

JIS

JAPANESE INDUSTRIAL STANDARD

Interface between flexible
disk cartridge drives
and their host controllers

JIS X 6052—1990

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Interface between flexible disk cartridge
drives and their host controllers

X 6052-1990

1. Scope

This Japanese Industrial Standard specifies flexible disk cartridge drives (hereafter referred to as the "flexible disk drives") using flexible disk cartridges specified in JIS X 6201 (200 mm flexible disk cartridge) and in JIS X 6211 (130 mm flexible disk cartridge), and defines the necessary functional and electrical requirements (including logic signals) and the mechanical requirements of the interface for the connections of conforming flexible disk drives to a host system, and is intended to facilitate the interconnection of flexible disk drives to a host system by a user who is well acquainted with the functional level of those specifications. However, it does not apply to host/drive subsystems where there is no clear physical and functional separation between the host and its drives.

Remarks: This standard, originally, was written specifically for 200 mm and 130 mm flexible disk drives. However, it may be applied to other disk size drives. In particular, for the application of smaller size flexible disk cartridge, for example, the one specified in JIS X 6221 [90 mm flexible disk cartridge (7958 ftprad)], it is recommended that for the interconnection between the flexible disk drives and their host controllers use the descriptions applicable to 130 mm flexible disk drives.

2. Definition

For the purpose of this standard, the following definitions apply:

- (1) active filter A network used to compensate flexible disks to maintain compatibility within reading signals.
- (2) cartridge An assembly consisting of a jacket and a disk.
- (3) cylinder The tracks available under the read/write head at each radial head position.

Remarks: Each cylinder on a double sided disk includes two tracks. On single sided disk, cylinders and tracks are synonymous.

Applicable Standards:

JIS X 6201-200 mm Flexible Disk Cartridges
JIS X 6211-130 mm Flexible Disk Cartridges
JIS X 6221-90 mm Flexible Disk Cartridges (7958-ftprad)

Corresponding International Standards:

ISO 9315-Interface between flexible disk cartridge drives and their
host controllers

- (4) disk A flat circular device having a magnetic coating layer which is able to write data by magnetic recording on at least one side.
- (5) disk drive A mechanism to drive a flexible disk electrically and magnetically.
- (6) format An arrangement of data on a track of a flexible disk.
- (7) hard sectoring The physical method such as multiplicity of holes in the index track to define fixed angular sector on the flexible disk.
- (8) index track A concentric track on a disk containing at least one round hole. It is used to establish a angular reference position of the flexible disk by photoelectric means.

Remarks: In the flexible disk drives of less than 90 mm, this operation may be realized by other methods.

- (9) level A term used to designate the following:
 - (a) A voltage level.
 - (b) One of two logic levels, high or low.
 - (c) A signal that remains fixed at a low or high level for the duration of a logical sequence, such as drive select, direction select, drive ready, as contrasted to a pulse.
- (10) logical false The non-asserted or non-active state of a control signal. In this Standard it is the high level of the signal (2.4 to 5.25 V).
- (11) logical true The asserted or active state of a control signal. In this Standard it is the low level of the signal (0 to 0.4 V).
- (12) mandatory An interface signal necessary to the transmitter. It may be used only at need by the receiver.
- (13) optional An interface signal which may be used on certain configurations at need. If used, it shall be used by the method and on the connector pin as defined in 3.
- (14) pulse A signal that is a change of the amplitude in a relatively brief time compared with the period of a logical sequence, and return back to the original level. It is used as an antonym to "level".
- (15) read/write head A magnetic head capable of magnetically recording and playing-back.
- (16) step The function that moves the read/write head at every cylinder.
- (17) track A concentric path on a magnetic surface of the disk on which data may be written and read.
- (18) vendor unique An interface signal which defined by the vendor about the use for the particular function.

3. Functional signals

3.1 Expression of functional signals The functional signals (lines) are defined in 3.2 to 3.25. The signals attached "M" are mandatory signals which are necessary at least for connection. The signals attached "O" are optional signals, and in the use of these signals, shall follow the pin connections defined in this Standard. The vendor unique signals attached "V" are effective only when the vendor defines them.

And, the pin numbers are indicated in parentheses.

The signals required for the connections between the host system and 200 mm flexible disk drive are listed in Attached Fig. 1, and the signals required for the connections between the host system and 130 mm flexible disk drive are listed in Attached Fig. 2. Included in the Figures are the pin number assignments of the signal interconnectors.

3.2 Head current switch/read active filter The head current switch and read active filter are as follows:

- 200 mm: M (2) to the disk drive, head current switch
 O (2) to the disk drive, read active filter
130 mm: V (2) to the disk drive
 V (2) to the host system

This signal is used for multiple functions, depending on whether the drive is in the write or the read mode and whether it is a 200 mm or 130 mm drive. This signal should be in a stable condition before attempting to read or write. In the case of 130 mm flexible disk drive, the functions of the signal shall be defined by the vendor.

- (1) Head current switch The head current switch in the write mode, shall be as follows: On the 200 mm flexible disk drive, it shall be mandatory. When this signal is true (low) and the flexible disk drive is selected, the lower value of the write current is selected for a write operation on cylinders 43 and above.

And, when this signal is false (high) and the flexible disk drive is selected, the higher value of the write current is selected for a write operation on cylinders 0 to 42.

- (2) Read active filter The read active filter in read mode, shall be as follows: On the 200 mm flexible disk drive, it shall be optional. When this signal is true (low) and the flexible disk drive is selected in a read operation, the read signal is passed through an active filter to form composite read data (see 3.13) on cylinders 60 and above.

And, when this signal is false (high) and the flexible disk drive is selected in a read operation, the read signal is passed directly to form composite read data. The use of this signal eliminates the need for a write precompensation. When a flexible disk that has been recorded by using write precompensation is being read, this signal should remain in the false (high) state.

3.3 Drive select (four signal lines) The drive select are as follows:

200 mm: M (26, 28, 30, 32) to the disk drive: four lines
mandatory

130 mm: M (10, 12, 14), 0 (6) to the disk drive: three lines
mandatory one
line optional

The drive select signals provide a means of selecting and deselecting a disk drive. These four lines select one of the disk drives attached to the controller. When the signal line logic level is true (low), the disk drive electronics are actuated for the execution of any step or read/write commands that might be issued. When the signal line logic level is false (high), all input/output bus interface lines are deselected.

If the head load signal (see 3.16) is not used, these lines are also used for the head load function.

3.4 Direction select The direction select are as follows:

200 mm: M (34) to the disk drive

130 mm: M (18) to the disk drive

When the drive is selected, this interface signal defines the direction of motion of one or more read/write heads when the step (see 3.5) line is pulsed. If an open circuit or logical false (high) level is applied, the direction of motion is defined as "out", and if a pulse is applied to the step line the read/write head will move away from the center of the disk. Conversely, if a logical true (low) level is applied, the direction of motion is defined as "in", and if a pulse is applied to the step line, the read/write heads will move toward the center of the disk.

3.5 Step The step signals are as follows:

200 mm: M (36) to the disk drive

130 mm: M (20) to the disk drive

When this signal arrives to the selected disk drive, this signal causes a read/write head to be moved one track, with the direction of motion set by the direction select signal (see 3.4). The signal level in the quiescent state is logical false (high).

3.6 Composite write data the composite write data is as follows:

200 mm: M (38) to the disk drive

130 mm: M (22) to the disk drive

When the disk drive is selected and the write gate (see 3.7) is true, this signal provides the data to be transferred. Each transition from the logical false (high) level to the logical true (low) level causes the current through the selected read/write head to be reversed.

3.7 Write gate The write gate is as follows:

200 mm: M (40) to the disk drive

130 mm: M (24) to the disk drive

When the disk drive is selected and this signal is in the logical true (low) level, the composite write data (see 3.6) is written on the disk.

Remarks: Erase timing is internally generated from this signal.

3.8 Index The index is as follows:

200 mm: M (20) to the host

130 mm: not assigned

This signal is to indicate the beginning of the cylinder, and is pulsed logical true (low) by the selected disk drive once each revolution. Each transition from the false (high) to the true (low) of this signal shall be used to ensure timing accuracy.

Remarks: Generally this signal is used only for the index signal, when hard sector type flexible disks are used and the disk drive is configured without index/sector separation, this signal may be a composite of the index and sector signals.

3.9 Sector The sector is as follows:

200 mm: 0 (24) to the host

130 mm: not assigned

When a hard-sector type flexible disk is being utilized, this signal is used. The true (low) pulses are generated by the selected disk drive for each sector to indicate to the host the beginning of the sector. Each transition from the false (high) to the true (low) of this signal shall be used to ensure timing accuracy.

3.10 Drive ready The drive ready is as follows:

200 mm: M (22) to the host

130 mm: 0 (34) to the host

This signal is in the logical true (low) level, when a flexible disk is loaded properly and rotating in the selected disk drive.

3.11 Cylinder 0 The cylinder 0 is as follows:

200 mm: M (42) to the host

130 mm: M (26) to the host

This signal is in the logical true (low) level to indicate to the host that the read/write head of the selected disk drive is positioned on cylinder 0. The cylinder 0 signal remains logical true (low) while the head is on cylinder 0.

3.12 Write protected The write protected is as follows:

200 mm: M (44) to the host

130 mm: M (28) to the host

When the flexible disk loaded in the selected disk drive is write protected, the logic level of this signal goes true (low). the write electronics in the disk drive is internally disabled, if the disk is write protected. When the level of this signal is false (high), the write electronics is enabled and the write operation can be performed.

3.13 Composite read data the composite read data is as follows:

200 mm: M (46) to the host

130 mm: M (30) to the host

Data from the selected disk drive are transferred to the host system, in the same form as write data from the host system. Each flux reversal sensed on the flexible disk will result in a pulse to the logical true (low) level. Each transition from the false (high) to the true (low) of this signal shall be used to ensure timing accuracy.

3.14 Side one select The side one select is as follows:

200 mm: 0 (14) to the disk drive

130 mm: 0 (32) to the disk drive

When the disk drive is selected, this signal defines which side of a two-sided flexible disk is used for reading or writing. An open circuit, or logical false (high) level selects the read/write head on the side 0 surface of the disk. An active state, or logical true (low) level, selects the read/write head on the side 1 surface of the disk.

3.15 In-use control The in-use control is as follows:

200 mm: 0 (16) to the disk drive

130 mm: 0 (4) to the disk drive

This signal is assigned for special control functions available as optional configurations from various equipments. It may be used with drive select signal or used independently for some functions.

Remarks: Typical functions are busy indicator or door lock. The protocol for this signal is dependent upon the particular control function selected.

3.16 Head load The head load is as follows:

200 mm: 0 (18) to the disk drive

130 mm: 0 (4) to the disk drive

This signal, when activated to a logical true (low) level, will load a read/write head against the disk.

3.17 Drive busy The drive busy is as follows:

200 mm: 0 (8) to the host

130 mm: not assigned

This signal is assigned for special status functions available as optional configurations from various equipments. It may be used with drive select signal or used independently for some functions.

Remarks: Typical functions are write active or seek active.

3.18 Two-sided The two-sided is as follows:

200 mm: 0 (10) to the host

130 mm: not assigned

This signal, when the disk drive is selected, indicates true (low) when a two-sided flexible disk is installed and false (high) when a single-sided flexible disk is installed.

3.19 Disk change The disk change is as follows:

200 mm: 0 (12) to the host

130 mm: 0 (34) to the host

When the disk drive is selected, this signal indicates a true (low) level, if, while drive select signal is false (high), some action corresponding to the disk change (for instance door opened) is made to the selected disk drive even one time. The disk change detecting circuit is reset false (high) on the true-to-false transition of drive select signal.

3.20 Separated read data The separated read data is as follows:

200 mm: 0 (48) to the host

130 mm: not assigned

When the disk drive is selected in the reading mode, this signal generates a pulse for each data "1" read from the flexible disk. The signal will be at logical true (low) level during the time of the pulse, and remaining logical false (high) for each data "0" read from the disk. Each transition from the false (high) to the true (low) of this signal shall be used to ensure timing accuracy.

3.21 Separated read clock The separated read clock is as follows:

200 mm: 0 (50) to the host

130 mm: not assigned

when the disk drive is selected in the reading mode, this signal provides the pulse that defines the bit-cell time of information read during a read operation. The transition from the false (high) to the true (low) of this signal defines the beginning of the new bit cell. The signal is at the logical true (low) level during the time of the pulse.

Remarks: Separated read data and separated read clock are optional and may be used only with a particular recording method, i.e. FM (double frequency) recording.