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(54) Title of the Invention: SCSI Device Converter

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Specification

1. Title of the Invention

SCSI Device Converter

2. Claims

(1) A SCSI device converter comprising: a SCSI interface connected to a SCSI interface in an engineering workstation (EWS) for connecting a hard disk;
a device interface for connecting a peripheral device;
a data writing unit, data reading unit, control data writing unit, and an interrupt data reading unit each identified by the EWS through the SCSI interface by a different ID number (or by the same ID number but a different unit number);
a code converting unit interposed between the data writing unit, the reading unit, and the device interface for converting data between the SCSI format and the peripheral device bus format;
a control unit for controlling the transmission/reception of data between the EWS and the peripheral device through the data writing unit and reading unit are interrupted; and
an interrupt control unit for outputting a disconnect signal via the SCSI interface to the EWS to release an EWS line when the data reading unit has not prepared interrupt data for an interrupt data read command sent from the EWS, and afterwards for sending a reconnect signal to the EWS via the SCSI interface to enable the EWS to read interrupt data when interrupt data has been inputted from a device to the interrupt data reading unit.

3. Detailed Description of the Invention

(Field of Industrial Applicability)

The present invention relates to a general SCSI device converter which is able to easily connect a device such as a PC peripheral device or a sequencer to a SCSI interface on an engineering workstation (EWS).

(Prior Art and Problem Solved by the Invention)

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Engineering workstations (EWS) include a collection of inexpensive devices which facilitate high-speed processing via multi-tasking and multi-window processing.

An EWS includes, as a standard interface, a SCSI interface used to connect hard disks and magnetic disk drives. However, they do not include expansion slots such as personal computers. As a result, output devices such as plotters and sequencers which have a personal computer I/O bus or bi-directional parallel bus with interrupt for a personal computer cannot be connected directly to an EWS. In other words, because current EWS only have an initiator function, a circuit connection cannot be established from a converter to an EWS.

While a personal computer can be connected to a wider variety of peripheral devices by using the expansion slot, it has a slower processing speed and not practical because of single-task processing. An higher grade EWS has a dedicated bus for connecting peripheral devices, but it is for specific device, so it cannot be connected to any peripheral device and the system configuration is very expensive.

When an EWS is connected to a peripheral device with a PC-compatible bus, the process requires a standard SCSI interface designed to accommodate a hard disk, a PC-compatible GPIB interface, and a code converter connected to these interfaces to perform the necessary code conversion.

However, current SCSI interfaces designed for hard disks do not have an interrupt function, and the device which is required to interrupt on the host end such as by a sequencer cannot be connected.

Therefore, it is an object of the present invention to provide a general SCSI device converter which enables a peripheral device having a bus standard differ from SCSI such as PC bus to be easily connected to the SCSI interface on a EWS designed to connect a hard disk, and especially allows the peripheral device end to interrupt.

(Means of Solving the Problem)

The present invention is a SCSI device converter comprising: a SCSI interface connected to a SCSI interface in an engineering workstation (EWS) for connecting a hard disk; a device interface for connecting a peripheral device; a data writing unit, data reading unit, control data writing unit, and an interrupt data reading unit each identified by the EWS via the SCSI interface by a different ID number (or by the same ID number but a different unit number); a code converting unit interposed between the data

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writing unit, the reading unit, and the device interface for converting data between the SCSI format and the peripheral device bus format; a control unit for managing the transmitting/receiving of data between the EWS and the peripheral device via the data writing unit and reading unit are interrupted; and an interrupt control unit for outputting a disconnect signal (conforming to SCSI standards) via the SCSI interface to the EWS to release an EWS line when the data reading unit has not prepared interrupt data for an interrupt data read command sent from the EWS, and afterwards for sending a reconnect signal (conforming to the SCSI standards) to the EWS via the SCSI interface to enable the EWS to read interrupt data when interrupt data has been inputted from a device to the interrupt data reading unit.

(Operation)

The above-described SCSI device converter is able to input and output data to a SCSI interface of an EWS using the same standards as SCSI interface for a hard disk, and enables the above-described four units, i.e., the data writing units and data reading units, which allow the EWS to operate as a data relay point with a peripheral device, to write and read data.

This SCSI device converter also inputs data to and outputs data from a peripheral device via a device interface by using a device bus standard, and the data is converted into SCSI standard data by a code converting unit, and is inputted to and outputted from the above-described four units, i.e., the data writing units and data reading units.

To an interrupt data read command from the EWS, the interrupt control unit temporarily releases the line to the EWS using a disconnect signal and reconnect signal of SCSI standards when data is not prepared in the interrupt data reading unit, and data reading is performed when the data is prepared thereafter.

This operation enables the SCSI interface of the EWS, which is not equipped to handle an interrupt from a device, to perform a virtual-interrupt operation, and enables the SCSI interface of the EWS, which is designed for connecting a hard disk, to connect a device requiring an interrupt.

(Embodiment)

The following is an explanation of a configuration shown in FIG. 1 in which a peripheral device is connected to an EWS using a SCSI device converter in an embodiment of the present invention.

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In this drawing, (1) indicates a relatively inexpensive EWS (Engineering Workstation) such as a desk top typewhich has a SCSI interface (2) as standard equipment for connecting with the hard disk. (3) indicates a SCSI device converter installed in one boardwhich connects the EWS (1) to a peripheral device, for example, an output device (4) such as a plotter, an input device (5) such as a CD-ROM, and a device (6) that performs interrupt control such as a sequencer.

The SCSI device converter (3) includes a SCSI interface (7) for connecting to the EWS (1), and includes personal computer I/O bus interfaces (8) (9) and an interface for a bi-directional parallel bus interface (10) with interrupt function as interface for connecting peripheral devices. The SCSI device converter (3) also implements a data writing unit (11), a data reading unit (12), a control data writing unit (13), an interrupt data reading unit (14), a code converting unit (15), a control unit (16) and an interrupt control unit (17) by using a microcomputer, ROM and RAM. The data writing unit (11), the data reading unit (12), the control data writing unit (13) and the interrupt data reading unit (14) are identified in different ID numbers N, N+1, …, and N+3 (or by the same ID number but different unit numbers N, N+1, …, and N+3) by the EWS (1) through the SCSI interface (2) (7). The codeconverting unit (15) and the control unit (16) are located between each of the data writing units and reading units (11) (12) (13) (14) and the device interfaces (8) (9) (10). The code converting unit (15) converts the data format between SCSI standards and device-interface bus standards. The control unit (16) controls the data transmission/reception between the EWS and the peripheral devices which is performed by relaying the data writing units and reading units. The interrupt control unit (17) generates a control signal so that the EWS (1) can receive interrupt signals from the devices through the SCSI interfaces (2) and (7) without terminating processing.

In addition to the I/O interfaces (8) (9) and interface for a bi-directional parallel bus with interrupt (10) mentioned above, the SCSI device converter (3) can be adapted to accommodate any other type of device interface. For example, an A/D converter (19) may be installed to receive analog data from an analog device (18) such as a sensor. The device interface used here can be a standard interface such as a RS-232, Centronics, or VME bus, or a special interface such as the expansion buses used in each personal computer.

The following is an explanation of the operations performed by an EWS device converter (3) with this configuration.

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