL/HD only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

CGA: By running SETUPRL /A, you can adjust the amount of video memory the system is using. If you have 768K of memory installed and you are having problems with programs not displaying their screen or loss of sound or lockups when running some programs, try adjusting the amount of memory used for the video. This seems to fix alot of problems with Sierra games and children's software.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200
16	640 x 200
Mono	720 x 348 Hercules Graphics Mode

VGA: This system can use VGA, however, it will use the system's only expansion slot. VGA card must be able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port - The printer port is a DB 25 connector.

Pin	Use	Pin	Use
1	- STROBE	2	- Data 0
3	- DATA 1	4	- Data 2
5	- DATA 3	6	- Data 4
7	- DATA 5	8	- Data 6
9	- DATA 7	10	- Printer Acknowledge
11	- Busy	12	- Paper Out
13	- Select	14	- Auto Feed
15	- Printer Fault	16	- Initialize
17	- Select In	18	- Ground
19	- Ground	20	- Ground
21	- Ground	22	- Ground
23	- Ground	24	- Ground
25	- Ground		

Audio Jack

1	- Audio Sound
2	- Ground

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground	6	- Intensity
2	- Ground	7	- Green - Mono
3	- RED	8	- Horizontal Sync
4	- Green	9	- VerticalSync
5	- Blue		

Floppy Drive Port - Internal

1	- Not Connected	2	- Not Connected
3	- + 5 Volts	4	- Not Connected
5	- + 5 Volts	6	- Not Connected
7	- + 5 Volts	8	- Index
9	- + 5 Volts	10	- Drive 0 Select
11	- + 5 Volts	12	- Drive 1 Select
13	- Ground	14	- Not Connected
15	- Ground	16	- Motor On
17	- Ground	18	- Direction
19	- Ground	20	- Step
21	- Ground	22	- Write Data
23	- Ground	24	- Write Enable
25	- Ground	26	- Track 0
27	- Ground	28	- Write Protect
29	- + 12 Volts	30	- Read Data
31	- + 12 Volts	32	- Disk Side Select
33	- + 12 Volts	34	- Disk Change

NOTE: Power is supply on the floppy drive controller cable. These lines are normally ground lines.

Keyboard Connector

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

PS/2 Mouse

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Power Supply Connector

1	-	-12 volts	4	-	Ground
2	-	+12 volts	5	-	+5 volts
3	-	Ground	6	-	+5 volts

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000RLX
Tandy 1000RLX-HD

Catalog Number 25-1452 (1000RLX)
Catalog Number 25-1453 (1000RLX-HD)

CPU Type : 80286
CPU Speed : 5 Mhz / 10 Mhz Switchable
Math Co-proc :
Standard Memory: 512K, on motherboard (RLX)
: 1 Meg on motherboard (RLX-HD)
Total Memory : 1 Meg
Expansion Slots: 1 XT style, 10" long
Video Output : VGA
Power Supply : 25 Watt

Keyboard : 101 style keyboard, PS/2 connector
Floppy Drive : 1 - 3.5" 1.44 Meg came standard
Hard Drive : 1 - 40 meg hard disk on RLX-HD model only
Drive Bays : 2 - 3.5" internal drive bays
Floppy Ctrl : High Density
Ext Floppy Port:

Printer Port : DB-25, built-in to motherboard
Serial Port : DB-9
Joystick Ports : 2 ports
Other Ports : Headphone Jack
: Microphone
: PS/2 Mouse Port

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 02.00.00

This system has a 80286 processor running at 10 Mhz. The 80286 chip has two modes of operation, Real Mode (8086) and Protected Mode (80286).

This system has part of DOS in ROM. Therefore, if your system only has floppy drives, you will have a drive C, which is the ROM. If you system has a hard drive, drive D: or E: will be the ROM. If you are using a higher version of DOS than DOS 3.3 which came with the system, the ROM will be turned off.

There is a program in ROM called RESTART.COM. This program will allow you to reboot the system into Deskmate.

1000RLX Motherboard

Jumper Settings

E2-E3	VGA on IRQ 3, No jumper - disable (Default) VGA on IRQ 3, Jumper - Enable
E4-E5	Floppy Controller Primary (3F0-3F7) (Default)
E5-E6	Floppy Controller Secondary (370-377)
E7-E8	Disable built-in VGA
E8-E9	Enable built-in VGA (Default)
E10-E11	Map Video BIOS at F0000-F7FFF and C0000-C7FFF (Default)
E11-E12	Disable dual mapping of video Bios

There is another jumper setting on the small satellite board located at the top inside rear of the computer. There are three jumper pins, with the center being common. This is how they are marked and your choices are:

E6 Microphone Input	<----+
E7 Common Pin	<----+
E8 Line Audio Input	<----+

- E6-E7 Microphone Input, allows you to connect a microphone to the computer.
- E7-E8 Line Audio Input, allows you to connect input from line-level output from music keyboard, stereos, etc.

Main Logic Board Chips

U2	-	Mouse, Keyboard, Interrupt Controller
U3	-	Setup EEPROM
U5	-	VGA controller
U6	-	VGA RAMDAC IC
U12	-	Floppy controller
U13	-	Sound, Printer, Serial, Joystick Controller
U19	-	80L286 10 Mhz CPU (low power)
U28	-	System controller
U32	-	BIOS ROM
U33	-	Clock chip
U9 and U10		64k x 16 video RAM
U15 to U18		256k x 4 system RAM = 512k

System Memory

The RLX comes with 512K of RAM on the motherboard and is expandable to 1 meg directly on the motherboard. You will need to install 4 - 256k x 4 ZIP chips into sockets U23, U24, U25 and U26. Please note these are not DRAM chips but ZIP chips. These may be a little hard to find.

The RLX/HD came with 1 meg of RAM installed.

The area above 640k can be accessed for loading DOS high with DOS 5.0 or higher. You will need to add the following line to the beginning of the config.sys file:

```
DEVICE=C:\DOS\HIMEM.SYS /M:PS2
DOS=HIGH
```

System Memory Map

With 512K	With 1 Meg	Description
000000-07FFFF	000000-07FFFF	512K System RAM
	080000-09FFFF	128K System RAM
0A0000-0BFFFF	0A0000-0BFFFF	Video RAM 256K
0C0000-0C7FFF	0C0000-0C7FFF	Reserved For Video BIOS
0C8000-0DFFFF	0C8000-0DFFFF	Expansion Card Use
0E0000-0EFFFF	0E0000-0EFFFF	64K paged ROM
0F0000-0FFFFFFF	0F0000-0FFFFFFF	64k system RAM
	100000-15FFFF	384k system RAM

1000RLX & RLX-HD 3.5" 1.44 Meg Floppy Drive

The 1.44 meg Teac FD235HF-106U or the Sony MP-F17W-70D may be used in this system.

Floppy Drive Jumper Settings

```
D0 - Drive select 0
D1 - Drive select 1
```

```
FG: Frame ground. Permanent installation
D0: Drive select zero (default)
D1: Drive select one
HHI: Logic HI sets the drive in high density mode (not used)
LHI: Logic LOW sets the drive in high density mode (not used)
OP: High density switch enabled (jumpered)
HHO: High density output on high (not used)
D2: Drive select 2. Jumper between D2 and center pin
D3: Drive select 3. Jumper between D3 and center pin
```

On some models of the Teac floppy drive, the D0 and D1 may be labeled as DS0 and DS1. On the Sony drive, there is a slide

switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive, you will short out your system.

Teac is well known for changing the part numbers on their drives. The above listed model number is for the factory supply drive. There are other models of the Teac drives that will work in the RLX and RLX-HD. These drives are a modified version of a standard 3.5" floppy drive. These modified drives have been setup to accept power through the flat ribbon data cable. Make sure when you order an A: or B: drive for the RLX and RLX-HD that it has the correct eject button. Some third party companies will have you cut up your computer case in order to install their drives. The proper drive will have no face plate and have a blue eject button. The RLX and RLX-HD has the floppy drive face plate built-in to the case.

Hard Drives

The RLX and RLX-HD has a built-in IDE interface. It is an XT IDE interface, however, it is not the same as the industry standard AT IDE interface. It looks like an AT IDE interface, but it is electrically different. The XT interface will only support a 20 or 40 meg XT IDE hard drive. The RLX-HD came standard with the 40 meg hard drive. DO NOT try to use an AT interface drive connected to the XT interface on the motherboard! The only three models recommended for this system are:

Seagate ST325X	20 Meg Hard Disk
Seagate ST351A/X	40 Meg Hard Disk
Seagate ST352A/X	40 Meg Hard Disk

The ST351A/X and ST352A/X are really the same drive. Both of these drives are XT and AT interface switchable by changing the jumper settings found on the side of the drive. For more information see Tech Notes & Jumper Manual Vol 2.

Tandy calls these hard drives "Smart Drives". It's just their name for IDE Hard Drive. When you purchase one of these hard drives from Tandy, they will supply you a disk to partition the hard disk, format it, and install Deskmate. This process takes about an hour on the 40 meg hard drive.

If you purchase your hard drive from a third party company, they will usually come pre-formatted, so all you have to do is copy DOS to the hard disk. In the worst case, you would have to partition the hard disk yourself and format it following their instructions. This should take no more than 10 minutes. Just

remember, always follow the directions sent with the drive from the place you purchased it from!

NOTE: Never run HSECT or AUTOFORMAT on these hard drives. It can render them useless. We have a way to recover the drive, we will have more instructions on that in Vol 2.

Let's say you want to install a larger than 40 meg hard drive into your system. You can! You will need a hard drive kit that has an IDE controller with a Tandy BIOS ROM.

Notes: Only 2 floppy disk drives or 1 floppy disk drive and 1 hard drive can be installed.

HDSPIN.COM

This program enables the hard drive spin down feature. Use Deskmate to adjust the time before spinning down. The hard drive will spin down after the screen saver option activates.

ST351A/X Jumper Setting

JP1 is toward the front of the drive, JP9 is closest to the rear of the drive.

JP1	1-2	Not jumpered
JP2	3-4	Jumpered
JP3	5-6	Not jumpered
JP4	7-8	Not jumpered
JP5	9-10	Jumpered
JP6	11-12	Not jumpered
JP7	13-14	Not jumpered
JP8	15-16	Not jumpered
JP9	17-18	Jumpered

The RLX Setup Program

The SETUPRLX program gives you access to the system's setup configuration. It is important to run this program when installing floppy disk drives, video options, startup boot options, configuration options, etc.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPRL program.

Check For Config.sys On Drive	A	or	C
Check For Autoexec.bat On Drive	A	or	C

Select A drive if you only have floppy drives.
Select C drive if you have a hard drive.

Using A Higher Version DOS

You will need to boot the system with the old version DOS and run the SETUPRLX program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A: or from a hard disk.

You can load DOS 5 into high memory using the command
DEVICE=C:\DOS\HIMEM.SYS /M:PS2
DOS=HIGH

Serial Port

You can select whether the serial port is COM 1 or COM 2 in the RLX setup program.

Parallel Port

You can select whether the parallel port is Uni-Directional or Bi-Directional through the RLX setup program. If you will be attaching an external floppy drive to the system, you will need to have the make sure the parallel port is set for Bi-Directional.

Mouse Notes:

This system uses a PS/2 style mouse. We have noted that some software will not work with the PS/2 mouse on TL/3, even though the software has the PS/2 style mouse as an option. If that happens, you will need to use a serial mouse.

CMOS/Clock Notes

There is a 3 volt battery that holds the CMOS memory and it is used for the clock. This battery will need to be replaced every so often. The battery is located right behind where the floppy/hard drive mounts. This battery can be purchased at most Radio Shack stores.

Power Supply

There is a 25 watt power supply in this system. The power supply is cooled by vents rather than a cooling fan. This is the same power supply used in the 1000 RL, RLX, RLX-B and RSX.

Video Notes:

This system has built-in VGA. The VGA memory is 256k and is not expandable. The video BIOS is a modified Phoenix VGA BIOS version 1.05.00. The VGA is IBM VGA compatible and is also downward compatible with EGA, CGA and MDA.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

640 x 480 16 colors
320 x 200 256 colors

Printer Port

The printer port is a DB 25 connector.

Pin	Use	Pin	Use
1	- STROBE	2	- Data 0
3	- DATA 1	4	- Data 2
5	- DATA 3	6	- Data 4
7	- DATA 5	8	- Data 6
9	- DATA 7	10	- Printer Acknowledge
11	- Busy	12	- Paper Out
13	- Select	14	- Auto Feed
15	- Printer Fault	16	- Initialize
17	- Select In	18	- Ground
19	- Ground	20	- Ground
21	- Ground	22	- Ground
23	- Ground	24	- Ground
25	- Ground		

Audio Jack

1	- Audio Sound
2	- Ground

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

VGA Port

1	- Red
2	- Green
3	- Blue
4	-
5	- Ground
6	- Ground
7	- Ground
8	- Ground
9	-
10	- Ground
11	- Ground
12	- Ground
13	- Horizontal Sync
14	- Vertical Sync
15	-

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supply on the floppy drive controller cable.
These lines are normally ground lines.

Keyboard Connector

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

PS/2 Mouse

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Power Supply Connector

1	-	-12 volts
2	-	+12 volts
3	-	Ground
4	-	Ground
5	-	+5 volts
6	-	+5 volts

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Expansion
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

DMA Usage

Channel 0	Not Used
Channel 1	Expansion Cards/Sound Generator
Channel 2	Expansion Bus/Floppy Controller
Channel 3	Expansion Bus/IDE Hard Drive

Tandy 1000RLX-B
Tandy 1000RLX-HD-B

Catalog Number 25-1452B (1000RLX)
Catalog Number 25-1453B (1000RLX-HD)

This system is basically the same as the RLX and RLX-HD. This version came with DOS 5.0 in ROM and has a newer version of Deskmate. The new version of Deskmate (3.04.03) allows you to interface the Automatic House X-10 controller to Deskmate. The joystick ports have also been changed to an 8 pin version. Also the jumper labels have changed on some models.

CPU Type : 80286
CPU Speed : 5 Mhz / 10 Mhz Switchable
Math Co-proc :
Standard Memory: 512K, on motherboard (RLX)
: 1 Meg on motherboard (RLX-HD)
Total Memory : 1 Meg
Expansion Slots: 1 XT style, 10" long
Video Output : VGA
Power Supply : 25 Watt

Keyboard : 101 style keyboard, PS/2 connector
Floppy Drive : 1 - 3.5" 1.44 Meg came standard
Hard Drive : 1 - 40 meg hard disk on RLX-HD model only
Drive Bays : 2 - 3.5" internal drive bays
Floppy Ctrl : High Density
Ext Floppy Port:

Printer Port : DB-25, built-in to motherboard
Serial Port : DB-9
Joystick Ports : 2 ports
Other Ports : Headphone Jack
: Microphone
: PS/2 Mouse Port

DOS Version : MSDOS 5.0 In ROM
Latest BIOS ROM: 02.00.00

There is a program in the ROM called RDEE.COM. This program determines if the Date and Time prompts should be displayed and if DOS or Deskmate should be run.

1000RLX Motherboard

Jumper Settings

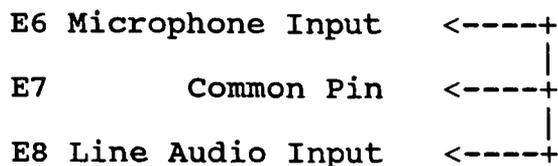
E7-E8 VGA on IRQ 3, No jumper - disable (Default)
VGA on IRQ 3, Jumper - Enable

- E1-E2 Floppy Controller Primary (3F0-3F7) (Default)
- E2-E3 Floppy Controller Secondary (370-377)

- E9-E10 Disable built-in VGA
- E10-E11 Enable built-in VGA (Default)

- E4-E5 Map Video BIOS at F0000-F7FFF and C0000-C7FFF (Default)
- E5-E6 Disable dual mapping of video Bios

There is another jumper setting on the small satellite board located at the top inside rear of the computer. There are three jumper pins, with the center being common. This is how they are marked and your choices are:



- E12-E13 Microphone Input, allows you to connect a microphone to the computer.

- E13-E14 Line Audio Input, allows you to connect input from line-level output from music keyboard, stereos, etc.

- E15-E16 Line Output

- E16-E17 Headphone Output

Main Logic Board Chips

- U1 - Setup EEPROM
- U7 - Floppy drive controller
- U8 - Keyboard, Mouse, Interrupt controller
- U10 - Clock Chip (located under U13)
- U13 - BIOS ROM
- U21 - System controller
- U22 - 80L286-10 low power CPU
- U29 - Sound, Serial, Printer, Joystick controller

- U3, U6, U11, U12 256k x 4 system RAM = 512K
- U2, U4, U5, U9 256K x 4 ZIP system RAM = 512k for a total of 1 meg RAM

U18 and U19 Video RAM

Hard Type is a Seagate ST351A/X set in the XT mode.

For more information on this system, check under the RLX and RLX-HD section.

Tandy 1000RSX
Tandy 1000RSX-HD

Catalog Number 25-1454 (1000RSX)
Catalog Number 25-1455 (1000RSX-HD)

CPU Type : 80386SX
CPU Speed : 8 Mhz / 25 Mhz Switchable
Math Co-proc : 80387SX-25Mhz
Standard Memory: 1 Meg
Total Memory : 9 Meg
Expansion Slots: 1 - 10" long and 1 - 7" long
Video Output : VGA
Power Supply : 25 Watt

Keyboard : 101 style keyboard, PS/2 connector
Floppy Drive : 1 - 3.5" 1.44 Meg came standard
Hard Drive : 1 - 40 meg hard disk on RLX-HD model only
Drive Bays : 2 - 3.5" internal drive bays
Floppy Ctrl : High Density
Ext Floppy Port:

Printer Port : DB-25, built-in to motherboard
Serial Port : DB-9
Joystick Ports : 2 ports
Other Ports : Headphone Jack
: Microphone
: PS/2 Mouse Port

DOS Version : MSDOS 5.0
Latest BIOS ROM: 1.10.00

This system came standard with a PS/2 mouse.

1000RSX Motherboard

Jumper Settings

E1-E2 Enable on board VGA
E2-E3 Disable on board VGA

E4-E5 Jumpered, allows you to plug headphones into the EAR connection.

E8-E9 Microphone Input, allows you to connect a microphone to the computer.

E7-E8 Line Audio Input, allows you to connect input from line-level output from music keyboard, stereos, etc.

Main Logic Board Chips

U4 - Floppy controller chip
U10 - 80387SX math co-processor chip socket
U13 - 80386SX-25 CPU chip
U18 - BIOS ROM
U23 - VGA controller
U24 - Keyboard and mouse controller

U16 to U21 RAM memory

System Memory

The RSX comes standard with 1 meg RAM. You can upgrade the RAM to either 3 megs or 9 megs, depending on the type of SIMMS you install. All memory above 1 meg is consider Extended memory. It's ideal for Windows and DOS.

There are two SIMM sockets located on the motherboard on the right side. You can install either 2 of the 1 meg SIMMS or 2 of the 4 meg SIMMS. You must install the extra memory in pairs. Note: Do not use 256k SIMMS in this system.

After installing additional memory, you will need to run SETUPRSX to update the EEPROM. Press F2 to exit and update the system.

It is possible to control how much memory is used for shadow RAM through the SETUPRSX program. If you turn on the shadow RAM option, the system will load the system BIOS and video BIOS to system RAM. This will speed up the system. If you ever have a problem with an expansion card not operating properly, try turning off the shadow RAM option. Some cards have been reported to not work correctly if the shadow option is on. Below is a chart that shows the amount that can be allocated.

Total Mem	Base	Shadow Yes	Shadow No
1	640k	384 extended	0 extended
3	640k	2432 extended	2048 extended
9	640k	N/A	8192 extended

With 9 megs RAM installed you cannot remap the shadow RAM.

CPU and Math Co-Processor Notes:

The CPU is a 80386SX running at 25 Mhz. This system supports an 80387-SX25 math co-processor. The math co-processor socket is located behind the floppy/hard drives, socket U-10. If you are running CAD or spreadsheet programs, this will help greatly in the system's speed.

1000RSX & RSX-HD 3.5" 1.44 Meg Floppy Drive

The 1.44 meg Teac FD235HF-106U (modified) or the Sony MP-F17W-00 may be used in this system.

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1

On some models of the Teac floppy drive, the D0 and D1 may be labeled as DS0 and DS1. On the Sony drive, there is a slide switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system.

Teac is well known for changing the part numbers on their drives. The above listed model number is for the factory supply drive. There are other models of the Teac drives that will work in the RSX and RSX-HD. These drives are a modified version of a standard 3.5" floppy drive. These modified drives have been setup to accept power through the flat ribbon data cable. Make sure when you order an A or B drive for the RSX and RSX-HD that it has the correct eject button. Some third party companies will have you cut up your computer case in order to install their drives. The proper drive will have no face plate and have a blue eject button. The RSX and RSX-HD has the floppy drive face plate built-in to the case.

Hard Drives

The RSX and RSX-HD has a built-in AT IDE interface. This system can use any industry standard 1" high, 3.5" AT IDE hard drive. This is the only system in the 1000 line that supports AT IDE drives.

When you install a hard drive into this system, you will need to run SETUPRSX and enter the user defined parameters for the hard drive.

The RSX-HD came standard with a 52 meg Quantum LPS52 hard drive or a Conner CP-30064 hard drive.

NOTE: Never run HSECT or AUTOFORMAT on these hard drives. It can render them useless.

The RSX Setup Program

The SETUPRSX program gives you access to the system's setup configuration. It is important to run this program when installing floppy disk drives, video options, startup boot options, configuration options, etc.

The setup program can be accessed by the SETUPRSX program on the utilities disk or by rebooting the computer and pressing F2. The setup screen will then be displayed.

When in setup, the following keys are used:

F1	=	Help
F2	=	Save setup information
F10	=	Reset to factory settings

Serial Port

You can select whether the serial port is COM 1 or COM 2 in the RSX setup program.

Parallel Port

You can select whether the parallel port is Uni-Directional or Bi-Directional through the RSX setup program. If you will be attaching an external floppy drive to the system, you will need to make sure the parallel port is set for Bi-Directional.

Remap Shadow Ram

This option allows you to remap 384k of system to RAM to be extended memory or to be used as shadow RAM. Remapping the 384k to shadow RAM will allow the system to run faster, by copying the system BIOS and video BIOS to RAM.

CMOS/Clock Notes

There is a 3 volt battery that holds the CMOS memory and it is used for the clock. This battery will need to be replaced every so often. The battery is located right behind where the floppy/hard drive mounts. This battery can be purchased at most Radio Shack stores.

Power Supply

There is a 25 watt power supply in this system. The power supply is cooled by vents rather than a cooling fan. This is the same power supply used in the 1000 RL, RLX, RLX-B and RSX.

Keyboard Notes:

This system uses a standard PS/2 style keyboard.

Video Notes:

This system has built-in VGA. The VGA memory is 256k and is expandable to 512K. The video BIOS is an AcuMos AVGA2. All standard VGA, EGA, CGA and MDA video modes are supported.

Super VGA modes are supported by upgrading the video memory to 512K. The most common SVGA modes are listed below:

Super VGA Modes:

1024 x 768	16 colors
800 x 600	256 colors
640 x 480	256 colors

The video memory upgrade consists of 2 - 256 x 4 DRAM chips. They plug into the two empty sockets on the motherboard near the CMOS battery.

There are three programs on the system utilities disk that are for VGA support. They are as follows:

ACU.EXE	Selects VSYNC modes
AVGA2CFG.COM	Run after running ACU.EXE
SETMODE.EXE	Selects various standard and extended video modes.

Whenever you change the VSYNC mode with ACU.EXE, you will need to run AVGA2CFG.COM. It is best to load this file in the autoexec.bat file, that way it will load the proper VSYNC modes every time you boot.

Windows 3.1

If you wish to use Windows in one of the SVGA modes, you will need to install the drivers from the utilities disk. Run the Windows setup program and insert the system's utilities disk into drive A:.. Select other under video choices. You will be asked to enter the driver, type in A:\win31.

You will have the follow choices:

1024 x 768	16 colors
800 x 600	256 colors
800 x 600	16 colors
640 x 480	256 colors

Printer Port

The printer port is a DB 25 connector.

Pin	Use	Pin	Use
1	- STROBE	2	- Data 0
3	- DATA 1	4	- Data 2
5	- DATA 3	6	- Data 4
7	- DATA 5	8	- Data 6
9	- DATA 7	10	- Printer Acknowledge
11	- Busy	12	- Paper Out
13	- Select	14	- Auto Feed
15	- Printer Fault	16	- Initialize
17	- Select In	18	- Ground
19	- Ground	20	- Ground
21	- Ground	22	- Ground
23	- Ground	24	- Ground
25	- Ground		

Audio Jack

1	- Audio Sound
2	- Ground

VGA Port

1	- Red
2	- Green
3	- Blue
4	-
5	- Ground
6	- Ground
7	- Ground
8	- Ground
9	-
10	- Ground
11	- Ground
12	- Ground
13	- Horizontal Sync
14	- Vertical Sync
15	-

Power Supply

1	- -12 Volts
2	- +12 Volts
3	- Ground
4	- Ground
5	- + 5 Volts
6	- + 5 Volts

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supply on the floppy drive controller cable.
These lines are normally ground lines.

Keyboard Connector

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

PS/2 Mouse

1	-	Data
2	-	Not Used
3	-	Ground
4	-	+5 Volts
5	-	Clock
6	-	Not Used

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

IRQ 0	System
IRQ 1	Keyboard
IRQ 2	Route to interrupts 8 to 15
IRQ 3	COM 2 / COM 4
IRQ 4	COM 1 / COM 3
IRQ 5	Printer LPT 2
IRQ 6	Floppy Drives
IRQ 7	Printer LPT 1
IRQ 8	Real Time Clock
IRQ 9	Reserved
IRQ 10	Available
IRQ 11	Available
IRQ 12	Available
IRQ 13	Math Co-processor
IRQ 14	Hard Drive Controller
IRQ 15	2nd Hard Drive Controller

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

DMA Usage

Channel 0	Not Used
Channel 1	Expansion Cards/Sound Generator
Channel 2	Expansion Bus/Floppy Controller
Channel 3	Expansion Bus/IDE Hard Drive

Tandy 1000SL

Catalog Number 25-1401

CPU Type : 8086
CPU Speed : 4.77 Mhz / 8 Mhz Switchable
Math Co-proc : 8087 8 Mhz
Standard Memory: 384K, on motherboard
Total Memory : 640k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 5 - 8bit expansion slots 10" long
Video Output : CGA, Monochrome, TGA
Power Supply : 67 Watt

Keyboard : 101 Style Keyboard
Floppy Drive : 1 - 5.25" 360K came standard
Hard Drive :
Drive Bays : 2 - 5.25" internal drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 01.04.00

1000SL Motherboard

On the satellite audio board:

E1-E2 Microphone Input, allows you to connect a microphone to the computer.

E2-E3 Line Audio Input, allow you to connect input from line-level output from music keyboard, stereos, etc

On the motherboard:

E2-E3 (Default) Sets IRQ 5 for the hard drive and IRQ 2 for the video.

E3-E4 Sets IRQ 2 for the hard drive and IRQ 5 for the video. It is really not recommended to use this setting. Not all software will run correctly on IRQ2.

E5-E6 Connects SLCTIN to the printer

E6-E7 Ties SLCTIN high (standard may be jumpered or not)

System Memory

The 1000SL came standard with 384K of memory on the motherboard. This is upgradeable to 640k by adding an additional 256K of memory. You will need 8 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 8 chips into the 8 empty sockets on the motherboard. There are no jumpers or switches to change.

CPU and Math Co-Processor Notes:

The CPU is an 8086 processor. You can replace this processor with a V-30 processor for improved performance.

The math co-processor is installed in the empty socket located at U21 on the motherboard.

1000SL Teac 360K FD55 Floppy Disk Drive

This is a standard Teac 360K floppy drive. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

On the floppy drive, at the rear of the drive, on the bottom side, you will find a row of jumpers labeled D0, D1, D2 and D3. These are the drive select jumpers.

D0 = Drive A
D1 = Drive B

The floppy drive cable is not very long. If you install a 3.5" floppy drive, you may need a longer floppy drive cable.

NOTE: Power is supplied through the flat ribbon cable. Even though the 360K floppy drive does not use it. BE CAREFUL when using a different floppy drive cable. Look at the floppy drive cable in the system now, you will notice that there are some holes punched in the cable. This prevents the power from going through the cable.

Hard Drives

This system can handle either a hard card or hard drive. Note: There are only two drive bays. A hard card is recommended so that you don't lose the 2nd drive bay.

The SL Setup Program

This computer has part of MSDOS 3.3 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS

prompt without having to insert a floppy disk into drive A. Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

NOTE: SETUPSL /A option will give you additional setup information for video memory size, certain chip selects, network options, etc. Be careful when running the /A option.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

There is also an EEPROM in the system that contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPSL to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPSL program.

Check For Config.sys On Drive	A or C
Check For Autoexec.bat On Drive	A or C

Using A Higher Version DOS

Yes, you can use DOS 5.0 or 6.0 or higher on the SL. All you will need to do is boot the system with the old version DOS and run the SETUPSL program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

Clock Chip Notes

The smartwatch or clock chip option is installed in the special Smartwatch 28 pin socket on the motherboard at location U13. See the chart on clock chips for more information about the software.

Serial Ports

This system has a 9 pin serial port located on the back of the computer.

Keyboard Notes:

This system uses a standard 101 style keyboard set in the XT mode. NOTE: Not all 101 style keyboards can be set into the XT mode. The original keyboard has 7 pins and a standard keyboard only has 5 pins. The 5 pin keyboard will still work.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow it to display 4 colors, whereas the TGA mode will allow you to display up to 16 colors.

The SL only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200
16	640 x 200
Mono	720 x 348 Hercules Graphics Mode

VGA: This system can run VGA. You will need a VGA card that is able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Ground
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supply on the floppy drive controller cable.
These lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port	Address
060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000SL/2

Catalog Number 25-1402

CPU Type : 8086
CPU Speed : 4.77 Mhz / 8 Mhz Switchable
Math Co-proc : 8087 8 Mhz
Standard Memory: 512K, on motherboard
Total Memory : 640k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 5 - 8bit expansion slots 10" long
Video Output : CGA, TGA
Power Supply : 67 Watt

Keyboard : 101 Style Keyboard
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive :
Drive Bays : 1 - 5.25" internal drive bay
: 1 - 3.5" internal drive bay
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 01.04.04

There are two main motherboard revisions. Revision C and D. Revision D has the same jumper setting as Revision C. Its main difference is that it has a jumper setting E901-E902-E903. Jumpering E901-E902 sets the system to use the Sharp ROM set 8079047 and 8079048. The jumper setting E902-E903 is for all other ROM sets.

1000SL/2 Motherboard

On the satellite audio board:

E2-E3 Microphone Input, allows you to connect a microphone to the computer.

E1-E2 Line Audio Input, allow you to connect input from line-level output from music keyboard, stereos, etc

On the motherboard:

E2-E3 (Default) Sets IRQ 5 for the hard drive and IRQ 2 for the video.

E3-E4 Sets IRQ 2 for the hard drive and IRQ 5 for the video. It is really not recommended to use this setting. Not

all software will run correctly on IRQ2.
E5-E6 Connects SLCTIN to the printer
E6-E7 Ties SLCTIN high (standard may be jumpered or not)

System Memory

The 1000SL/2 came standard with 512K of memory on the motherboard. This is upgradeable to 640k by adding an additional 128K of memory. You will need 4 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 4 chips into the 4 empty sockets on the motherboard. There are no jumpers or switches to change.

System Memory Map

Address	Description
00000-7FFFF	512K system RAM
80000-9FFFF	128K system and video RAM
A0000-BFFFF	128K video RAM
C0000-DFFFF	128k expansion memory, above board
E0000-FFFFF	128k system BIOS

The video in this system will use 16k to 64k of system RAM, depending on the video mode. This will reduce the amount of memory you have for your programs.

CPU and Math Co-Processor Notes:

The CPU is an 8086 processor. You can replace this processor with a V-30 processor for improved performance.

The math co-processor is installed in the empty socket located next to the CPU chip at location U21.

1000SL/2 720K Teac or Sony Floppy Drive

This is not a standard 720K floppy drive, power is supplied through the flat ribbon cable. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1

On some models of the Teac floppy drive, the D0 and D1 may be labeled as DS0 and DS1. On the Sony drive, there is a slide switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive, as you will short out your system.

Hard Drives

This system can handle either a hard card or hard drive. Note: There are only two drive bays. A hard card is recommended so that you don't lose the 2nd drive bay.

The SL/2 Setup Program

This computer has part of MSDOS 3.3 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS prompt without having to insert a floppy disk into drive A. Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

NOTE: SETUPSL2 /A option will give you additional setup information for video memory size, certain chip selects, network options, etc. Be careful when running the /A option.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

There is also an EEPROM in the system that contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPSL2 to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPSL2 program.

Check For Config.sys On Drive	A or C
Check For Autoexec.bat On Drive	A or C

Using A Higher Version DOS

Yes, you can use DOS 5.0 or 6.0 or higher on the SL2. All you will need to do is boot the system with the old version DOS and run the SETUPSL program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

Clock Chip Notes

The smartwatch or clock chip option is installed in the special Smartwatch 28 pin socket on the motherboard at location U13.

Serial Ports

This system has a 9 pin serial port located on the back of the computer.

Keyboard Notes:

This system uses a standard 101 style keyboard set in the XT mode. NOTE: Not all 101 style keyboard can be set into the XT mode. The original keyboard has 7 pins and a standard keyboard only has 5 pins. The 5 pin keyboard will still work.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors.

The SL/2 only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

Display Modes

80 lines by 25 lines
40 lines by 25 lines
16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution	
4	320 x 200	
16	320 x 200	
16	160 x 200	
2	640 x 200	
4	640 x 200	
16	640 x 200	
Mono	720 x 348	Hercules Graphics Mode

VGA: This system can run VGA. You will need a VGA card that is able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Ground
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supply on the floppy drive controller cable.
These lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect	5	-	SG	Signal Ground
2	-	RD	Receive Data	6	-	CTS	Clear to Send
3	-	TD	Transmit Data	7	-	RTS	Request to Send
4	-	DTR	Data Terminal Rdy	8	-	CS	Clear to Send
				9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000SX

Catalog Number 25-1051

CPU Type : 8088
CPU Speed : 4.77 / 7.16 Mhz Selectable
Math Co-proc : 8087
Standard Memory: 384K, on motherboard
Total Memory : 640k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 5 - 8 bit XT slots (10" long)
Video Output : CGA & Composite Monochrome
Power Supply : 67 Watt

Keyboard : Tandy style 90 keys
Floppy Drive : 1 - 5 1/4" 360K came standard
Hard Drive :
Drive Bays : 2 - 5 1/4" drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : N/A
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Light Pen Port - DB 9
: Composite Video - RCA connector
: Audio Output - RCA connector

DOS Version : MSDOS 3.2
Latest BIOS ROM: 01.02.00

1000SX Motherboard Jumpers

E1-E2 Jumpered if only 384k memory is installed
Removed, when you install the 256K memory upgrade kit

E3-E4 Jumpered if there is NO math co-processor
Removed, when you install a math co-processor

E6-E7 Jumpered connects printer select to parallel port

Note: E6-E7 should be removed to use of some IBM software and/or IBM compatible printers. This may be necessary for some IBM programs that use the status line for printer control.

DIP Switch Setting

1 - OFF Selects composite monochrome monitor
ON Selects CGA monitor (Default)

2 - OFF Selects IRQ 5 for hard drive/IRQ 2 for video
ON Selects IRQ 2 for hard drive/IRQ 5 for video
(default)

- 3 - OFF Disables IRQ 6, floppy controller IRQ
 ON Enables IRQ6, (default)
- 4 - OFF Disables IRQ 7, printer port IRQ
 ON Enables IRQ 7, (default)

NOTE: For some hard drives and hard cards, you will need to set switch 2 to OFF. This allows you to use standard XT controller cards in the SX.

Memory

The 384k of memory on the motherboard consists of 8 - 256 x 1 chips and 4 - 64 x 4 chips.

To upgrade the SX to 640K, you will need to install 8 - 256K x 1 DRAM chips into the eight empty sockets on the motherboard. Then remove jumper E1-E2.

CPU and Math Co-Processor Notes:

The CPU is an 8088 processor. You can replace this processor with a V-20 processor for improved performance.

The math co-processor is installed in the empty socket located at U33. Once you have installed the math co-processor you must remove the jumper at E3-E4.

1000SX Teac 360K FD55BV Floppy Disk Drive

This is a standard Teac 360K floppy drive. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

On the floppy drive, at the rear of the drive, on the bottom side, you will find a row of jumpers labeled D0, D1, D2 and D3. These are the drive select jumpers.

D0 = Drive A
D1 = Drive B

The floppy drive cable is not very long. If you install a 3.5" floppy drive, you may need a longer floppy drive cable.

Note: The on-board floppy controller will support a 720K floppy drive as A: or B:. Depending on the DOS version you may need to add a drivparm or driver.sys statement to you config.sys file. More information on installing a 5 1/4" floppy drive may be found on the "Secrets of the 1000's" video.

3.5" 720K Floppy Drives

You can add a 3.5" 720K floppy drive to your system. You will need:

- 3.5" Floppy Drive
- 5 1/4" Mounting Frame
- MSDOS 3.2 or Higher
- Longer Floppy Drive Cable (optional, but helpful)

You will need to configure the drive to be either drive A: or drive B: by changing the drive select jumpers, like above with the 5 1/4" drives.

You will also need to add one of the two following lines to your config.sys file.

```
drivparm=/D:0    <-- if the 3.5" drive is drive A:
```

```
drivparm=/D:1    <-- if the 3.5" drive is drive B:
```

The drivparm command will inform MSDOS that the A: drive is a 720K floppy drive. If you don't add this line, the system will think that it is only a 360k floppy.

NOTE: It is possible to install a 1.2 or 1.44 meg floppy drive into this system. See the section on High Density Floppy Drives.

Hard Drives

This system can handle either a hard card or hard drive. Note: There are only two drive bays. A hard card is recommended so that you don't lose the 2nd drive bay.

This system can use a standard Seagate ST11M (for MFM) or ST11R (for RLL) controller, when you set DIP switch 2 off. You can also run an IDE drive in this system with the proper IDE controller.

Serial Ports

This system does not have a built-in serial port, one can be added. Do not try to use the light pen port on the back of the system as a serial port. It is not electrically the same.

Clock Notes:

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location and software information.

Keyboard Notes:

The 1000SX does not use a standard keyboard interface. It is possible to connect a 101 style keyboard to these 1000's. You will either need a special keyboard converter Tandy part number 25-1030 (has been discontinued for awhile) or a keyboard with the converter built-in. Tandy produced a keyboard, model 25-4038 had a converter built-in.

There are also a couple of third party manufacturers that have made keyboards for the 1000's, they are Datadesk and Northgate. When connecting up the Northgate keyboard, you will need to change the DIP switch setting found under the name plate.

Video Notes:

This system supports composite monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution. When connecting a composite monochrome monitor, you should turn DIP switch 1 OFF on the motherboard.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

VGA: This system can use VGA, however, an expansion slot will be needed. The VGA card must be able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port - The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA0	4	- Ground
5	- DATA1	6	- Ground
7	- DATA2	8	- Ground
9	- DATA3	10	- Ground
11	- DATA4	12	- Ground
13	- DATA5	14	- Ground
15	- DATA6	16	- Ground
17	- DATA7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- BUSY	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Motherboard Power Connector

1	- +5 Volts
2	- +5 Volts
3	- +5 Volts
4	- Ground
5	- Ground
6	- Ground
7	- Ground
8	- -12 Volts
9	- +12 Volts

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

Light Pen Port (DB 9)

1	- +5 volts
2	- Ground
3	- Light Pen IN
4	- Light Pen Switch
5	- Not Connected
6	- Light Pen Switch
7	- Not Connected
8	- Not Connected
9	- Not Connected

Keyboard Connector

1	- Keyboard Data
2	- Keyboard Busy
3	- Ground
4	- Keyboard Clock
5	- +5 Volts
6	- Keyboard Reset
7	- Multi Data
8	- Multi Clock

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- +12 volts
8	- Horizontal Sync
9	- Vertical Sync

Floppy Drive Port

1	-	Ground	2	-	Not Connected
3	-	Ground	4	-	Not Connected
5	-	Ground	6	-	Not Connected
7	-	Ground	8	-	Index
9	-	Ground	10	-	Drive 0 Select
11	-	Ground	12	-	Drive 1 Select
13	-	Ground	14	-	Not Connected
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	Ground	30	-	Read Data
31	-	Ground	32	-	Disk Side Select
33	-	Ground	34	-	Drive Ready/Disk Change

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	See Switch Setting Notes
3	Com Port 2
4	Com Port 1
5	See Switch Setting Notes
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller

Tandy 1000TL

Catalog Number 25-1201

CPU Type : 80286
CPU Speed : 4.77 Mhz / 8 Mhz Switchable
Math Co-proc : 80287 8 Mhz
Standard Memory: 640K, on motherboard
Total Memory : 768k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 5 - 8bit expansion slots 10" long
Video Output : CGA, TGA, Monochrome
Power Supply : 67 Watt

Keyboard : 101 Style Keyboard
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive :
Drive Bays : 1 - 5.25" internal drive bay
: 2 - 3.5" internal drive bay
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 01.04.02

1000TL Motherboard

E1-E2 Sets IRQ 5 for the video.
It is really not recommended to use this setting. Not
all software will run correctly on IRQ 5.

E2-E3 (Default) Sets IRQ 5 for the hard drive and IRQ 2 for
the video.

E4-E5 Jumper on connects SLCTIN to the printer
Jumper off ties SLCTIN high

E6-E7 Microphone Input, allows you to connect a microphone
to the computer.

E7-E8 Line Audio Input, allows you to connect input from
line- level output from music keyboard, stereos, etc

E9-E10 Solder pads on the mother board, not used.

System Memory

The 1000TL came standard with 640K of memory on the motherboard. This is upgradeable to 768k by adding an additional 128K of memory. You will need 4 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 4 chips into the 4 empty sockets on the motherboard. There are no jumpers or switches to change. This extra memory is used for video RAM. Without this extra memory, the video will use 16k to 64k of memory, depending on the video mode, from the lower 640k RAM. This may cause you to run out of memory with some programs. It is highly recommended that you install this extra 128K. The cost is minimal.

CPU and Math Co-Processor

The TL has an 80286 CPU running in the real mode. You can change the CPU out for a 386 module or 486 module by Improve. For more information see the chart on Speed Upgrades.

The TL uses a 80287 math co-processor. The socket is located at U60 on the motherboard. There are no jumpers or switches to set. Just plug it in.

1000TL 720K Teac or Sony Floppy Drive

Whenever you add or remove a floppy drive from the system you will need to run the SETUPTL program.

This is not a standard 720K floppy drive, power is supplied through the flat ribbon cable. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1
D2	-	Drive select 2

On some models of the Teac floppy drive, the D0, D1 and D2 may be labeled as DS0, DS1 and DS2. On the Sony drive, there is a slide switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system. The power is blocked from going to the 5 1/4" drive by the punched holes in the flat ribbon cable. DO NOT try to use a standard floppy drive cable in this system.

This system supports up to 3 floppy drives. Each drive must be set for a different drive selection.

Hard Drives

This system can use a standard Seagate ST11M (for MFM) or ST11R (for RLL) controller. You can also run an IDE drive in this system with the proper IDE controller.

The TL Setup Program

This computer has part of MSDOS 3.3 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS prompt without having to insert a floppy disk into drive A. Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

In the setup program you can also change which drive is designated as drive A.

NOTE: SETUPTL /A option will give you additional setup information for video memory size, certain chip selects, network options, etc. Be careful when running the /A option.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

There is also an EEPROM in the system that contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPTL to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPTL

Check For Config.sys On Drive	A or C
Check For Autoexec.bat On Drive	A or C

Using A Higher Version DOS

Yes, you can use DOS 5.0 or 6.0 or higher on the TL. All you will need to do is boot the system with the old version DOS and run the SETUPTL program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

TL Battery

The TL has a 3 volt battery on the motherboard for the clock. This battery is obtained at any Radio Shack store.

Serial Ports

This system has a 9 pin serial port located on the back of the computer.

Keyboard Notes:

This system uses a standard 101 style keyboard set in the XT mode. NOTE: Not all 101 style keyboards can be set into the XT mode. The original keyboard has 7 pins and a standard keyboard only has 5 pins. The 5 pin keyboard will still work.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, whereas the TGA mode will allow you to display up to 16 colors.

The TL only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

Display Modes

80 lines by 25 lines

40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution	
4	320 x 200	
16	320 x 200	
16	160 x 200	
2	640 x 200	
4	640 x 200	
16	640 x 200	
Mono	720 x 348	Hercules Graphics Mode

VGA: This system can run VGA. You will need a VGA card that is able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Ground
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supplied on the floppy drive controller cable to the 3.5" drives only. The floppy drive flat ribbon cable has holes punched in it to prevent the power from reaching the 5 1/4" drive. These power lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tandy 1000TL/2

Catalog Number 25-1602

CPU Type : 80286
CPU Speed : 4.77 Mhz / 8 Mhz Switchable
Math Co-proc : 80287 8 Mhz
Standard Memory: 640K, on motherboard
Total Memory : 768k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 4 - 8bit expansion slots 10" long
Video Output : CGA, TGA, Monochrome
Power Supply : 67 Watt

Keyboard : 101 Style Keyboard
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive : IDE XT Interface, 20 or 40 Meg support
Drive Bays : 1 - 5.25" internal drive bay
: 2 - 3.5" internal drive bay
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 02.00.00

1000TL/2 Motherboard

E6-E7 Not jumpered, sets IRQ 5 for hard drive/expansion bus (default)

Jumpered, sets IRQ 5 for the video sync. It is really not recommended to use this setting. Not all software will run correctly on IRQ 5.

E7-E8 Jumpered, connects IDE to IRQ 5 (default)

E8-E9 Jumpered, connects IDE to IRQ5. NOTE: if E8-E9 is jumpered, you must also jumper E6-E7.
Not jumpered, set IRQ 2 for video (default)

E11-E12 Line Audio Input, allows you to connect input from line-level output from music keyboard, stereos, etc

E12-E13 Microphone Input, allows you to connect a microphone to the computer.

System Memory

The 1000TL/2 came standard with 640K of memory on the motherboard. This is upgradeable to 768k by adding an additional 128K of memory. You will need 4 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 4 chips into the 4 empty sockets on the motherboard. There are no jumpers or switches to change. This extra memory is used for video RAM. Without this extra memory, the video will use 16k to 64k of memory, depending on the video mode, from the lower 640k RAM. This may cause you to run out of memory with some programs. It is highly recommended that you install this extra 128K. The cost is minimal.

CPU and Math Co-Processor

The TL/2 has an 80286 CPU running in the real mode. You can change the CPU out for a 386 module or 486 module by Improve. For more information see the chart on Speed Upgrades.

The TL/2 uses a 80287 math co-processor. The socket is located at U43 on the motherboard. There are no jumpers or switches to set. Just plug it in.

1000TL/2 720K Teac or Sony Floppy Drive

Whenever you add or remove a floppy drive from the system you will need to run the SETUPTL2 program.

This is not a standard 720K floppy drive, power is supplied through the flat ribbon cable. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1
D2	-	Drive select 2

On some models of the Teac floppy drive, the D0, D1 and D2 may be labeled as DS0, DS1 and DS2. On the Sony drive, there is a slide switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system. The power is blocked from going to the 5 1/4" drive by the punched holes in the flat ribbon cable. DO NOT try to use a standard floppy drive cable in this system.

This system supports up to 3 floppy drives. Each drive must be set for a different drive selection.

Hard Drives

The TL/2 has a built-in IDE interface. The only catch is, it is an XT IDE interface and is not the same as the industry standard AT IDE interface. It looks like an AT IDE interface, but it is electrically different. The XT interface will only support a 20 or 40 meg XT IDE hard drive. DO NOT try to use an AT interface drive connected to the XT interface on the motherboard!

Tandy calls these XT IDE hard drives, "Smart Drives". It's just their name for IDE Hard Drive. When you purchase one of these hard drives from Tandy, they will supply you a disk to partition the hard disk, format it, and install Deskmate. This process will take about an hour on the 40 meg hard drive.

If you purchase your hard drive from a third party company, they will usually come pre-formatted, so all you have to do is copy DOS to the hard disk. In the worst case, you would have to partition the hard disk yourself and format it following their instructions. This should take no more than 10 minutes. Just remember, always follow the directions sent with the drive from the place you purchased it from!

NOTE: Never run HSECT or AUTOFORMAT on these hard drives. It can render them useless. We have a way to recover the drive, we will have more instructions on that in Vol 2.

Let's say you want to install a larger than 40 meg hard drive into your system. You can! You will need a hard drive kit that has an IDE controller with a Tandy BIOS ROM.

Some MFM and RLL controllers will work in this system. The Seagate ST11M and ST11R will work without any changes.

The TL/2 Setup Program

This computer has part of MSDOS 3.3 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS prompt without having to insert a floppy disk into drive A. Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

In the setup program you can also change which drive is designated as drive A.

NOTE: SETUPTL2 /A option will give you additional setup information for video memory size, certain chip selects, network options, etc. Be careful when running the /A option.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

There is also an EEPROM in the system that contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPTL2 to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file and you are booting from ROM, then make the following changes in the SETUPTL

Check For Config.sys On Drive	A or C
Check For Autoexec.bat On Drive	A or C

Using A Higher Version DOS

Yes, you can use DOS 5.0 or 6.0 or higher on the TL/2. All you will need to do is boot the system with the old version DOS and run the SETUPTL2 program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

Serial Ports

This system has a 9 pin serial port located on the back of the computer.

Keyboard Notes:

This system uses a standard 101 style keyboard set in the XT mode. NOTE: Not all 101 style keyboard can be set into the XT mode. The original keyboard has 7 pins and a standard keyboard only has 5 pins. The 5 pin keyboard will still work.

TL/2 Battery

The TL/2 has a 3 volt battery on the motherboard for the clock. This battery is obtained at any Radio Shack store.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors.

The TL2 only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

Display Modes

80 lines by 25 lines
40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution	
4	320 x 200	
16	320 x 200	
16	160 x 200	
2	640 x 200	
4	640 x 200	
16	640 x 200	
Mono	720 x 348	Hercules Graphics Mode

VGA: This system can run VGA. You will need a VGA card that is able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Ground
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supplied on the floppy drive controller cable to the 3.5" drives only. The floppy drive flat ribbon cable has holes punched in it to prevent the power from reaching the 5 1/4" drive. These power lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

IDE Interface

1	-	Reset	2	-	Ground
3	-	SD7	4	-	Ground
5	-	SD6	6	-	Ground
7	-	SD5	8	-	Ground
9	-	SD4	10	-	Ground
11	-	SD3	12	-	Ground
13	-	SD2	14	-	Ground
15	-	SD1	16	-	Ground
17	-	SD0	18	-	Ground
19	-	Ground	20	-	Key
21	-	Ground	22	-	Ground
23	-	HDIOW	24	-	Ground
25	-	HDIOR	26	-	Ground
27	-	HIOCRDY	28	-	
29	-	Ground	30	-	Ground
31	-	IRQ14	32	-	
33	-	HDA1	34	-	
35	-	HDA0	36	-	
37	-	HHDCS0	38	-	
39	-	ACTIVE	40	-	Ground

Tandy 1000TL/3

Catalog Number 25-1603

CPU Type : 80286
CPU Speed : 5 Mhz / 10 Mhz Switchable
Math Co-proc : 80287 10 Mhz
Standard Memory: 640K, on motherboard
Total Memory : 768k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 4 - 8bit expansion slots 10" long
Video Output : CGA, TGA, Hercules
Power Supply : 67 Watt

Keyboard : 101 Style Keyboard
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive : IDE XT Interface, 20 or 40 Meg support
Drive Bays : 1 - 5.25" internal drive bay
 : 2 - 3.5" internal drive bay
Floppy Ctrl : High density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
 : Microphone
 : PS/2 Mouse Port

DOS Version : MSDOS 3.3 In ROM
Latest BIOS ROM: 02.00.00

1000TL/3 Motherboard

Motherboard Jumpers

E1-E2 ROM type
E3-E4 Jumpered, 4 ROM installed (default)

E6-E7 Jumpered, selects primary floppy controller (3F0)
E7-E8 Changed on-board floppy controller to secondary (370)

E9-E10 Disable floppy controller
E10-E11 Enable floppy controller (default)

E16-E17 Sets hard drive IRQ to IRQ 2
E17-E18 Sets hard drive IRQ to IRQ 5 (default)
E18-E19 Sets video sync to IRQ 5

Satellite Board Jumpers

- E1-E2 Line Level Input, allows you to connect input from line-level output from music keyboard, stereos, etc
- E2-E3 Microphone Input, allows you to connect a microphone to the computer.
- E4-E5 Line Level Output Enabled
- E5-E6 Earphone Output Enabled

Main Logic Chips

- U1 - Real time clock chip
- U8 - Floppy controller
- U12 - BIOS ROM
- U23 - 80286 microprocessor
- U24 - Tandy video controller
- U25 - Custom chip for Keyboard, PS/2 mouse interface, floppy interface, interrupt controller, programmable interval timer and clock divider/address decoder
- U26 - Custom chip for sound, serial port, printer port and joystick
- U27 - Custom chip for DMA and RAM control, bus control and ready interface
- U31 - EEPROM for setup information
- U39 - Character generator rom

System Memory

The 1000TL/3 came standard with 640K of memory on the motherboard. This is upgradeable to 768k by adding an additional 128K of memory. You will need 4 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 4 chips into the 4 empty sockets on the motherboard at location U4, U5, U6 and U7. There are no jumpers or switches to change. This extra memory is used for video RAM. Without this extra memory, the video will use 16k to 64k of memory, depending on the video mode, from the lower 640k RAM. This may cause you to run out of memory with some programs. It is highly recommended that you install this extra 128K. The cost is minimal.

Memory Map

Address	Description
000000-09FFFF	640K RAM
0A0000-0BFFFF	Video RAM
0C0000-0DFFFF	Expansion Cards
0E0000-0EFFFF	64k paged ROM
0F0000-0FFFFF	64k fixed ROM

CPU and Math Co-Processor

The TL/3 has an 80286 CPU running in the real mode. You can change the CPU out for a 386 module or 486 module by Improve. For more information see the chart on Speed Upgrades.

The TL/3 uses a 80287 8 or 10 Mhz math co-processor. The socket is located at U9 on the motherboard. There are no jumpers or switches to set. Just plug it in.

1000TL/3 720K Teac or Sony MFD-11W-72 Floppy Drive

A total of three floppy drive are supported in the TL/3.

The on-board floppy controller will support a 1.2 or 1.44 meg floppy drive. The 1.44 meg floppy drive is a special type of drive that pulls the power through the flat ribbon cable. Like the 720K drive, DO NOT connect a standard floppy drive to the system or you may damage the motherboard and floppy drive.

Whenever you add or remove a floppy drive from the system you will need to run the SETUPTL3 program.

Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

Floppy Drive Jumper Settings

D0	-	Drive select 0
D1	-	Drive select 1
D2	-	Drive select 2

On some models of the Teac floppy drive, the D0,D1 and D2 may be labeled as DS0, DS1 and DS2. On the Sony drive, there is a slide switch on the side, near the rear of the drive, that is used for selecting the drive setting. Power is drawn from the ribbon cable.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system. The power is blocked from going to the 5 1/4" drive by the punched holes in the flat ribbon cable. DO NOT try to use a standard floppy drive cable in this system.

This system supports up to 3 floppy drives. Each drive must be set for a different drive selection.

Hard Drives

A hard drive or hard card can be installed into this system. If the system has 3 floppy drives installed, you can either install a hard card or mount a hard drive in a "Smart Drive Mounting Bracket". This is available by special order.

The TL/3 has a built-in IDE interface. The only catch is, it is an XT IDE interface and is not the same as the industry standard AT IDE interface. It looks like an AT IDE interface, but it is electrically different. The XT interface will only support a 20 or 40 meg XT IDE hard drive. DO NOT try to use an AT interface drive connected to the XT interface on the motherboard!

Tandy calls these XT IDE hard drives, "Smart Drives". It's just their name for IDE Hard Drive. When you purchase one of these hard drives from Tandy, they will supply you a disk to partition the hard disk, format it, and install Deskmate. This process will take about an hour on the 40 meg hard drive.

If you purchase your hard drive from a third party company, they will usually come pre-formatted, so all you have to do is copy DOS to the hard disk. In the worst case, you would have to partition the hard disk yourself and format it following their instructions. This should take no more than 10 minutes. Just remember, always follow the directions sent with the drive from the place you purchased it from!

NOTE: Never run HSECT or AUTOFORMAT on these hard drives. It can render them useless. We have a way to recover the drive, we will have more instructions on that in Vol 2.

Let's say you want to install a larger than 40 meg hard drive into your system. You can! You will need a hard drive kit that has an IDE controller with a Tandy BIOS ROM.

The TL/3 Setup Program

This computer has part of MSDOS 3.3 built-in to the ROM. This allows you to simply turn on the computer and boot to a DOS prompt without having to insert a floppy disk into drive A. Also contained in ROM is Deskmate. The main desktop menu and some support programs are in the ROM. The rest of Deskmate is on diskettes.

There are three ways to run the setup program, they are as follows:

SETUPTL3	Standard setup
SETUPTL3 /A	Available on SOME system for extended setup
SETUPTL3 /F	Reset to factory setup
TLSETUP	Standard setup through Deskmate

When exiting setup, press F2 to update the new setup or ESC to abort any setup changes. When in setup press F10 to reset to the factory setup.

In the setup program you can also change which drive is designated as drive A.

Tech Note: You can change the video mode from monochrome and color by using the following key sequence during bootup:

<CTRL><ALT><SHIFT><V>

This means you would hold down the CTRL key, then hold down the ALT key, then hold down the SHIFT key and then press the V key, while keeping other keys held down.

The setup EEPROM in the system contains such information as type of video display, prompt for date and time, number of disk drives, etc. Whenever you add or remove a disk drive you must run the SETUPTL3 to update the system configuration.

If you are running a program that requires the use of a config.sys file or autoexec.bat file, and you are booting from ROM, then make the following changes in the SETUPTL

Check For Config.sys On Drive	A or C
Check For Autoexec.bat On Drive	A or C

Using A Higher Version DOS

You can use DOS 5.0 or 6.0 or higher on the TL/3. All you will need to do is boot the system with the old version DOS and run the SETUPTL3 program. Set the system for:

Primary Start-Up Device	DISK
Initial Start-Up Program	MS-DOS

Save the setup and reboot the system.

From now on, the computer will boot from a higher version DOS disk, when placed in drive A or from a hard disk.

TL/3 Battery

The TL/3 has a 3 volt battery on the motherboard for the clock. This battery is obtained at any Radio Shack store.

Serial Port

You can select whether the serial port is COM 1 or COM 2 or Disabled in the RLX setup program.

Parallel Port

You can select whether the parallel port is Normal (Uni-Directional) or Extended (Bi-Directional) or Disabled through the setup program. If you will be attaching an external floppy drive to the system, you will need to make sure the parallel port is set for Bi-Directional.

CMOS/Clock Notes

There is a 3 volt battery that hold the CMOS memory and it is used for the clock. This battery will need to be replaced every so often. The battery is located right behind where the floppy/hard drive mounts. This battery can be purchased at most Radio Shack stores.

Power Supply

This is a 67 watt power supply. It is the same power supply that is used in the TL and TL/2 computers. Power is supplied to the motherboard with a 6 pin connector.

Keyboard Notes:

This system uses a standard 101 style keyboard set in the XT mode. NOTE: Not all 101 style keyboards can be set into the XT mode. The original keyboard has 7 pins and a standard keyboard only has 5 pins. The 5 pin keyboard will still work.

Video Notes:

This system supports Hercules Graphics (monochrome) and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, whereas the TGA mode will allow you to display up to 16 colors.

The TL2 only has one video connection on the back of the computer. You can connect either a CGA or Mono monitor to the video port. You will need to change the mode of the video port when changing from CGA to Mono or Mono to CGA. This can be done by pressing CTRL + ALT + SHIFT + V all at the same time. This will cause the video mode to switch and the system to reboot.

Display Modes

80 lines by 25 lines

40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution	
4	320 x 200	
16	320 x 200	
16	160 x 200	
2	640 x 200	
4	640 x 200	
16	640 x 200	
Mono	720 x 348	Hercules Graphics Mode

VGA: This system can run VGA. You will need a VGA card that is able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

Printer Port

Printer port is a DB 25 connector.

Pin	Use	Pin	Use
1	- STROBE	2	- Data 0
3	- DATA 1	4	- Data 2
5	- DATA 3	6	- Data 4
7	- DATA 5	8	- Data 6
9	- DATA 7	10	- Printer Acknowledge
11	- Busy	12	- Paper Out
13	- Select	14	- Auto Feed
15	- Printer Fault	16	- Initialize
17	- Select In	18	- Ground
19	- Ground	20	- Ground
21	- Ground	22	- Ground
23	- Ground	24	- Ground
25	- Ground		

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supplied on the floppy drive controller cable to the 3.5" drives only. The floppy drive flat ribbon cable has holes punched in it to prevent the power from reaching the 5 1/4" drive. These power lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

IDE Interface

1	-	Reset	2	-	Ground
3	-	SD7	4	-	Ground
5	-	SD6	6	-	Ground
7	-	SD5	8	-	Ground
9	-	SD4	10	-	Ground
11	-	SD3	12	-	Ground
13	-	SD2	14	-	Ground
15	-	SD1	16	-	Ground
17	-	SD0	18	-	Ground
19	-	Ground	20	-	Key
21	-	Ground	22	-	Ground
23	-	HDIOW	24	-	Ground
25	-	HDIOR	26	-	Ground
27	-	HIOCRDY	28	-	
29	-	Ground	30	-	Ground
31	-	IRQ14	32	-	
33	-	HDA1	34	-	
35	-	HDA0	36	-	
37	-	HHDCS0	38	-	
39	-	ACTIVE	40	-	Ground

Tandy 1000TX

Catalog Number 25-1600

CPU Type : 80286
CPU Speed : 4.77 Mhz / 8 Mhz Switchable
Math Co-proc : 80287 8 Mhz
Standard Memory: 640K, on motherboard
Total Memory : 768k, expandable on motherboard
Video Memory : N/A
Expansion Slots: 5 - 8bit expansion slots 10" long
Video Output : CGA, TGA, Monochrome
Power Supply : 67 Watt

Keyboard : Tandy 90 Key
Floppy Drive : 1 - 3.5" 720K came standard
Hard Drive :
Drive Bays : 2 - 5.25" internal drive bays
Floppy Ctrl : Low density

Printer Port : 34 Pin card edge, built-in to motherboard
Serial Port : 9 pin
Joystick Ports : 2 ports, 6 pin din connector
Other Ports : Headphone Jack
: Microphone
: Joystick Ports

DOS Version : MSDOS 3.2
Latest BIOS ROM: 01.03.00

There are two different TX motherboards. The Cleburn version of the motherboard has an extra switch setting near the keyboard socket on the motherboard.

1000TX Motherboard

E1-E2 Jumper installed, enables serial port
Jumper removed, disables serial port

E3-E4 Jumper installed, sets serial port to COM 1
Jumper removed, sets serial port to COM 2

E9-E10 Jumper installed, when motherboard has 640k RAM
Jumper removed, when motherboard has 768k RAM

E11-E12 Jumper installed, enables printer select signal to printer port.
Jumper removed, disables printer select signal (default)

Jumper E11-E12 is located under the power supply.

There are two other jumper locations E5-E6 and E7-E8. They do not have any pins and are not user options.

DIP Switch Setting

- 1 - OFF Selects composite monochrome monitor
ON Selects CGA monitor (Default)
- 2 - OFF Selects IRQ 5 for hard drive/IRQ 2 for video
ON Selects IRQ 2 for hard drive/IRQ 5 for video
(default)
- 3 - OFF Disables IRQ 6, floppy controller IRQ
ON Enables IRQ6, (default)
- 4 - OFF Disables IRQ 7, printer port IRQ
ON Enables IRQ 7, (default)

NOTE: For some hard drives and hard cards, you will need to set switch 2 to OFF. This allows you to use standard XT controller cards in the SX.

1000TX "Cleburn" Version Motherboard

- E1-E2 on - enables on board serial port - standard
off - disables on board serial port
- E3-E4 on - selects Com 1 - standard
off - selects Com 2
- E9-E10 on - selects 640k memory - standard
off - selects 768k memory
- E11-E12 off - ties SLCTIN high - standard
on - connects SLCTIN to the printer

Jumpers E7-E8 have no user options.

Switch S2

- Pos 1 - Off - selects composite monochrome monitor
On - selects color RGB monitor - standard
- Pos 2 - Off - disables on board INT5
On - enables on board INT5 - standard
- Pos 3 - Off - disables on board INT6
On - enables on board INT6 - standard
- Pos 4 - Off - disables on board INT7
On - enables on board INT7 - standard

Switch S3

- Pos 1 & 2 towards the inside is for standard keyboard operation
- Pos 1 & 2 towards the outside is not used

System Memory

The 1000TX came standard with 640K of memory on the motherboard. This is upgradeable to 768k by adding an additional 128K of memory. You will need 4 - 64 x 4 DRAM chips (DO NOT try to use 256k chips). Simply plug the 4 chips into the 4 empty sockets on the motherboard, at location U54, U55, U56 and U57. Then remove the jumper at location E9-E10. This extra memory is used for video RAM. Without this extra memory, the video will use 16k to 64k of memory, depending on the video mode, from the lower 640k RAM. This may cause you to run out of memory with some programs. It is highly recommended that you install this extra 128K. The cost is minimal.

CPU and Math Co-Processor

The TX has an 80286 CPU running in the real mode. You can change the CPU out for a 386 module or 486 module by Improve. For more information see the chart on Speed Upgrades.

The TX uses a 80287 math co-processor. The socket is located at U15 on the motherboard. There are no jumpers or switches to set. Just plug it in.

1000TX 720K Sony MP-F63-01D 720k Floppy Drive

This is not a standard 720K floppy drive, power is supplied through the flat ribbon cable. You can use a modified version of a TEAC FD235HF or FD235F. Drive selection is handled by changing the drive select jumper on the drive. Not through the flat ribbon cable, as it is done on many compatibles.

Sony Drive Settings

DS0 drive A slide switch all the way to the back of the drive
DS1 drive B slide switch second notch from rear of the drive.

Teac Floppy Drive Jumper Settings

D0 - Drive select 0
D1 - Drive select 1

On some models of the Teac floppy drive, the D0, D1 and D2 may be labeled as DS0, DS1 and DS2.

NOTE: This is NOT a standard 3.5" floppy drive. It has been designed to draw the power through the data cable. DO NOT try to use a standard 3.5" floppy drive as you will short out your system. The power is blocked from going to the 5 1/4" drive by the punched holes in the flat ribbon cable. DO NOT try to use a standard floppy drive cable in this system.

When you add a 5 1/4" 360k floppy drive to the system, make sure the drive select jumper is set on D1 or DS1. Depending on the location of the card edge connector on the back of the drive. You may have to twist the flat ribbon cable over for a proper connection. We recommend the TEAC 360k floppy drive for the best fit.

Hard Drives

This system can handle either a hard card or hard drive. Note: There are only two drive bays. A hard card is recommended so that you don't lose the 2nd drive bay.

This system can use a standard Seagate ST11M (for MFM) or ST11R (for RLL) controller, when you set DIP switch 2 off. You can also run an IDE drive in this system with the proper IDE controller.

Serial Ports

This system has a 9 pin serial port located on the back. It is selectable between COM1, COM2 or disabled by changing the jumpers on the motherboard. See above for motherboard jumpers.

Clock Notes:

A "Smart" clock chip can be installed into this system. See the chart for clock chips for the exact location and software information.

Keyboard Notes:

The 1000SX does not use a standard keyboard interface. It is possible to connect a 101 style keyboard to these 1000's. You will either need a special keyboard converter Tandy part number 25-1030 (has been discontinued for a while) or a keyboard with the converter built-in. Tandy produced a keyboard, model 25-4038 had a converter built-in.

There are also a couple of third party manufacturers that have made keyboards for the 1000's, they are Datadesk and Northgate. When connecting up the Northgate keyboard, you will need to change the DIP switch setting found under the name plate.

Video Notes:

This system supports composite monochrome and standard CGA along with an extended CGA mode. This is also referred to as TGA. Standard CGA will allow you to display 4 colors, where as the TGA mode will allow you to display up to 16 colors. Very similar to EGA, but without the higher resolution. When connecting a composite monochrome monitor, you should turn DIP switch 1 OFF on the motherboard.

Display Modes

80 lines by 25 lines

40 lines by 25 lines

16 foreground colors / 8 background colors

Graphics Modes

Colors	Resolution
4	320 x 200
16	320 x 200
16	160 x 200
2	640 x 200
4	640 x 200

VGA: This system can use VGA, however the VGA card must be able to run in an 8 bit mode. You will also need a VGA monitor, the CM11 or CM5 are not VGA monitors.

You can connect the TX to a TV by using the composite monitor output on the back of the computer. When booting the computer press the F2 key during the boot up. This will cause the computer to sync up to the TV in the 40 column mode. At the DOS prompt, just issue the command `MODE 80`. This will give you an 80 column display.

Printer Port

The printer port is a 34 pin card edge.

Pin	Use	Pin	Use
1	- STROBE	2	- Ground
3	- DATA 0	4	- Ground
5	- DATA 1	6	- Ground
7	- DATA 2	8	- Ground
9	- DATA 3	10	- Ground
11	- DATA 4	12	- Ground
13	- DATA 5	14	- Ground
15	- DATA 6	16	- Ground
17	- DATA 7	18	- Ground
19	- Printer ACK	20	- Ground
21	- BUSY	22	- Ground
23	- Out of Paper	24	- Ground
25	- Select	26	- Not Connected
27	- Auto Feed	28	- Printer Fault
29	- Not Connected	30	- Printer Init
31	- Ground	32	- Not Connected
33	- Ground	34	- + 5 volts

Audio Jack

1	- Ground
2	- Audio Out

Joystick Ports

1	- Y Axis
2	- X Axis
3	- Ground
4	- Switch #1
5	- +5 Volts
6	- Switch #2

RGB Port (CGA Video)

1	- Ground
2	- Ground
3	- RED
4	- Green
5	- Blue
6	- Intensity
7	- Green - Mono
8	- Horizontal Sync
9	- Vertical Sync

Keyboard

1	- Clock
2	- Data
3	- Reset
4	- Ground
5	- + 5 volts
6	- Busy
7	- Type

Floppy Drive Port - Internal

1	-	Not Connected	2	-	Not Connected
3	-	+ 5 Volts	4	-	Not Connected
5	-	+ 5 Volts	6	-	Not Connected
7	-	+ 5 Volts	8	-	Index
9	-	+ 5 Volts	10	-	Drive 0 Select
11	-	+ 5 Volts	12	-	Drive 1 Select
13	-	Ground	14	-	Drive 2 Select
15	-	Ground	16	-	Motor On
17	-	Ground	18	-	Direction
19	-	Ground	20	-	Step
21	-	Ground	22	-	Write Data
23	-	Ground	24	-	Write Enable
25	-	Ground	26	-	Track 0
27	-	Ground	28	-	Write Protect
29	-	+ 12 Volts	30	-	Read Data
31	-	+ 12 Volts	32	-	Disk Side Select
33	-	+ 12 Volts	34	-	Disk Change

NOTE: Power is supplied on the floppy drive controller cable to the 3.5" drives only. The floppy drive flat ribbon cable has holes punched in it to prevent the power from reaching the 5 1/4" drive. These power lines are normally ground lines.

Serial Port

1	-	CD	Carrier Detect
2	-	RD	Receive Data
3	-	TD	Transmit Data
4	-	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	-	CTS	Clear to Send
7	-	RTS	Request to Send
8	-	CS	Clear To Send
9	-	RI	Ring Indicator

Interrupts Available

Interrupt	Function
0	Timer Channel 0
1	Keyboard
2	Video
3	Com Port 2
4	Com Port 1
5	Hard Disk
6	Floppy Disk Controller
7	Printer Port

I/O Port Address

060	PIO
0C0	Sound Generator
0E0	Math Co-Processor
1E0	Tandy Sound
200	Joystick Interface
2F8	COM 2
320	Hard Disk Interface
370	Secondary Floppy Controller
378	Printer Port
3B0	Monochrome Display Adapter
3D0	System Video
3F2	Floppy Disk Controller
3F8	COM 1

Tech Bulletins For The 1000's

The following is list of tech bulletins for the 1000's. If your system is working fine, then don't worry about them. If you should encounter a strange problem with your system, then you may want to check out the tech bulletin list under the description. If your symptom are like the description, you may want to contact your local repair center for more information.

Tech Bulletin	Computer's Catalog Number	Description
1000:001	25-1003	The modification for the Hitachi Modem chip usage.
1000:002	25-1000	A correction for the possible cause of unit appearing dead and speaker squealing.
1000:003	25-1000	Installation procedure for memory expansion boards.
1000:004	25-1000	Describes test points on drives used in the Tandy 1000.
1000:005	25-1000	The circuit change required to the printer port to allow the use of IBM software and Tandy printers.
1000:006	25-1000	IBM PC compatibility improvement.
1000:007	25-1000	Intensity increase of the composite video output.
1000:008	25-1000	To stop FDC errors caused by ringing in the FDC clock.
1000:009	25-1000	Keyboard cable possible wiring problem.
1000:010	25-1000	Performance improvement of the joystick port.
1000:011	25-1000	Explanation of ROM differences.
1000:012	25-1000	Correction of missing negative 5 volt supply on expansion slots.
1000:013	25-1000	Installation of a grounding lug for hard drive upgrade.

1000:014	25-1007	Loss of data prevention on hard drive due to accidental enabling of write gate.
1000:015	25-1000	Modification to decrease floppy I/O errors.
1000:016	25-1000	To stop speaker noise during power up.
1000:017	25-1000	To stop the production of extra long strobe pulses.
1000:018	25-1000	The modification to stop use of ground write mode for DMA access.
1000:019	25-1011	To eliminate DMA timing errors with slow peripherals.
1000:020	25-1000A	To correct or prevent system reset and poor sound level problems.
1000:021	25-1003	To increase amplitude for modem output.
1000:022	25-1000A	To stop the problem of fuzzy or missing video on RGB output.
1000:023	25-1000A	To stop intermittent lockups because of timing problems.
1000:024	25-1000A	To correct an improperly installed component.
1000:025	25-1000A	To correct a DMA timing problem.
1000:026	25-1000A	To stop noise from the light pen socket when no light pen is installed.
1000:027	25-1001	To enable the use of a tape cartridge with an internal hard in the Tandy 1000.
1000:028	25-1000A	A change to the floating state of IRQ4 to allow Deskmate to boot.
1000:029	25-1050	To enable the NCR sound generator IC to be used for Texas Instruments part.
1000:030	25-1001	Troubleshooting outline for some hard drives that have startup problems.

1000:031	25-1050	Outline of power supply adjustment procedures.
1000:032	25-1030	To give service information on the universal keyboard adapter.
1000:033	25-1600	To enable the use of optional video boards in the Tandy 1000TX.
1000:034	25-1600	To eliminate smearing or shadows of characters on video output.
1000:035	25-1000	Possibility of shorting or damaging when installing Express board into Tandy 1000's.
1000:036	25-1600	A correction to the main logic boards with C211 installed backwards.
1000:037	25-1001	To enable the use of the 25-1041 20 meg secondary hard drive with the Tandy 1000HD.
1000:038	25-1600	A modification to prevent the upper head shield from falling off.
1000:039	25-1600A	To outline a manufacturing modification to prevent 8253 failures during power on.
1000:040	25-1401	To increase the volume level on computers with low volume.
1000:041	25-1601	To describe possible compatibility problems with early Tandy 1000TL's.
1000:042	25-1052	To prevent units with this supply from flickering back on.
1000:043	25-1600	To enable the use of the 20 meg IDE hard card for work properly in the 1000 TX.
1000:044	25-1600	To stop the computer from intermittently locking up.
1000:045	25-1401	To improve reliability of the serial port when direct connection to another computer.

1000:046	25-1401	Identification and repair for 1000SL and 1000SL/2 main logic boards.
1000:047	25-1401	To improve data transfers when using only 3.5 disk drives.
1000:048	25-1050	Modem installation procedure to prevent failures.
1000:049	25-1402	Specific sharp ROM set requires a board modification to allow proper address selection.
1000:050	25-1602	The prevention of possible file corruption when used with network adapters.
1000:051	25-1601	A correction of intermittent power-up problems on revision A, A-1, and A-2 PCB's.
1000:052	25-1402	To document new diagnostic status codes and new error beep codes for the Tandy 1000SL/2 and 1000TL/2.
1000:053	25-1450	PS/2 mouse driver causes intermittent lockups in Deskmate.
1000:054	25-1051	Damage prevention to main logic boards caused by cracked power supply boards.
1000:055	25-1450	Improvement of monochrome video output when connected to a VM-5.
1000:056	25-1603	Improvement of monochrome video output when connected to a VM-5.
1000:057	25-1450	To insure reliable operation of the power supply.
1000:058	25-1452	Reprogramming a 1000RLX or 1000RLX/HD EPROM.
1000:059	25-1450	Using the 25-1087 external floppy with the 1000RL and 1000RL/HD.
1000-060	25-1602	2400 baud modem experiences intermittent initialization errors in some communications.