
MF353B

Half Height, 3.5" 720k Disk Drive
User's Manual

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INTRODUCTION

1. Product Description

The MF353B is a standard 3.5 inch, 720k floppy disk drive that can be used in most IBM-compatible personal computers. Before installing your new drive, read through all of the documentation. Although the drive is shipped ready to be installed in most systems, you may need to move one or more jumpers in order to configure the drive correctly for your system.

Note that the MF353B is actually a very small drive physically. To facilitate its mounting in standard IBM PCs, XTs, ATs, and compatibles, it is mounted in a larger metal frame with a connector adapter plate at the rear and a standard 5.75 by 1.625 inch bezel in the front. The drive should always be handled by this outer frame if possible; do not grasp or squeeze the drive itself, or damage may result.

IMPORTANT: 3.5" DSDD floppy drives such as the MF353B require software support in order to obtain the full 720k capacity. This support is provided by MS-DOS and PC-DOS versions 3.20 and up. Although special software drivers can be obtained to provide compatibility with earlier DOS versions, the preferred method is to upgrade to a suitable DOS version. Without this support, you will only be able to format 3.5 inch double-density disks to hold 360k.

2. Specifications

Capacity (MFM)			
Unformatted, per disk	1000		Kbytes
Formatted, per disk	720		Kbytes
Recording			
Bits, per inch	8,717		
Tracks, per inch	135		
Data Transfer Rate, per second	250		Kbits
Media			
Bytes, per sector	512		
Sectors, per track	9		
Number of sides	2		
Cylinders, per disk	80		
Tracks, per disk	160		
Index	1		
Performance			
Average Latency	100		msec
Track-to-track Access Time	3		msec
Settling Time	15		msec
Average Access Time	94		msec
Motor Starting Time	500		msec
Spindle Speed	300		rpm
Power			
Consumption, Operating	1.85		watts
Consumption, Stand-by	0.05		watts
Requirements	+12VDC @ 120mA typ. +5VDC @ 80mA typ.		
Temperature			
Operating	4° to 46° C		
Storage	-22° to 60° C		

Dimensions

Width	5.75 inches
Height	1.625 inches
Depth	7.85 inches

Power Connector

Terminal	Color	Description	Connector Diagram
1	Red	+5 VDC	
2	Black	Ground	
3	Black	Ground	
4	Yellow	+12 VDC	

34-Pin Control Cable

Pin	Direction	Description
2	----	Spare
4	----	Spare
6	Input	Drive Select 3
8	Output	Index/Sector
10	Input	Drive Select 0
12	Input	Drive Select 1
14	Input	Drive Select 2
16	Input	Motor On
18	Input	Direction Select
20	Input	Step
22	Input	Write Data
24	Input	Write Gate
26	Output	Track 00
28	Output	Write Protect
30	Output	Read Data
32	Input	Side Select
34	Output	Standard Ready/Disk Change (Jumper Selected)

NOTE: All odd pins are GROUND.

3. Precautions

When working with any circuit board or IC, some precautions need to be observed for the safest installation. Many parts are static sensitive and may be easily damaged by static electricity that may have built up in your body. The best way to assure that no damage comes to your new equipment is to observe a few precautions:

1. Whenever you move your body, you can easily build up enough static electricity to damage a board. When handling a board or chips, ground yourself often. The best way to do this is with a grounding wrist strap that is properly connected to a frame ground. These may be purchased through Jameco Electronics (Part # WS). Another method to ground yourself would be to plug the computer's power supply into a grounded outlet (but leave it turned off), then touch the frame of the power supply often to dissipate any static charge that you may have built up.
2. Make sure that the power supply is turned OFF before installing or removing anything.
3. Hold all boards by the edges.

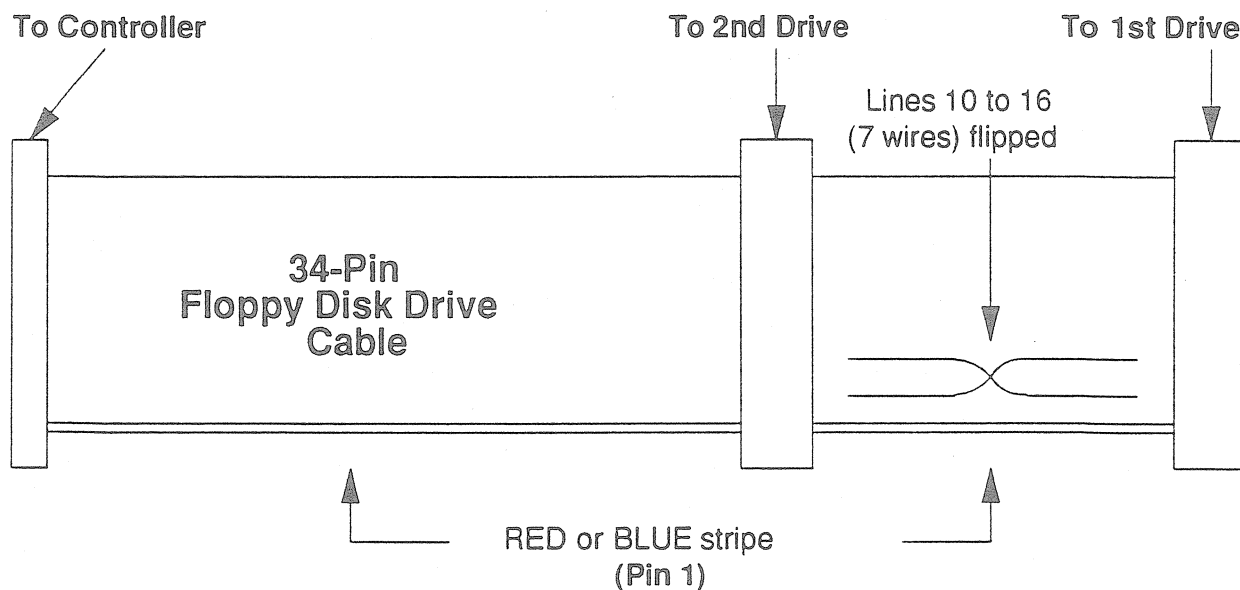
INSTALLATION

1. Drive Select Jumper

All floppy drives have a dipswitch or bank of jumper-selected pins known as the drive select straps. The MF353B uses pin-type drive select straps; they are located at the rear of the drive itself, near the power supply connector. There are 5 jumper positions, labeled DS 0, 1, 2, 3, and MX. The MX position is not used and should never be selected in an IBM PC, XT, AT, or compatible.

There are different ways that the drive select straps are labeled in some systems. They may be labeled as on the MF353B: DS0, DS1, DS2, DS3. They may also be labeled DS1-4, 0-3, 1-4, or A-D. All these labels refer to the same respective drive select straps. Only one drive select strap on a drive should ever be jumpered closed (or "selected") at any time.

IBM PC, XT, AT and compatible systems require that BOTH drives be selected as the second drive in the system (i.e. there should be a jumper across DS1 on both drives). In these computers, floppy drive selection is made by the control and data cable. At one end of the cable you will find a section of "flipped" wires. It is this "flip" that selects between the drives. Drive A must always be connected to the endmost connector. Drive B, if installed, should be attached to the middle connector. The connector at the other end of the cable is connected to the drive controller. Please refer to the diagram below:

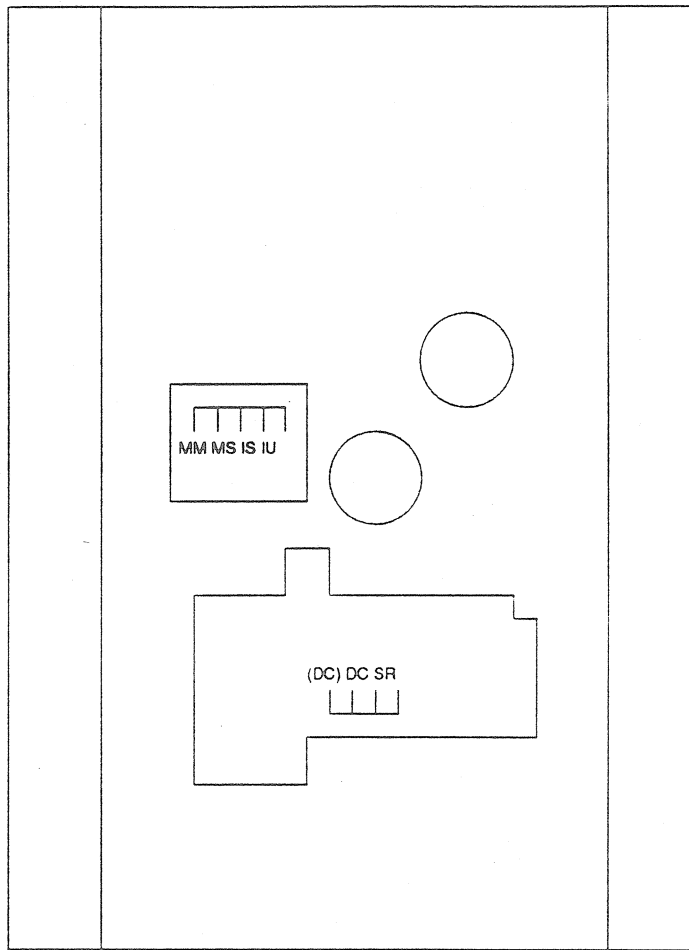


Inspect the drive select jumper on your MF353B. It should already be on the DS1 jumper pins. If it is not, remove the single screw (above the jumper block and to the left) holding the drive cover in place. Remove the cover. Do not touch any of the exposed circuitry or mechanisms! Using a pair of needlenose or other fine-pointed gripping tool, pull the jumper off its current pair of pins and install it on the DS1 pair. Make certain it is properly seated, then replace the drive cover and reinstall the screw.

2. Other Jumpers

Unlike most 5.25 inch drives, the MF353B has three jumpers that allow you to customize its operation. Two of these jumpers have no significant effect on the drive's operation. However, unless you have specific reason to change them, they should all be left in their default positions.

All of these optional jumpers are located on the underside of the drive, as the illustration shows:



The first jumper, labeled **(DC)-DC-SR**, is the most important one. It selects between "Disk Change" and "Standard Ready" signals for pin 34 of the cable connector. The use of this pin varies from system to system. In most IBM PC, XT, and compatible systems, pin 34 is not used. In IBM AT and compatible systems, pin 34 is sometimes used for a "Disk Change" signal. Leaving the jumper in the default position on the two middle pins ("DC") is probably the correct choice for most systems. If you have problems getting the system to recognize the drive, try changing this jumper to SR, or, as a last resort, to "(DC)". Note that "(DC)" means "disconnected" and is NOT the same as "DC" or "Disk Change".

SR	Standard Ready signal from connector pin 34
DC	Disk Change signal from connector pin 34
(DC)	Connector pin 34 disconnected

The other two jumpers are of less importance, and are combined on a single 6-pin block. The first is labeled **MM-MS**, and selects whether the spindle motor (the motor that turns the disk) is controlled by the Motor On signal or the Drive Select signal from the floppy controller. The default is to have the motor controlled by the Motor On signal.

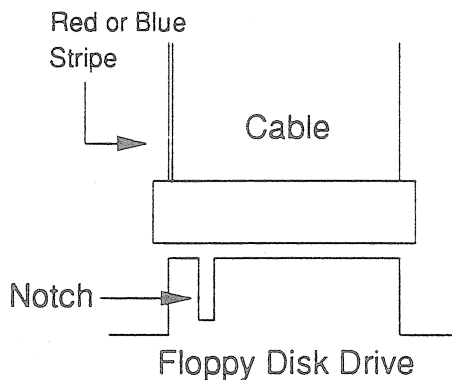
MM	Spindle motor controlled by Motor On signal
MS	Spindle motor controlled by Drive Select signal

The final jumper, labeled IS-IU, changes the control for the drive activity LED from the Drive Select input to the In Use input. Most drive controllers do not support the In Use signal line, and selecting that jumper position will result in the activity LED remaining off no matter what the drive status. It is recommended that the jumper be left in the default position, so that the LED is controlled by the Drive Select signal.

IS	Drive activity LED controlled by Drive Select signal
IU	Drive activity LED controlled by In Use signal

3. Cable Connection

The 34-pin ribbon cable that connects the disk drive controller to the floppy disk drive or drives has a red or blue stripe along one edge that marks the pin 1 side of the connectors. This cable attaches to a card edge connector on the drive(s). Each drive's edge connector has a notch cut in it to indicate the pin 1 side of the side of the connector. (There should also be a polarizing blade inside the cable connector that corresponds to this notch. If the polarizing blade is absent, be very certain to match the cable stripe and the notch side of the edge connector.) Please refer to the diagram below:



4. Power Cable Connection

If you are installing the MF353B in a relatively new computer, the power supply should have four disk drive power connectors; if there's still room to mount the new drive, there should be a free connector. Some older power supplies may have only two such connectors, both of which may be in use. If your computer power supply does not have a free power connector for the MF353B, you will need a power splitter or "Y" connector (such as Jameco Electronics part number PCY) that will allow you to connect one existing power connector to two drives.

If the system to which you're attaching the MF353B does not have a power connector that can supply +5VDC and +12VDC to the drive itself, you may need to purchase a power cable kit from Jameco Electronics (part number PCK-5.) This kit is not a power supply; it only provides you with a means of connecting a disk drive to an existing +5VDC and +12VDC power supply.

Note that the power connector shell is polarized, with two beveled edges. If you have trouble inserting the power supply connector into the drive connector, check to see that you have it turned the right way.

5. Mounting in a PC, XT, or compatible

IMPORTANT: The MF353B, like most disk drives, must be mounted correctly in order to function properly. The MF353B may be mounted vertically on either edge or horizontally with the disk-eject button and drive-activity LED at the bottom. Mounting this (or any other) drive upside-down, on either end, or at an angle will result in erratic operation and a shortened service life.

If the MF353B is being installed by itself in a full-height PC/XT style drive bay, you will need a half-height bezel to fill the other half of the opening. If you do not have a spare bezel, you can order one from Jameco Electronics as part number BEZEL.

If the MF353B is being installed as the second half-height drive in a PC/XT style full-height bay, you will need a dual drive mounting bracket. Again, if you don't have a spare bracket, you can order one from Jameco Electronics as part number TMHD.

In either case, be certain that the drive is securely mounted in the case, with its bezel square and flush against the drive opening. A poorly secured drive is prone to electronic and physical damage.

Most PCs, XTs, and compatibles have dip switches on the motherboard that must be set to reflect the total number of floppy disk drives. Refer to your motherboard manual and reset the dip switches to reflect the new drive.

6. Mounting in an AT or compatible

IMPORTANT: The MF353B, like most disk drives, must be mounted correctly in order to function properly. The MF353B may be mounted vertically on either edge or horizontally with the disk-eject button and drive-activity LED at the bottom. Mounting this (or any other) drive upside-down, on either end, or at an angle will result in erratic operation and a shortened service life.

If the MF353B is being installed in an IBM AT or compatible, or any computer using an AT or baby-AT style case, it will be mounted in a disk drive cage. This requires that slide rails be attached to the sides of the drive. If you don't have a spare pair of rails, they can be ordered from Jameco Electronics as part number ATRAIL.

You may have to experiment to find the correct position for the slide rails on the sides of the new drive. Once the correct holes are found and the screws are installed, you might have to slightly adjust the rails' locations to get the drive's bezel exactly flush with the case's front panel.

You will need to run your setup program in order to tell your AT or compatible that a second floppy drive has been installed. If your setup program does not allow you to specify a 720k drive, choose a 360k drive instead. The software driver (see below) will correctly reconfigure the drive.

7. Software Installation

Unlike 5.25 inch floppy disk drives, 3.5 inch drives like the MF353B require special support from the software. 720k floppy disk drives like the MF353B can be used in nearly any PC, XT, AT, or compatible as long as this software support is present. Without this special support, DOS will only be able to recognize the MF353B as a 360k drive-- wasting half of its potential storage space. The needed support is an integral part of MS-DOS and PC-DOS versions 3.20 and up; if you are using an earlier DOS version, you must upgrade to version 3.20 or higher.

There are two ways to tell DOS that the new drive is a 720k type. The optimal method is only available in DOS versions 3.20 and 3.21, as well as a few higher versions. If your DOS manual indicates that your version supports the DRIVPARM configuration command, add the following line to your CONFIG.SYS file:

```
DRIVPARM /D:dd /F:2
```

where "dd" represents the logical drive number of the new drive: 00=drive A:, 01=drive B:, etc. This command reconfigures the drive without changing its logical drive letter.

If you are using a DOS version higher than 3.21 that does not support DRIVPARM, or do not wish to use the DRIVPARM command, the alternative is DRIVER.SYS. While DRIVER.SYS is a more flexible command, it has one quirk that can be annoying: it always assigns the new drive configuration to the next available logical drive letter. If you have a 5.25 inch drive as A:, the MF353B as B:, and a hard drive as C:, DRIVER.SYS will leave drive B: as a 360k, 3.5 inch drive, and create drive D:, a 720k 3.5 inch drive. Drives B: and D: are the same, physically, but configured differently, logically. If you must use (or choose to use) DRIVER.SYS, add the following line to your CONFIG.SYS file:

```
DEVICE=[path]DRIVER.SYS /D:dd /F:2
```

where "dd" is again the logical drive number you wish to reconfigure. Since DRIVER.SYS is a separate file, you'll need to include a path if it is not in the boot disk's root directory.

If your floppy disk controller has jumpers or dipswitches that indicate the type of drive(s) attached, these should also be set. Refer to your floppy controller manual.

8. Cleaning and Maintenance

It is recommended that a head cleaning diskette be used periodically as a preventive maintenance and to insure data integrity. Jameco Electronics part number DCK contains the necessary cleaning equipment and supplies.

TROUBLESHOOTING

1. Common Problems and Solutions

A. Cannot insert disk.

The MF353B does not have a drive door or lever like that found on 5.25 inch drives. If you have trouble inserting a disk, there may already be a disk in the drive. Otherwise, be sure you are inserting the disk the correct way, with the metal shutter forward and the notched corner of the disk to the right.

B. Two or more drives spin simultaneously.

Check the drive select jumpers. If you are on an IBM PC, XT, AT or compatible system, they should BOTH be set on the second position, DS1. On other systems, they are normally set for DS0 and DS1.

C. The drive does not operate properly.

Make sure the red or blue stripe on the control cable is on the same side of the edge card connector as the slot on the card edge.

Make sure power is connected to the drive correctly.

Make sure you are using a known good, formatted diskette.

Your system may require you to change switch settings or jumper settings within the computer. If you have an IBM PC, switches 1, 7 and 8 on switch block 1 determine how many disk drives you have installed in the system. If you have an IBM XT, there will only be one switch block. Switches 7 and 8 on this switch block determine how many drives you have installed. If you have an IBM AT, you must run the SETUP program to let the computer know if you have added or deleted a drive and what type of drive it is.

2. Additional Technical Assistance

Many problems can be resolved by referencing the manual and confirming configuration and installation. If you have exhausted all other options and are still encountering difficulty, our Technical Support Staff are available between 7am and 5pm, Pacific Time, Monday through Friday. When you call, please have the equipment in question handy, along with the necessary customer and order numbers. If appropriate, please write down DIP switch settings or other configuration data. The technicians may need all of this information to fully assist you. The phone number is (415) 592-9990.

Discrepancies in shipment, returns, exchanges and refunds are handled by our Customer Service Department. They are also available between 7am and 5pm, Pacific Time, Monday through Friday. Their number is (415) 592-8121.

If you are located outside the United States, you may find it more convenient to contact us by either FAX or Telex, both available 24 hours a day. Inquiries should be marked to the attention of either Customer Service or Technical Support. Our FAX numbers are (415) 592-2503 and (415) 595-2664. Our Telex number is 176043, answerback: JAMECO BLMT.

If you run across any errors or omissions in this manual or the manual does not explain something thoroughly enough, please write to us and let us know. Feedback from our customers provides for consistently high quality now, and in the future. Please reference the document and revision numbers as well as the printing date (located on the cover of all Jameco manuals) when writing so that corrections can be made as easily as possible. Address correspondence to:

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