MINISCRIBE CORPORATION
5 1/4" HALF HEIGHT PRODUCTS GROUP
M88 PRODUCTS DIVISION

TECHNICAL SUPPORT MANUAL

SEPTEMBER, 1988

INDEX

MODEL	FORMATTED CAPACITY	CYLS	HEADS	PARK	WRITE PRECOMP	ACCESS TIME	DRIVE TYPE (AT)
1006	5 MB FH	306	2	336	128	179 MS	-------
1012	10 MB FH	306	4	336	128	179 MS	1
2006	5 MB FH	306	2	336	128	93 MS	-------
2012	10 MB FH	306	4	336	128	85 MS	1
4010	8 MB FH	480	2	336	128	133 MS	-------
4020	16 MB FH	480	4	522	128	133 MS	1
3012	10MB HH	612	2	656	128	155 MS	-------
3212	10MB HH	612	2	656	128	85 MS	-------
3412	10MB HH	306	4	100	128	60 MS	1
3425	20MB HH	615	4	656	128	85 MS	2,6
3425P	20MB HH	615	4	656	128	53 MS	2, 6
3438*	32MB HH	615	4	656	128	85 MS	2,6
3438*P	33MB HH	615	4	656	128	53 MS	2,6
3650	42MB HH	809	6	852	128	61 MS	3
3675*	63MB HH	809	6	852	128	61 MS	3
3053	44MB HH	1024	5	AUTO	512	25 MS	11,17,36
3085	71 MB HH	1170	7	AUTO	512	22 MS	12, 19
6032	26 MB FH	1024	3	AUTO	512	28 MS	10
6053	44 MB FH	1024	5	AUTO	512	28 MS	11,17,36
6085	71 MB FH	1024	8	AUTO	512	28 MS	4,45
6079*	68 MB FH	1024	5	AUTO	512	28 MS	11,17,36
6128*	110 MB FH	1024	8	AUTO	512	28 MS	4, 45

MODEL	FORMATTED CAPACITY	CYLS	HEADS	PARK	WRITE PRECOMP	ACCESS TIME	DRIVE TYPE (AT)
8412	10MB 3 1/2"	306	4	336	128	50 MS	1
8425	32MB 3 1/2"	615	4	664	128	68 MS	2,6
8438*	32MB 3 1/2"	615	4	664	128	63 MS	2,6
8425F	20MB 3 1/2"	615	4	664	128	40 MS	2,6
8438F*	32 MB 3 1/2"	615	4	664	128	40 MS	2,6
8225	21MB 3 1/2"	771	2	810	128	45 MS	-------
8450	40MB 3 1/2"	771	4	810	128	46 MS	2,6
8425S	20MB 3 1/2"	615	4	656	128	68 MS	2,6
8425XT	20MB 3 1/2"	615	4	AUTO	128	28 MS	-------
8051A	42MB 3 1/2"	745	4	AUTO	128	28 MS	-------
8051S	42MB 3 1/2"	745	4	AUTO	128	28 MS	-------
9230E	203 MB FH	1224	9	AUTO	512	16 MS	-------
9380E	338 MB FH	1224	15	AUTO	512	16 MS	-------
9230S	207 MB FH	1224	9	AUTO	512	16 MS	-------
9380S	347 MB FH	1224	15	AUTO	512	16 MS	-------

* RLL Certified
Reduced write current = total cyls. + 1
Max correctable error burst = 11 (Western Digital)
CCB option byte = 3 or 7 (Western Digital)

TECH SUPPORT QUESTIONNAIRE

1. Hard drive model number?

2. Are you getting a flashing error message from LED?

    a. If yes, identify error message (see product manual)
    b. If no, continue . . . .

3. What system? (AT, XT, clone, etc.)

4. Is this the only hard drive in the system?

5. What controller? (Mfg. and model number) Is the controller compatible with the drive and/or system?

6. What version of DOS?

7. How is the hard drive being formatted? (Low level format, partition, high level format)

8. At what point did the problem occur?

9. Verify the following:

    a. 34 pin ribbon cable (straight or twisted?)
        (The twist inverts the drive select)
    b. Drive Select
    c. Is the 20 pin ribbon cable attached to the correct port on the controller?
    d. Is pin one (1) properly identified at the controller?
        At the hard drive
    e. Has a low level format been performed? (XT - debug)
        (AT - debug, Advanced Diag., Disk Manager)
    f. Is a power plug connected to the hard drive?

10. Have you tried to format the drive with another controller?

11. Have you tried to format the hard drive in another system, or format another hard drive in this system?

12. Have you tried another formatting procedure and/or software?

HARD DISK DRIVE ERROR MESSAGES
(Not Necessarily Hard Drive Failures)

PROBLEM: 1701 error (Drive Not Ready)
SOLUTION: A.   Drive not formatted, press F1 to continue.

PROBLEM: 1780 error
SOLUTION: A.   Check for proper drive select.
                  B.   Check ribbon cables at controller for proper pin one (1) alignment
                  C.   Verify that the 20 pin ribbon cable is connected to the correct port on the controller card.
                  D.   Replace 20 pin ribbon cable.
                  E.   Replace controller card.

PROBLEM: Error Code 20
SOLUTION: A.   Check for proper drive select.
                  B.   Check ribbon cables at controller for proper pin one (1) alignment.
                  C.   Verify that the 20 pin ribbon cable is connected to the correct port on the controller card.
                  D.   Check for proper installation of the controller card in the expansion slot.
                  E.   Replace controller card.

PROBLEM: Error Code 80
SOLUTION: A.   Check for proper drive select.
                  B.   Check 34 pin and 20 pin ribbon cables for proper installation.
                  C.   Replace controller card.

PROBLEM: "Error Reading Fixed Disk" when booting the system.
SOLUTION: A.   Primary DOS partition not active.

PROBLEM: "Track Zero Bad-Disk Unusable"
SOLUTION: A.   Reformat hard disk with DOS 3.0 or higher.
                  B.   Access the config.sys file, make buffers = 99, and reformat hard disk. After the format is complete, lower buffers to their original configuration.

PROBLEM: "Error Reading Track 0"
SOLUTION: A.   Hard disk not formatted.

PROBLEM: Low level Format Takes Too Long.
SOLUTION: A.   20 pin ribbon cable connected to the wrong port on the controller card.
                  B.   Check ribbon cables at controller for proper pin one (1) alignment.

PROBLEM: "Won't Format" - "System Won't Recognize" -
             "Can't Access"
SOLUTION: A.   Has drive been initialized?   (low level format,
                  partitioned, high level format)
             B.   Check for proper drive select.
             C.   Check ribbon cables at controller for proper
                  pin one (1) alignment.
             D.   Verify that the 20 pin ribbon cable is connected
                  to the correct port on the controller card.
             E.   If two hard drives in system, verify proper
                  termination.   (The terminating resistor must be
                  removed from all but the last physical hard drive
                  in the chain)
             F.   Check for proper installation of the controller card
                  in the expansion slot.
             G.   Replace controller card.

TECHNICAL SUPPORT AVAILABLE AT 1 (800) 356-5333

Installation Guide for MiniScribe Models
3650 & 3675

This guide will allow you to install a MiniScribe hard disk drive into your IBM PC XT/AT or clone system.
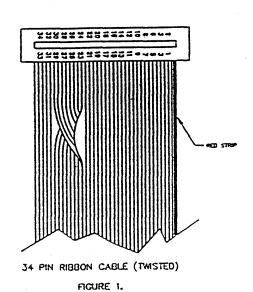
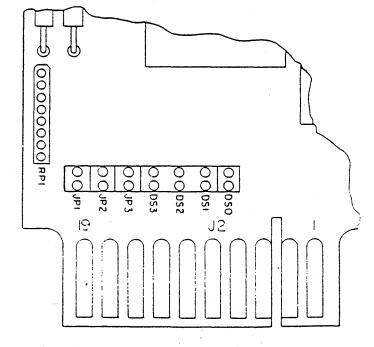Please read the entire installation guide before attempting to install your hard disk drive.

Installation

1. Set the drive on a padded surface (anti-static if available) with the printed circuit board facing up. (If available, a properly grounded write strap should be worn during this installation.) **Do not touch any part of the printed circuit board at any time during installation.**

2. If your system requires the drive to use mounting rails, secure the rails to the drive in the orientation that best fits your system.

3. Setting the Drive Select jumpers:

    The drive select jumper (see fig. 2) is set according to the drives assignment, (C,D, etc.) and the configuration of the 34 pin ribbon cable.

    If the 34 pin ribbon cable has no twisted connections (see fig. 1) configure the first drive (C) (inner connector) as drive select 0 (DS0), and the second drive (D) (end connector) as drive select 1 (DS1). For a single drive installation, attach the drive to either connector and configure as drive select 0 (DS0).

34 PIN RIBBON CABLE (TWISTED)

FIGURE 1.

If the 34 pin ribbon cable has a twist (see fig. 1) at the end connector, attach the first drive (C) to the end (twisted) connector, and the second drive (D) to the inner connector. Configure both drives (C & D) for drive select 1 (DS1). For a single drive installation, attach the drive to the end (twisted) connector and configure as drive select 1 (DS1).

4. When installing a single drive, the resistor termination pack (RP1) must remain installed. When installing two drives, the resistor termination pack (RP1) must be removed from all but the last physical drive in the chain.

5. Slide the drive into your system's open slot with the activity LED towards the outside of the system.

6. Plug the 34 pin control cable and 20 pin data cable onto the hard drive's printed circuit board edge connectors J1 and J2 respectively. The striped edge of the ribbon cable indicates pin 1. The location of pin 1 on the connector must coincide with pin 1 on the printed circuit board edge connector. Tip: On models 3650 and 3675 the striped edge of the ribbon cable should always face the power connector (J3).

7. Connect a 4 pin power connector to J3 on the hard disk.

8. Check all connections for proper installation before powering up the system. **Do not apply power to the drive until the drive is secure and the system cover is in place.**

9. You are now ready to proceed with the required hard disk formatting operations. To properly prepare the hard disk for use in your system, three steps must be taken: low level format, partition, and high level or physical format. Consult the formatting documentation supplied with the controller card or partitioning software instructions for the model 3650 and 3675.

Drive Specifications

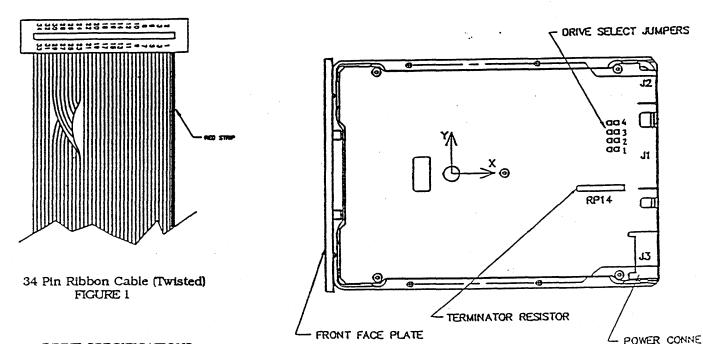| Drive	CYL	HDS	RWC	Precomp
3650	809	6	810	128
3675	809	6	810	128

Technical Support is available at 1-800-356-5333.

MINISCRIBE CORPORATION

INSTALLATION GUIDE
FOR MINISCRIBE MODEL
3053

This guide will allow you to install a MiniScribe hard disk drive into your IBM PC XT/AT or clone system.

1. Set the drive on a padded surface (anti-static if available), with the printed circuit board facing up.

2. If your system requires the use of mounting rails to secure the drives, attach them in the orientation that best fits your system.

3. Setting the drives select switch:

34 Pin Ribbon Cable (Twisted)
FIGURE 1

DRIVE SPECIFICATIONS

Formatted Capacity	-44.6 MBytes
Data Cylinder	-1024
Read/Write Heads	-5
Average Access Time	-25msec
(Based on a 6 microsec step rate)	
Power Dissipation	-12.4 Watts Average
Write Precompensation Cyl	-512
Starting Reduce Write Current Cylinder	-1024

Attach 20 pin ribbon cable to J2.
Attach 34 pin ribbon cable to J1.
Attach power connector to J3.
FIGURE 2.

When attaching the first drive (C) to the twisted connection of the 34 pin ribbon cable (see figure 1). and the second drive (D) to the non-twisted connection of the 34 pin ribbon cable. configure both drives as drive select 2.

When attaching the first drive (C) to the non-twisted connection of the 34 pin ribbon cable and the second drive (D) to the twisted connection of the 34 pin ribbon (See Figure 1). configure both drives as drive select 1.

Check your controller installation manual to ensure correct attachment of the 20 pin ribbon cable and the 34 pin ribbon cable at the controller.

4. Configuring the terminator resistor:

    When installing a single drive, the terminator resistor (RP14) must remain installed. When installing two or more drives, the terminator resistor must be removed from all but the least drive (the drive attached to the end connector). (See Figure 2.)

5. Slide the hard drive into your system. The drive may be mounted in any attitude including the normal flat position, on either side or on either end.

6. Verify that the location of pin 1 on the controller coincides with pin 1 of the ribbon cables (See Figure 1.). The color coded, striped edge of the ribbon cable indicates pin 1.

7. Connect a 4 pin power connector to J3 on the disk drive. Do not apply power until the drive is secured.

8. You are now ready to complete drive formatting procedures.

PARKING HEADS ON MODELS 3650 AND 3675

In the month of July, 1988 MiniScribe's Recon facility reported that 76% of the Model 3650 and 3675 drives arrived with the heads **NOT PARKED** at the "landing zone", which on these models is Cylinder 852.

As you know, drives "not landed" could seriously damage the heads and disks of the drives when they are in transit, resulting in high scrap cost, and possibly voiding the warranty of the drive.

We really need your help in stressing to your customers and fellow employees the importance of "PARKING THE HEADS" and "proper packaging" of the drives for shipping.

Here are the steps to take to "park the heads" and "properly package" the Model 3650 and 3675 for shipping.

1.   Disconnect both ribbon cables from the hard drive.

2.   Remove the drive select jumper from either DSO or DSI.

3.   Place that jumper on the pins marked JP3.

4.   Apply power to the drive.

5.   In approximately 30 seconds the heads will park at the "landing zone". You will hear the stepper motor turn as it moves the heads to the "landing zone", and the drives' LED will turn amber, indicating the heads are parked.

6.   Disconnect power.

7.   Place the drive in its "original" anti-static bag, and package the drive for shipment in its "original" container.

If the drive will not spin or the stepper motor and/or its circuitry is defective, then of course the heads cannot be parked. In this case it is imperative that the drive is packaged for shipment in its "original" container, thus minimizing the possibility of serious damage to the heads and disks.

Your cooperation is vital and will certainly be greatly appreciated. Thank you.

MINISCRIBE MODELS 3650 AND 3675

ERROR CODES

Zero = 0.5 second flashing red mode
One = 0.5 second continuous red ON mode
Between Bits = 0.5 seconds off
Between Repeat Cycles = 1.0 second off

Listed below are the binary to hexadecimal conversion values:

0=0000	4=0100	8=1000	C=1100
1=0001	5=0101	9=1001	D=1101
2=0010	6=0110	A=1010	E=1110
3=0011	7=0111	B=1011	F=1111

Example: Code "E"

0.5 Sec ON
0.5 Sec OFF
0.5 Sec ON
0.5 Sec OFF
0.5 Sec ON
0.5 Sec OFF
0.5 Sec FLASHING
1.0 Sec OFF

MESSAGE DEFINITIONS

Code 0 - Microprocessor RAM error
Code 1 - Microprocessor ROM checksum error
Code 2 - Interface chip diagnostic failure
Code 3 - Write Fault latch will not reset
Code 4 - Index pulse not detected during spinup
Code 5 - Unable to reach 3600 rpm in 30 seconds
Code 6 - Unable to stabilize spin speed in 10 seconds
Code 7 - Unable to maintain spin speed to 0.5%
Code 8 - Unable to uncover Track Zero sensor
Code 9 - Unable to cover Track Zero sensor
Code A - Track Zero interrupter misadjusted
Code B - Shipping zone error, crash stop misadjusted
Code C - Carriage stuck during recal error
Code D - Seek error during burn-in or recal
Code E - Unused
Code F - Unexpected interrupt from processor

MINISCRIBE MODEL 3053
ERROR CODES

Zero   =   0.5 second flashing mode
One   =   0.5 second Continuous ON mode
Between Bits = 0.5 second off
Between Repeat Cycles (Words) = 1.0 second off

Listed below are the binary to hexadecimal conversion values:

0=00000	8=01000	10=10000	18=11000
1=00001	9=01001	11=10001	19=11001
2=00010	A=01010	12=10010	1A=11010
3=00011	B=01011	13=10011	1B=11011
4=00100	C=01100	14=10100	1C=11100
5=00101	D=01101	15=10101	1D=11101
6=00110	E=01110	16=10110	1E=11110
7=00111	F=01111	17=10111	1F=11111

Example: Code "1A" 11010

1	0.5 sec ON
	0.5 sec OFF
1	0.5 sec ON
	0.5 sec OFF
0	0.5 sec FLASHING
	0.5 sec OFF
1	0.5 sec ON
	0.5 sec OFF
0	0.5 sec FLASHING
	1.0 sec OFF

ERROR CODE DEFINITIONS

Code 00 = Microprocessor RAM error
Code 01 = Microprocessor ROM Checksum error
Code 02 = Interface chip diagnostic error
Code 03 = -WRITE FAULT will not reset
Code 04 = Index pulse not detected or lost
Code 05 = Unable to maintain spin speed within 0.5%
Code 06 = Loss of +FINE TK during idle mode
Code 07 = More than one seek retry
Code 08 = Time out on +END DECEL signal
Code 09 = Time out on track crossing (-CYL PULSE)
Code 0A = Overshoot
Code 0B = Time out on +FINE TK
Code 0C = +TKO signal not detected on a seek to TKO
Code 0D = Comparator mismatch during settling
Code 0E = Comparator mismatch after track crossing
Code 0F = Unexpected interrupt from microprocessor
Code 10 = Time out on TKO pattern
Code 11 = Time out on GB1 pattern
Code 12 = Time out on GB2 pattern
Code 13 = Seek range error
Code 14 = Voltage unsafe with -WRTGATE inactive
Code 15 = Voltage unsafe with -WRTGATE active
Code 16 = Chip unsafe (-WRITE FAULT)
Code 17 = Step pulses received with -WRTGATE active
Code 18 = Time out on +END DECEL signal
Code 19 = Time out on track crossing (-CYL PULSE)
Code 1A = Overshoot
Code 1B = Time out on +FINE TK
Code 1C = +TK0 signal not detected
Code 1D = Comparator mismatch after rezero
Code 1E = Servo adjust failure - no closure
Code 1F = 6301 Trap

NOTE: Codes: 08, 09 = During a seek

            Codes: 0A, 0B, 0C, 0D = After a seek

            Codes: 10, 11, 12, 18, 19, 1A = During a rezero

            Codes: 1B, 1C, 1D = After a rezero

STANDARD REPORT

COMPLAINT	COMPLAINT CODE
BAD DIRECTORY TRACK - TRACK 0 ERROR	63A
BAD TRACKS/SECTORS/BLOCKS	68
BROKEN/LOOSE HARDWARE	12
BROKEN WIRE/CONNECTOR	9
DAMAGED FACEPLATE	5
DAMAGED SHOCKMOUNTS	6
DAMAGED PCBA	7
DEFECTIVE LED	4
DEFECTIVE MEDIA SURFACE	69
DEFECTIVE PCBA COMPONENTS-BURNED	7B
DEFECTIVE REZERO	11
EXCESSIVE FLAWS	66
FLASH CODE 0	13
FLASH CODE 1	14
FLASH CODE 2	15
FLASH CODE 3	16
FLASH CODE 4	17
FLASH CODE 5	18
FLASH CODE 6	19
FLASH CODE 7	20
FLASH CODE 8	21
FLASH CODE 9	22
FLASH CODE A	23
FLASH CODE B	24
FLASH CODE C	25
FLASH CODE D	26
FLASH CODE E	27
FLASH CODE F	28
FLASH CODE 10	29
FLASH CODE 11	30
FLASH CODE 12	31
FLASH CODE 13	32
FLASH CODE 14	33
FLASH CODE 15	34
FLASH CODE 16	35
FLASH CODE 17	36
FLASH CODE 18	37
FLASH CODE 19	38
FLASH CODE 1A	39
FLASH CODE 1B	40
FLASH CODE 1C	41
FLASH CODE 1D	42
FLASH CODE 1E	43
FLASH CODE 1F	44
HARD ERRORS-TOO MANY BAD TRACKS	52C
NOISY DRIVE	2
NOT READY - WON'T COME READY	59A
POWER UP/SPIN	62
READ/WRITE ERRORS/PROBLEMS	55
SEEK STEP ERROR	56
TIME OUT	61
VERIFY/SELECT PROBLEM	58
WON'T BOOT LOAD	60
WON'T PARK - CAN'T PARK HEADS	71B

HANDLING AND PACKING

CAUTION/WARNING

The MiniScribe drive is a precision product. During handling, the product must not be dropped, jarred or bumped. Otherwise, damage to the heads and disks may occur. When the drive is removed from the MiniScribe shipping container and not immediately secured within a chassis through its shock mounts, it must be stored on a soft padded conductive (antistatic) surface.

UNPACKING AND INSPECTION

SINGLE PACK A

Retain the packing materials for reuse. Refer to Figure 1 for the following steps:

Step 1:   Inspect the shipping container for evidence of damage in transit. If damage is evident, notify the carrier immediately.

Step 2:   Ground out work area and operator to eliminate electrostatic discharge.

Step 3:   Open the outer carton by carefully cutting the tape on the top of the carton.

Step 4:   Lift the inner carton out of the outer carton and remove the end foam cushions.

Step 5:   Open the inner carton by carefully cutting the tape on the top of the carton.

Step 6:   Lift the drive from the inner carton and remove the end foam cushions, the cardboard wrap with spacer, and the conductive/antistatic bag.

Step 7:   Place the two pairs of end cushions, the cardboard wrap with spacer, and the inner carton within the outer carton and store for subsequent use.

Step 8:   Inspect the drive for shipping damage, loose screws or components and correct if possible. If damage is evident without noticeable damage to the shipping cartons, notify MiniScribe immediately for drive disposition.
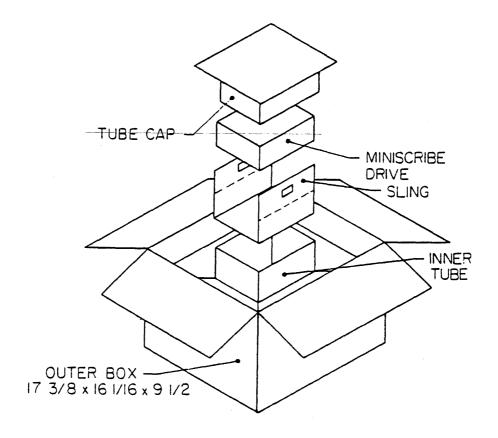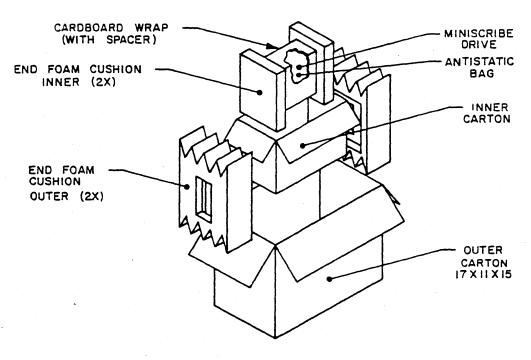
Figure 1
Single Pack Shipping Container A

SINGLE PACK B

Retain the packing materials for reuse. Refer to Figure 2 for the following steps:

Step 1: Inspect the shipping container for evidence of damage in transit. If damage is evident, notify the carrier immediately.

Step 2: <u>Ground out work area and operator to eliminate electrostatic discharge</u>.

Step 3: Open the outer carton by carefully cutting the tape on the top of the carton.

Step 4: Lift the inner carton out of the outer carton and remove the end foam cushions.

Step 5: Open the inner carton by carefully cutting the tape on the top of the carton.

Step 6: Lift the drive from the inner carton and remove the end foam cushions, the cardboard wrap with spacer, and the conductive/antistatic bag.

Step 7: Place the two pairs of end cushions, the cardboard wrap and store for subsequent use.

Step 8: Inspect the drive for shipping damage, loose screws or components and correct if possible. If damage is evident without noticeable damage to the shipping cartons, notify MiniScribe immediately for drive disposition.

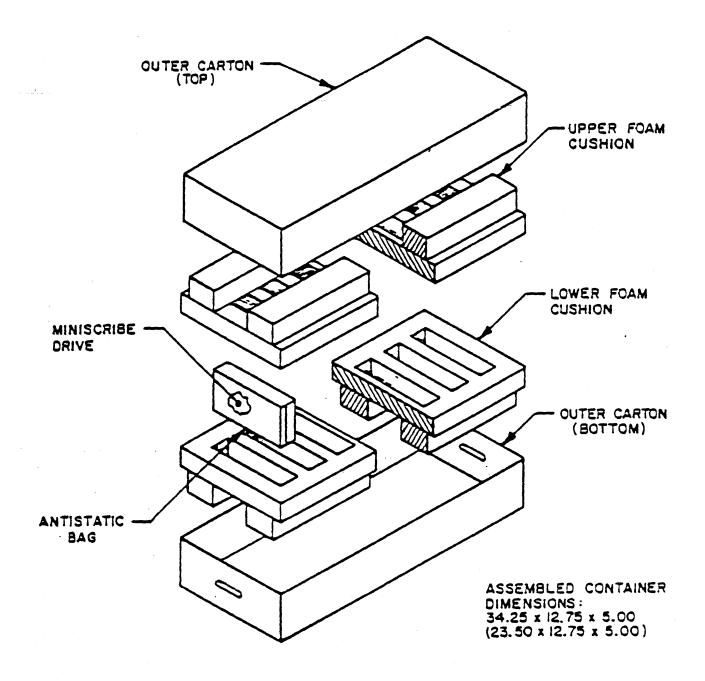Figure 2
Single Pack Shipping Container B

MULTIPACK

Retain the packing materials for reuse. Refer to Figure 3 for the following steps:

Step 1:   Inspect the shipping container for evidence of damage in transit. If damage is evident, notify the carrier immediately.

Step 2:   <u>Ground out work area and operator to eliminate electrostatic discharge</u>.

Step 3:   Lift off outer carton top.

Step 4:   Lift off upper foam cushion. This will expose the drives in their conductive/antistatic bag.

Step 5:   Lift each drive out of the lower foam cushion individually and remove the conductive/antistatic bag.

Step 6:   Return conductive/antistatic bag to lower foam cushion for reuse.

Step 7:   Place drive on a protective foam pad and inspect the drive for shipping damage, loose screws or components and correct if possible. If damage is evident without noticeable damage to the shipping carton, notify MiniScribe immediately for drive disposition.

Step 8:   Once all the drives have been removed from the shipping carton and the conductive/antistatic bad has been returned to the lower foam cushion, reassemble the carton and store for reuse.

REPACKING

Should the MiniScribe drive require shipment, repack the drive using the antistatic bag supplied and the other MiniScribe packing materials and following the steps above in reverse order. The MiniScribe series contain shipping zones for protection of the data areas from periods of mishandling. Prior to power down for shipment, the host controller should access this zone; if it is NOT the product warranty is void.

OUTER CARTON (TOP)

UPPER FOAM CUSHION

LOWER FOAM CUSHION

MINISCRIBE DRIVE

OUTER CARTON (BOTTOM)

ANTISTATIC BAG

ASSEMBLED CONTAINER DIMENSIONS:
34.25 x 12.75 x 5.00
(23.50 x 12.75 x 5.00)

MULTIPACK SHIPPING CONTAINER

NOTICE

The MiniScribe drive product warranty is void if the drive is returned to MiniScribe in other than the standard MiniScribe shipping carton packed in accordance with the enclosed procedure.

It should also be noted that the MiniScribe drive product warranty is void if the multi-pack shipping container is not shipped on a pallet.

FORMATTING AND PARTITIONING THE
MINISCRIBE 3650, 3675, OR 3053
WITH THE WESTERN DIGITAL WD1002A-WX1 CONTROLLER

1.   Boot the machine from drive A:

2.   Load DOS debug.com utility by typing: A>debug<Return>

3.   At the debug prompt (-) type: -g=c800:5<Return>

4.   The screen should display the following:
        Super Bios Formatter Rev. 2.4 (C) Copyright Western Digital
        Corp. 1987
        Current Drive is C:, Select new Drive or RETURN for current.

5.   Press return for drive C: <Return>

6.   The screen should display the following:

        Current interleave is 3. Select new interleave or RETURN for
        current.

7.   Press Return or type new interleave value. <Return>

8.   The screen should display the following:
        Are you dynamically configuring the drive - answer Y/N

9.   Type Y for Yes <Return>

10.   Key in disk characteristics as follows: ccc h rrr ppp ee o where
        ccc = total number of cylinders (1-4 digits)
        h = number of heads (1-2 digits)
        rrr = starting reduced write cylinder (1-4 digits)
        ppp = write precomp cylinder
        ee = max correctable error burst length (1-2 digits)
            range = 5 to 11 bits, default = 11 bits
        o = CCB option byte, step rate select (1 hex digit)
            range = 0 to 7, default = 5
            refer to controller and drive specification for step rates

11.   Enter: 809, 6, 810, 128, 11, 7 for models 3650/3675.
        Enter: 1024, 5, 1025, 512, 11, 7 for model 3053.

12.   Are you virtually configuring the drive - answer Y/N

13.   Enter Y for yes.

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14. Key in cylinder number for virtual drive split as vvv...
    where vvv = number of cylinders for drive C: (1-4 digits)

15. Enter: 602 for 30/10 Meg. split or 405 for 20/20 split (models
    3650/3675).
    Enter: 698 for 30/14 meg. split or 512 for 22/22 meg split (model
    3053).

16. Screen will display: press Y to begin formatting Drive C with
    interleave 3.

17. Press Y <Return> to begin the Low Level Format. Any other key will
    exit with nothing done.

18. The screen should display the following:
    Formatting...
    Then or after several minutes it will prompt you.
    Do you want to format bad tracks - answer Y/N

19. Type N, for no (typing Y for yes is not recommended.)

20. The screen should display the following:
    Format Successful
    System will not restart
    Insert DOS diskette in drive A:
    Press any key when ready.

21. Load and execute DOS FDISK utility for drive C and D.

22. Load and execute DOS FORMAT utility for drive C and D.

Reference DOS Manual for questions regarding FDISK and FORMAT
utilities.

If further assistance is required, contact MiniScribe Tech Support at
800-356-5333.

FORMATTING AND PARTITIONING THE
MINISCRIBE 3650, 3675, OR 3053
WITH THE ADAPTEC ABC2010A CONTROLLER

Boot system with DOS in drive "A".

Run DEBUG as follows:

A>debug
-g=c800:ccc

ADAPTEC ACB2010A FORMAT PROGRAM

Enter interleave (1-9) = 3

Enter drive id (0/1) = 0

Should we use Adaptec defect handling (Y/N)? N

Should we use the default parameters (Y/N)? N

Reply to the following questions in hex only:

Number of logical units for this drive (1-8) = 2

Step pulse rate (0-7) = 6

Landing zone = 852 (3650/3675), 1024 (3053)

ECC correction span = 11

Write pre-comp cylinder = 128 (3650/3675), 512 (3053)

Reduce write current cylinder = 810 (3650/3675), 1025 (3053)

Head count = 6 (3650/3675), 5 (3053)

Cylinder count = 809 (3650/3675), 1024 (3053)

Sending mode select = 15

Sending write buffer = OF

Format in progress = 04

Track verification = logical unit 00

Track verification = logical unit 01

Press <RETURN> to proceed or <ESCAPE> to cancel. . .

Interleave (1-15):   3

Are you SURE you want to format (Y/N) Y

Formatting. . .

Format complete.

Verifying. . . 100%.

Verify complete.

Load and execute DOS FDISK utility for drive C and D.

Load and execute DOS FORMAT utility for drive C and D.

Reference DOS Manual for questions regarding FDISK and FORMAT utilities.

If further technical assistance is required, contact MiniScribe Technical Support at 800-356-5333.

FORMATTING AND PARTITIONING THE
MINISCRIBE 3650, 3675, OR 3053 WITH DTC
MODEL 5150 CR, CI, AND CS CONTROLLERS

Turn system power on.

The following prompts will appear on the screen; please respond as indicated.

Controller board configuration
Hards Disk 1: Configuration parameters not found.

To install configuration parameters, run DEBUG from floppy disk "A" as follows:

A>debug
g=C800: 5

Insert DOS diskette in drive "A"
System will boot! Please wait. . . .

Format Utility

Drive no. (1-2): 1

Interleave (2-9): 3

Drive Table:

0.	ST-225/Tandon-262
1.	ST-4038.
2.	MiniScribe-3425/Microscience-725.
3.	ST-212/ST-412.
4.	Priam-V150.
5.	Priam-V170.
6.	ST-425.
7.	Tandon-362/ST-138.
8.	ST-4051/Tandon-755.
9.	ST-251.
10.	ST-213/MiniScribe-3012/3212/Syquest-312.
11.	Tandon-703.
12.	Maxtor-1085.
13.	ST-4096.
14.	Oki-540.
15.	Free Format

Table no: 15

Format complete, press CTRL-BRK.

Type Q to exit DEBUG.

Load and execute DOS FDISK utility for drive C and D.

Load and execute DOS FORMAT utility for drive C and D.

Reference DOS Manual for questions regarding FDISK and FORMAT utilities.

If further technical assistance is required, contact MiniScribe Technical Support at 800-356-5333.

FORMATTING AND PARTITIONING THE
MINISCRIBE 3650, 3675, OR 3053
WITH OMTI MODEL 5220A CONTROLLER (-10 BIOS)

Turn system power on.

The following prompts will appear on the screen; please respond as indicated.

To install configuration parameters, run DEBUG from floppy disk "A" as follows:

A>debug
g=C800: 6

This FORMAT routine will DESTROY ALL data on your disk!

Press <RETURN> to proceed or <ESCAPE> to cancel. . .

Enter drive # (0 or 1): 0

Use default parameters (Y/N) N

Total CYLS; 809 (3650/3675), 1024 (3053)

Total HEADS: 6 (3650/3675), 5 (3053)

Write Precomp CYL (<RETURN> for none): 128 (3650/3675, 512 (3053)

CONTROL BYTE: 2

Press >RETURN> to proceed or <ESCAPE> to cancel. . .

Logical partitioning desired (Y/N) Y

Total CYLS in 1st logical unit: 616 (3650/3675), 744 (3053)

Any defects (Y/N)?   N   Any defects (Y/N)?   Y

                                          (Press <RETURN> to end defect list)
                                          CYLINDER:
                                          HEAD:
                                          CYLINDER:
                                          More entries (Y/N)?   N

Format Utility

Cylinders (1-2048): 809 (3650/3675), 1024 (3053).

Heads (1-16): 6 (3650/3675), 5 (3053)

Step Rate (Micro sec):
(5, 10, 20, 30, 40, 50, 60, 70)

Step Rate (Micro sec): 10

Set reduced write current at cylinder: Press <RETURN> for None

Set write precompensation at cylinder: 128 (3650/3675), 512 (3053)

Split into 2 logical units (Y/N): Type Y

Drive will split into 2.

Enter drive defect table? (Y/N) Y   Enter drive defect table (Y/N) N
(Type <ESCAPE> to end input)
Line   Cylinder   Head

, Is above information correct? (Y/N)

Ready to ERASE entire disk? (Y/N): Type Y

Formatting hard disk no. 1
        Cyl   Head

Cyl 808   Head 5
Format complete.

Insert DOS diskette in drive A:
Proceed to FDISK and FORMAT.
Enter any key. System will restart!

Load and execute DOS FDISK utility for drive C and D.

Load and execute DOS FORMAT utility for drive C and D.

Reference DOS Manual for questions regarding FDISK and FORMA utilities.

If further technical assistance is required, contact MiniScribe Technical
Support at 800-356-5333.

COMPATIBILITY

Interfaces

ST506/ST412

The ST506/ST412 interface has been an industry standard since 1981. It is primarily intended for low-cost. low-capacity applications.

This interface standard places most of the drive subsystem's logic on the controller. The drive in this installation is primarily a recording device.

The compatibility from drive to controller is primarily centered around one question. Can the controller properly handle a drive with the drive's characteristics? These characteristics are number of cylinders, number of heads and encoding method (MFM or RLL). If the controller can handle the drives characteristics it should be compatible.

RLL is an encoding method that allows about 50% more information to be recorded on a disk drive compared to MFM recording. This does not imply that drives that have been designed for MFM use will work properly when connected to a RLL controller. RLL encoding by nature requires drive circuitry that can handle a wider frequency range than MFM drives have been designed for. If using an RLL controller it is always best to stay with an RLL certified drive. This will minimize the chances of data loss.

The compatibility of the controller to the computer largely depend on whether both the controller and the computer adhere to industry standards. If either the controller or the computer deviate from the standards there is a potential for incompatibility. Controller to computer compatibility questions should be directed to the controller manufacturer and/or computer manufacturer.

ESDI

The ESDI (Enhanced Small Device Interface) is as its name implies an enhanced interface. This interface has been around for a shorter period than the ST506/ST412 and there are still new features being designed in. It is a substantial upgrade of the ST506/ST412 interface. This interface is oriented toward high-capacity. high-speed small Winchesters. It is also capable of handling magnetic tapes and optical disk drives.

The ESDI is designed around a serial transfer rate of 10 and 15 megabit per second. This interface puts more logic on the drive and allows the controller to be simplified.

The compatibility issues are almost the same as the ST506/ST412 interface. One new issue is interface speed. ESDI drives and controllers are available in 10 and 15 megabit per second versions. The controller speed has to match the drive speed.

SCSI

The SCSI (Small Computer Systems Interface) differs from the previous interfaces in that it is not dedicated only to hard disk interfacing. It will allow printers, floppy drives and other devices to share a common interface. The SCSI interface allows the computer to communicate with up to eight separate devices.

With SCSI most of the drive control is designed into the drive. The SCSI bus transfers bytes of information in parallel rather than in serial form like the ST506/ST412 and ESDI interfaces. The maximum data transfer rate is from 1.5 Megabytes/second to 4 Megabytes/second. This is equivalent to a 12 Megabit/second to 32 Megabit/second serial transfer rate.

SCSI is still in an evolutionary stage. Some computer manufacturers have customized their SCSI interfaces for their systems. These two factors coupled with the inherent complexity of the interface are the primary causes of incompatibility with SCSI devices.

ONBOARD CONTROLLER

Drives with integrated controllers are allowing MiniScribe to maximize disk drive performance while at the same time reduce the had drive subsystems overall cost, size and power consumption. These drives also minimize compatibility issues since the controller circuitry is imbedded on the drive.

Computer manufacturers are designing new computers with hard disk support circuitry on their motherboards. With these newer systems it is possible to plug the new drives with integrated controllers directly into the motherboard. Check with MiniScribe for compatibility with these new computers.

Older XT and AT systems can utilize these new drives with a simple interface board that plugs into the system bus (like a regular controller) and the appropriate cable. The XT interface will handle two integrated XT style drives. The AT interface is available in two versions. One version will control two integrated AT style drives while the other version will handle two floppy drives as well as the two AT drives.

INSTALLATION SOFTWARE

Installation/partitioning software is sometimes necessary in AT systems when the AT BIOS does not support the drive satisfactorily and/or their version of DOS does not allow multiple DOS partitions without external drivers.

Installation/partitioning software's function is quite simple. It handles all I/O to all partitions beyond the DOS boot partition. It does this with an external device driver that is loaded in at boot time. This device driver reads the drive parameters from the boot area of the disk allowing partitions beyond the DOS partition to escape the limitations of the BIOS drive type.

Installation software is generally compatible with current versions of MS-DOS and PCODOS. As new versions of DOS become available it is usually necessary to obtain the most current version of installation software.

When used with controllers with BIOS low-level formatters it is generally necessary to initialize the drive with the BIOS formatter. Then the installation software is used to partition and prepare the drive.

The three steps necessary to prepare a drive for use are as follows:

    1.   Initialize (low-level format) the drive (with utility disk, controller BIOS routine, or install/partitioning software).

    2.   Partition the drive (with DOS Fdisk command or partitioning software).

    3.   Format the drive (with DOS Format command or partitioning software).

Caution! Do not use any disk diagnostics on drives installed with installation software (other than those included with the installation software) without checking with the installation software company. Outside diagnostic utilities can inadvertently write to a data area on the disk, damaging information.

NON-DOS OPERATING SYSTEMS

UNIX & XENIX

Unix and Xenix for 286 and 386 machines for the most part require a drive table entry for the drive to work properly. Controllers that have their own BIOS routines for hard disk control may present unique installation problems. contact your controller manufacturer and/or operating system company for compatibility issues.

NOVELL

Novell's hard disk installation program "CompSurf" limits drive selection to those found in the AT drive table. If the drive is found in the drive table there is no need for installation software.

If there is no suitable match in the AT drive table, installation software like Ontrack's disk Manager type N will be necessary for a drive installation under Novell. Contact Ontrack for compatibility issues surrounding Novell versions and controller compatibility.

MFM OR RLL?

MFM has been the industry standard for a number of years. It is part of a family of codes used for magnetic recording which allows the controller to track the data as it is being read to help insure reliable data transfers. This code is based on a 5 megabit per second transfer rate which, when used with the industry standard format, yields 512 bytes in 17 sectors or 8704 bytes per recording track. (A byte of information can be thought of as any key stroke on a typewriter).

RLL has recently become popular and is based on a 7.5 megabit per second transfer rate. Because of the higher transfer rate, more data can be put onto a track; 26 sectors of 512 bytes or 13312 bytes per track. 7.5 mega bits per second is 50% faster than 5.0 megabits per second. A drive running MFM might yield 20 megabytes and 30 if it can run RLL.

RLL is similar enough to MFM so that no major redesign of the drive was required. Differences however do exist. MFM code uses a simpler arrangement of three frequencies while RLL uses 6. The drive configuration table identifies which drives are MFM or RLL.

This does not mean an MFM drive will not run RLL. MiniScribe's warranty for data reliability of the drive is based on the designated encoding method.

There are companies that buy our MFM products and retest it to RLL specifications. These companies then offer their own warranty for RLL performance. If you come across one of these drives verify that they do test to RLL specifications and that they warranty their product. If in doubt give us a call at 1-800-356-5333.

INTERLEAVING

During the initialization of the drive you may be asked for interleave. Interleave refers to the numbering sequences of the sectors of information. Typically there are 17 sectors per disk. If these were visible, the disk would resemble being sliced into sections like pie.

During a read or write operation, the controller must collect the data then transfer it to the desired location. This handling of data takes time causing consecutive sectors may be missed. To avoid this, the data can be recorded or read in leap frog fashion. Example: Read 1, skip 2, read 1, skip 2, etc.

In this case, every 3rd sector is read which represents an interleave of 3 to 1 (3:1 or simply 3). It also means that it will take 3 revolutions of the disk to read the entire track.

If the interleave is too tight; say 1:1, the next sector may have already passed under the recording head when the controller is ready to continue. The result is that the controller will have to wait 1 revolution for that sector to arrive again. This pattern continues for all of the 17 sectors forcing the controller to wait for 17 revolutions to read 1 track. It is better to be too loose than be too tight on interleave.

Following is an interleave table to better illustrate different interleaves.

Typically the following table will work:

        6:1   IBM XT
        4:1   R11 XT Clones
        3:1   MFM AT and XT Clones
        2:1   Turbo MFM Systems

To determine the optimum performance will require some experimentation.

WRITE PRECOMPENSATION

If you were to look at the drive's data signals they would appear as electronic pulses. The frequencies used to generate these pulses are stepped up and down at very specific intervals. This is necessary for the controller to be able to track the data as it is being read.

As the drive records toward the inner portions of the disk these precisely timed pulses begin to shift. This degrades its reliability. Fortunately, the shift occurs in a predictable manner which can be corrected by the controller. If the shift will cause a shorter pulse the controller will write the pulse longer. This causes the pulse to shift closer to the correct time interval.

The predictable shifting of the data signal is precompensated to cancel the effect of writing at the inner portion of the disk.

PC-XT TYPE CONSIDERATIONS

Approach 1:

If your controller card has a switch or jumper setting which correctly matches all parameters necessary for correct operation of your particular disk drive, you should set those switches/jumpers accordingly. The drive should then be treated as a "STANDARD" drive when using DISK MANAGER.

Approach 2:

Use "AUTO-CONFIGURE" on controller cards so equipped (usually invoked by using "DEBUG") to make DISK MANAGER perceive that the hard disk controller correctly matches all parameters necessary for correct operation of your particular disk drive. This process is usually invoked by using the DOS "DEBUG" program, and involves using programs which are stored in the controller's BIOS ROM to "AUTO-CONFIGURE" and low level format the hard disk. The drive should then be treated as a "STANDARD" drive when using DISK MANAGER. The DISK MANAGER low level format SHOULD NOT be performed after low level formatting with an "AUTO CONFIGURE" BIOS, since the "AUTO CONFIGURATION" data may be destroyed. NOTE: Many "AUTO CONFIGURE" controllers provide an option for allowing the user to "SPLIT" the drive into 2 parts. Use of this option will cause DISK MANAGER to see the drive as though it were 2 separate disks. This is not recommended, and precludes the attachment of a second physical hard disk in most cases.

Approach 3:

Use of DISK MANAGER to call it a NONSTANDARD drive can be done as follows:

A. Choose a drive-type which is supported by your controller's ROM-BIOS using the TYPE-SELECTION criteria below.
B. Use DISK MANAGER in either the "AUTOMATIC" or "MANUAL" mode to install the drive as a NONSTANDARD drive, and inform DISK MANAGER of what type of drive you actually have at the appropriate prompt.
C. Please see the note below on CAPACITY REDUCTION.

PC-XT TYPE SELECTION CRITERIA

The chosen TYPE must be smaller or equal to the actual disk drive you are installing in BOTH the head-count and cylinder-count dimensions. Further, it is desirable to match AS CLOSELY AS POSSIBLE the head-count between the drive-type and the drive you are installing. For further information on the consequences of this parameter, read the section below on CAPACITY REDUCTION.

PC-AT TYPE CONSIDERATIONS

Drive-type selection is performed on PC-AT type computers by an internal "CMOS CONFIGURATION MEMORY" rather than switches and jumpers as in the PC-XT type computers.

DISK MANAGER is capable of analyzing your computer's internal drive-type tables and correctly selecting the optimum CMOS setting for you, if desired. DISK MANAGER also allows you to choose CMOS settings based on your own criteria, if desired. Further, if your disk drive is a NONSTANDARD drive (one that does NOT have a corresponding entry in your machine's internal tables), DISK MANAGER's device driver will compensate for that, allowing partitions handled by the device driver to use the drive's full capacity. See notes below regarding CAPACITY REDUCTION, and, if you desire to select CMOS yourself, see the section immediately below on TYPE SELECTION criteria.

PC-AT TYPE SELECTION CRITERIA

The chosen TYPE must be smaller or equal to the actual disk drive you are installing in BOTH the head-count and cylinder-count dimensions. Further, if you are installing a drive with more than 8 heads (or has logic which decodes all 4 head-select bits) you MUST choose a type which either does NOT use WRITE-PRECOMPENSATION, or has a "08" value for the control byte.

Failure to satisfy the above requirements will result in a system which has an extremely long delay on boot (2-3 minutes) and finally produces a DISK ERROR message after the delay. Usually, the boot process can then be completed from diskette.

Finally, it is desirable to match AS CLOSELY AS PODSSIBLE the head count between the drive-type and the drive you are installing. For further information on the consequences of this parameter, read the section below on CAPACITY REDUCTION.

CAPACITY REDUCTION

The DOS partition (necessary ONLY to boot) on a NONSTANDARD disk can use ONLY the part of the disk depicted by the BIOS ROM for the particular drive-type you have chosen (with switches, jumpers, CMOS, etc.). Therefore, if you have a drive which DOES NOT have a drive-type entry with the same number of heads, the DOS partition will effectively WASTE DISK SPACE. If the head-count mismatch is severe, only a VERY SMALL DOS partition would be possible without wasting a significant portion of the capacity. This limitation DOES NOT apply to partitions handled by the DISK MANAGER device driver.

Specific operating instructions are available by accessing the "READ ME" file on your DISK MANAGER diskette.

MS DOS 3.3

HARD DISK PARTITIONING GUIDE

Prepared by:

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The information contained in this Guide is for partitioning hard disk drives in a PC/XT type system using MS DOS 3.3.

The debug address used for the low level formt is for a Western Digital controller card. This address may vary depending on the brand of controller card used.

Data that must be entered via keyboard will be indicated by underining.

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I. Low Level Format (Western Digital)

    A. Insert MS DOS 3.3 diskette into A: drive.
    B. Cold or warm boot system.
    C. Remove MS DOS 3.3 diskette from A: drive.
    D. Insert MS DOS 3.3 "Utility" diskette into A: drive.
        1. Enter DEBUG CR
        2. At DEBUG prompt (-), enter: G=C800:5 CR
    E. Screen will display:
        1. SUPER BIOS FORMATTER
        2. CURRENT DRIVE IS C:, SELECT NEW DRIVE OR CR FOR CURRENT.
        3. CURRENT INTERLEAVE IS 3, SELECT NEW INTERLEAVE OR CR FOR CURRENT.
        4. ARE YOU DYNAMICALLY CONFIGURING THE DRIVE - ANSWER Y/N
            A. ENTER Y CR
            B. KEY IN DISK CHARACTERISTICS __ __ __ CYLINDERS, HEADS, ETC. CR
        5. ARE YOU VIRTUALLY CONFIGURING THE DRIVE - ANSWER Y/N
            A. NOTE: ENTER Y CR IF YOU WANT A C: PARTITION SMALLER THAN THE MAXIMUM SIZE ALLOWED FOR A DOS PARTITION. ENTER N CR IF YOU WANT A C: PARTITION THE MAXIMUM SIZE ALLOWED FOR A DOS PARTITION.
        6. PRESS Y TO BEGIN FORMATTING DRIVE C WITH INTERLEAVE 03.
            A. ENTER Y CR

NOTE: Low level format should take approximately 10-20 minutes to complete.

II. FDISK and DOS format (if you answered "N" for virtually configuring).

    A. Remove MS DOS 3.3 utility diskette from A drive.
    B. Insert MS DOS 3.3 diskette into A drive.
    C. Press any key to reboot system.
    D. A: Enter FDISK CR
    E. Screen will display:
        1. FDISK OPTIONS
        2. CURRENT FIXED DISK DRIVE: 1
        3. CHOOSE ONE OF THE FOLLOWING:
        4. ENTER CHOICE: (1) CR (CREATE DOS PARTITION)
    F. Screen will now display:
        1. CREATE DOS PARTITION
        2. CURRENT FIXED DISK DRIVE: 1
        3. ENTER CHOICE: (1) CR (CREATE PRIMARY DOS PARTITION)
    G. Screen will now display:

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1.   CREATE PRIMARY DOS PARTITION
2.   CURRENT FIXED DISK DRIVE: 1
3.   DO YOU WISH TO USE THE MAXIMUM SIZE FOR A DOS PARTITION AND MAKE THE DOS PARTITION ACTIVE (Y/N) . . . .?
    A.   ENTER (Y) (CR)

H.   Screen will now display:
1.   SYSTEM WILL NOW RESTART
2.   INSERT DOS DISKETTE IN DRIVE A: PRESS ANY KEY WHEN READY . . .

NOTE: System will now reboot.

I.   A: Enter FDISK CR
J.   Screen will now display:
1.   FDISK OPTIONS
2.   CURRENT FIXED DISK DRIVE: 1
3.   CHOOSE ONE OF THE FOLLOWING:
4.   ENTER CHOICE: (1) CR (CREATE DOS PARTITION)

K.   Screen will now display:
1.   CREATE DOS PARTITION
2.   CURRENT FIXED DISK DRIVE: 1
3.   ENTER CHOICE: (2) CR (CREATE EXTENDED DOS PARTITION)

L.   Screen will now display:
1.   CREATE EXTENDED DOS PARTITION
2.   CURRENT FIXED DISK DRIVE: 1
3.   PARTITION STATUS ___ ___ ___
4.   TOTAL DISK SPACE IS # CYLINDERS. MAXIMUM SPACE AVAILABLE FOR PARTITION IS # CYLINDERS.
5.   ENTER PARTITION SIZE . . . (#CYLS) CR

M.   Screen will now display:
1.   CREATE EXTENDED DOS PARTITION
2.   CURRENT FIXED DISK DRIVE: 1
3.   PARTITION STATUS ___ ___ ___
4.   EXTENDED DOS PARTITION CREATED
5.   PRESS ESC TO RETURN TO FDISK OPTIONS

N.   Screen will now display:
1.   CREATE LOGICAL DOS DRIVE(S)
2.   NO LOGICAL DRIVES DEFINED
3.   TOTAL PARTITION SIZE IS # CYLINDERS
4.   MAXIMUM SPACE AVAILABLE FOR LOGICAL DRIVE IS # CYLINDERS.
5.   ENTER LOGICAL DRIVE SIZE . . . (# CYLS) CR

O.   Screen will now display:
1.   CREATE LOGICAL DOS DRIVE(S)
2.   DRV START END SIZE
    D: ___ ___ ___
3.   ALL AVAILABLE SPACE IN THE EXTENDED DOS PARTITION IS ASSIGNED TO LOGICAL DRIVES
4.   LOGICAL DOS DRIVE CREATED, DRIVE LETTERS

CHANGED OR ADDED
    5.   PRESS <u>ESC</u> TO RETURN TO FDISK OPTIONS
P.   Screen will now display:
    1.   FDISK OPTIONS
    2.   PRESS <u>ESC</u> TO RETURN TO DOS
Q.   Screen will now display:
    1.   SYSTEM WILL NOW RESTART
    2.   INSERT DOS DISKETTE IN DRIVE A: <u>PRESS ANY</u>
           <u>KEY</u> WHEN READY . . . .

NOTE: System will now reboot.

R.   A: Enter <u>FORMAT C:/S</u> <u>CR</u>
    1.   WARNING. ALL DATA ON NON-REMOVABLE DISK
           DRIVE C: WILL BE LOST! PROCEED WITH FORMAT
           (Y/N)?
           A   Enter <u>Y</u> <u>CR</u>

NOTE: D: Partition is now being prepared. This should take
        approximately 4 - 5 minutes.

S.   Screen will now display:
    1.   FORMAT COMPLETE
    2.   SYSTEM TRANSFERRED
    3.   CAPACITY OF C: PARTITION
    4.   A: ENTER <u>FORMAT D:</u> <u>CR</u>
    5.   WARNING. ALL DATA ON NON-REMOVABLE DISK
           DRIVE D: WILL BE LOST! PROCEED WITH FORMAT
           (Y/N)?
           A   Enter <u>Y</u> <u>CR</u>

NOTE: D: Partition is now being prepared. This should take
        approximately 2 - 3 minutes.

T.   Screen will now display:
    1.   FORMAT COMPLETE
    2.   CAPACITY OF D: PARTITION

Your hard disk drive is now ready to be used.

III.   FDISK and DOS Format (if you answered "Y" to virtually
     configuring)

A.   Remove MS DOS 3.3 utility diskette from A: drive
B.   Insert MS DOS 3.3 diskette into A: drive
C.   <u>Press any key</u> to reboot system
D.   A: Enter <u>FDISK</u> <u>CR</u>
E.   Screen will now display:
    1.   FDISK OPTIONS
    2.   CURRENT FIXED DISK DRIVE: 1
    3.   CHOOSE ONE OF THE FOLLOWING:

4. ENTER CHOICE: (1) <u>CR</u> (CREATE DOS PARTITION)
F. Screen will now display:
   1. CREATE DOS PARTITION
   2. CURRENT FIXED DISK DRIVE: 1
   3. ENTER CHOICE (1) <u>CR</u> (CREATE PRIMARY DOS PARTITION)
G. Screen will now display:
   1. CREATE PRIMAR DOS PARTITION
   2. CURRENT FIXED DISK DRIVE: 1
   3. DO YOU WISH TO USE THE MAXIMUM SIZE FOR A DOS PARTITION AND MAKE THE DOS PARTITION ACTIVE (Y/N) . . . ? ( )
     A. Enter <u>N</u> <u>CR</u>
H. Screen will now display:
   1. CREATE PRIMARY DOS PARTITION
   2. CURRENT FIXED DISK DRIVE: 1
   3. TOTAL DISK SPACE IS # CYLINDERS. MAXIMUM SPACE AVAILABLE FOR PARTITION IS # CYLINDERS.

NOTE: The # cylinders will be the number of cylinders minus one that you selected for the virtual split in the low level format.

4. ENTER PARTITION SIZE . . . : (# CYLS) <u>CR</u>
I. Screen will now display:
   1. CREATE PRIMARY DOS PARTITION
   2. CURRENT FIXED DISK DRIVE: 1
   3. PARTITION STATUS TYPE START END SIZE
   4. PRIMARY DOS PARTITION CREATED
   5. PRESS <u>ESC</u> TO RETURN TO FDISK OPTIONS
J. Screen will now display:
   1. FDISK OPTIONS
   2. CURRENT FIXED DISK DRIVE: 1
   3. CHOOSE ONE OF THE FOLLOWING:

NOTE: WARNING! No partitions marked active.

4. ENTER CHOICE: <u>(2)</u> <u>CR</u> (CHANGE ACTIVE PARTITION)
K. Screen will now display:
   1. CHANGE ACTIVE PARTITION
   2. CURRENT FIXED DISK DRIVE: 1
   3. PARTITION STATUS TYPE START END SIZE
   4. TOTAL DISK SPACE IS # CYLINDERS
   5. ENTER THE NUMBER OF THE PARTITION YOU WANT TO MAKE ACTIVE . . . : <u>(1)</u> <u>CR</u>
   6. PARTITION 1 MADE ACTIVE
   7. PRESS <u>ESC</u> TO RETURN TO FDISK OPTIONS
L. Screen will now display:
   1. FDISK OPTIONS
   2. CURRENT FIXED DISK DRIVE: 1
   3. CHOOSE ONE OF THE FOLLOWING:

4. ENTER CHOICE: [5] CR (SELECT NEXT FIXED DISK DRIVE)

M. Screen will now display:
1. FDISK OPTIONS
2. CURRENT FIXED DISK DRIVE: 2
3. CHOOSE ONE OF THE FOLLOWING:
4. ENTER CHOICE: [1] CR (CREATE DOS PARTITION)

N. Screen will now display:
1. CREATE DOS PARTITION
2. CURRENT FIXED DISK DRIVE: 2
3. ENTER CHOICE: [2] CR (CREATE EXTENDED DOS PARTITION)

O. Screen will now display:
1. CREATE EXTENDED DOS PARTITION
2. CURRENT FIXED DISK DRIVE: 2
3. TOTAL DISK SPACE IS # CYLINDERS. MAXIMUM SPACE AVAILABLE FOR PARTITION IS # CYLINDERS
4. ENTER PARTITION SIZE . . .: (# CYLS) CR

P. Screen will now display:
1. CREATE EXTENDED DOS PARTITION
2. CURRENT FIXED DISK DRIVE: 2
3. PARTITION STATUS TYPE START END SIZE
4. EXTENDED DOS PARTITION CREATED
5. PRESS ESC TO RETURN TO FDISK OPTIONS

Q. Screen will now display:
1. CREATE LOGICAL DOS DRIVE(S)
2. NO LOGICAL DRIVES DEFINED
3. TOTAL PARTITION SIZE IS # CYLINDERS
4. MAXIMUM SPACE AVAILABLE FOR LOGICAL DRIVE IS # CYLINDERS
5. ENTER LOGICAL DRIVE SIZE . . .: (# CYLS) CR

R. Screen will now display:
1. CREATE LOGICAL DOS DRIVE(S)
2. DRV START END SIZE
3. ALL AVAILABLE SPACE IN THE EXTENDED DOS PARTITION IS ASSIGNED TO LOGICAL DRIVES
4. LOGICAL DOS DRIVE CREATED, DRIVE LETTERS CHANGED OR ADDED
5. PRESS ESC TO RETURN TO FDISK OPTIONS

S. Screen will now display:
1. FDISK OPTIONS
2. PRESS ESC TO RETURN TO DOS

T. Screen will now display:
1. SYSTEM WILL NOW RESTART
2. INSERT DOS DISKETTE IN DRIVE A: PRESS ANY KEY WHEN READY . . .

NOTE: System will now reboot.

U. A: Enter FORMAT C:/S CR
1. WARNING: ALL DATA ON NON-REMOVABLE DISK DRIVE C: WILL BE LOST! PROCEED WITH FORMAT

(Y/N)?
A.   Enter Y CR

NOTE: C: Partition is now being prepared. This will take approximately 4 - 5 minutes.

V.   Screen will now display:
1.   FORMAT COMPLETE
2.   SYSTEM TRANSFERRED
3.   CAPACITY OF C: PARTITION
4.   A: ENTER FORMAT D: CR
5.   WARNING, ALL DATA ON NON-REMOVABLE DISK DRIVE D: WILL BE LOST! PROCEED WITH FORMAT (Y/N)?
A.   Enter Y CR

NOTE: D: Partition is now being prepared. This should take approximately 4 - 5 minutes.

W.   Screen will now display:
1.   FORMAT COMPLETE
2.   CAPACITY OF D: PARTITION

Your hard disk drive is now ready to be used.

CREATING MULTIPLE PARTITIONS WITH DOS 3.3

DRIVE: MiniScribe 3650
CONTROLLER: WD1002 - WX1
SYSTEM: XT

The drive was virtually split at Cylinder 404 in the low level format to create two logical drives. In FDisk a 10MB DOS partition and a 10MB extended DOS partition was created within each logical drive. These partitions were designated C, D, E and F.

Drive 1			Drive 2	
DOS	C		DOS	D
EXT.	E		EXT. DOS	F

DOS 3.3 will not allow two DOS or two extended DOS partitions to be created within a logical drive partition. What is of interest, when the extended DOS partition was created on the first logical drive, DOS 3.3 labeled it as the D partition. When the DOS partition was created on the second logical drive, DOS 3.3 then labeled it as the D partition and changed the extended DOS partition on the first logical drive to E.

If the drive is not virtually split into logical units, DOS 3.3 is capable of creating multiple partitions through the FDISK command. This is accomplished by first creating a DOS partition (32MB limit), then selecting extended DOS for the remaining cylinders on the drive.

When logical partitions are assigned, DOS 3.3 will create 32MB partitions labeled D, E, F, etc. until the maximum number of cylinders indicated as extended DOS are reached.

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Section F

This ection will cover system errors and possible solutions.

Hard File Adaptor Errors:

1700   Hard file/adaptor test passed (no error)

1701   Drive not ready (also a post error)
Non fatal drive/adaptor test failed (also a post error)
Check that drive has power and that spindle motor is spinning.
If motor is not spinning, check that 12 vdc comes up within
one second. Some large switching power supplies require
more time to charge the large capacitors which may cause
system to time out.

1702   Hard file/adaptor error
Time out - is drive powered up and spinning?
Are cables correct?

1703   Hard file/drive error
Seek failed - is drive low level formatted?
ECC error - probably controller related

1704   Check drive select
Hard file or adaptor error
Controller failed

1705   No record found

1706   Write fault
Are two heads selected?
Are voltages ok?
See product manual for what causes write fault

1707   Track 0 error
Is drive formatted?

1708   Bad select error
Is drive formatted?

1709   Bad ECC
Check controller

1710   Read buffer override
Check controller and interleave

1711   Hard file bad address mark
        Check controller and drive low level format

1712   Bad address mark
        Check controller

1714   Drive select
        Check jumpers 7 cables

1726   Data Compare Error
        Check for added hard error
        Check format

1770   Surface errors
        Check for added hard error

1780   Check Data Cable
        Set-up error drive 0 failure
        drive 0 failure

1781   Drive 1 failure
        (fatal-drive may still be ok)

1782   Controller failure

1790   Drive # 0 Error

1799   Undefined

"Track zero bad-disk unuasable"

Check format, spare hard errors if the drive is more than 16 mega bytes formated.

Check for bug in DOS 2.0 & 2.1.

Neither the drive nor controller is defective.

Indicated by drive failure due to hard error beyond 16 mega bytes.

Section F continued

XX Expansion Unit Error 8 IPL Initial Program Load:

1400   Graphic Printer

0154   Detects absence of 10MB drive C

Error Reading Track 0:

> Not formatted.

Read Error:

> Check ground. controller or disc.

Format taking too long to format:

> Indicated data cable may be connected wrong. (drive C goes to controller J4 connector)

> Also check interleave for a value of 3 or 4 (AT).

> Only change to an interleave IR 4 if 3 causes format to be too slow. It is not possible to use faster (2 or 1).

Illegal Drive Specified:

> Indicates that the primary format or "FDISK" was not performed correctly. Recheck your parameter values and redo the format.

Section G

This section we will cover controller error codes. This is an error code table used by both Adaptec and Western Digital.

Code   **Error**

01   -   Bad Command passed to Disk I/O
02   -   Address mark not found
04   -   Requested Sector not found
05   -   Reset Failed
07   -   Drive Parameter Activity Failed
09   -   Attempt to DMA across 64k Boundary
0A   -   Access to Bad Sector
0B   -   Bad Track Flag Detected
01   -   Bad ECC on Disk Read
11   -   ECC Corrected Data Error
20   -   Controller Timeout
40   -   Seek Operation Failed
80   -   Attachment Failed to Respond
BB   -   Undefined Error Occurred
FF   -   Sense Operation Failed