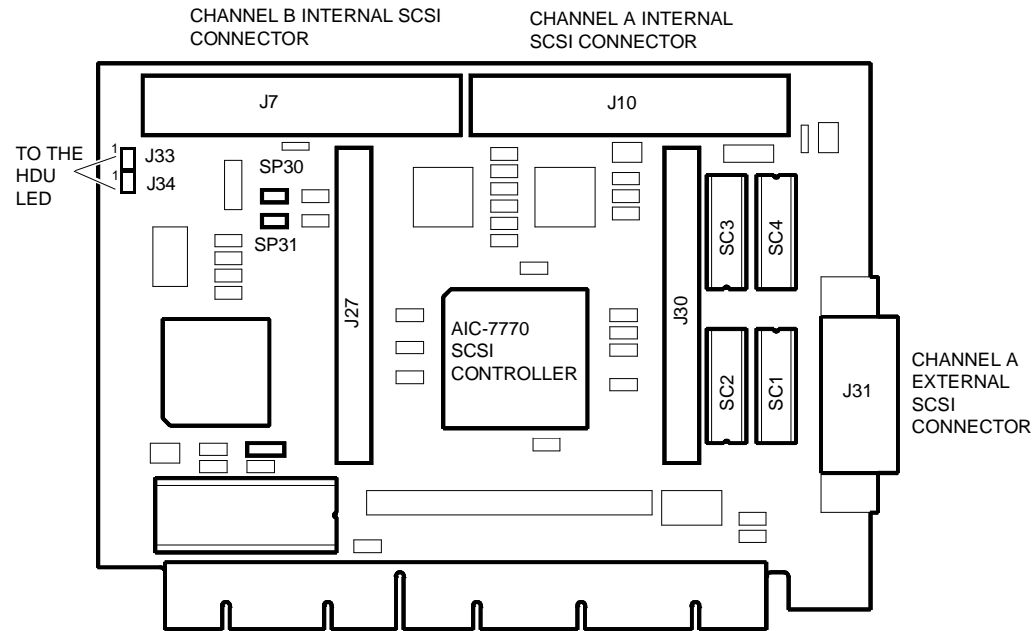# MAGNETIC PERIPHERAL CONTROLLERS

DUAL-CHANNEL EISA GO622/B/C, GO2051 (ARROW) SCSI NARROW CONTROLLER

This controller provides two Fast Single-Ended SCSI Narrow channels and uses the Adaptec AIC-7770 (Arrow) chip. This chip is a bus master intrface controller that can take control of the bus and transfer information to system memory at the maximum speed allows on the EISA bus (33 MB/sec), while the data transfer rate from/to SCSI bus is 10 MB/sec.
Channel B (connector J7) is reserved for the system internal peripherals and is always connected. Channel A is generally only used for connecting external SCSI peripherals (the PEM 100/R for example) and therefore only external connector J31 is used and not internal connector J10.

Connectors J27 and J30 are not used since they allow a piggy back board which converts the single-ended channel A into a differential channel (not available on this system) to be installed. To keep channel A as a single-ended channel in this case, the four DIP-Shunts SC1, SC2, SC3 and SC4 must always be installed on the board.

This board also comes with a double connector (J33 and J34) for connection to the HDU LED on the console. Either J33 or J34 can be connected, indifferently; do not attach the connector deriving from the LED to the middle pins between J33 and J34.

Appendix I gives this board's SCSI configurations as it is dedicated to the configurations of the magnetic peripherals installed in the basic module and in the PEM.

Up to eight devices, controller included, can be connected to the SCSI Narrow channel. These devices are assigned IDs ranging from 0 to 7, where each SCSI controller channel must always have an ID of 7. The board is configured by the ECU or Setup Utility for installation; the only hardware jumper setting to be made on the board concerns the enabling of the SCSI terminators.

JUMPER	SETTING	DESCRIPTION
SP30	OFF	Channel A terminators are always enabled regardless of the configuration of jumper SP30. This jumper is usually set to OFF. Channel A terminators are automatically disabled when both SCSI connectors (internal and external) are connected and when the piggy back board is installed in connectors J27 and J30 (not planned for this system). Channel A is generally used to connect external SCSI peripherals only and therefore the terminators are always enabled.
SP31	ON * (Default)	Channel B teminators are are enabled (always true).
	OFF	Channel B terminators are disabled.

ARROW SCSI CONTROLLER CONFIGURATION

This controller can be configured through the ECU or the Setup Utility: the following parameters can be defined:

- **SCSI Controller**: Enables or disables the system SCSI controller. The default selection is Enabled. If Disabled is set, the following Interrupt Select option is automatically updated to Disabled.

- **Interrupt Select**: Selects the IRQ for the SCSI interface. When the controller is disabled, this option is automatically set to Disabled. When the controller is enabled again, the previous IRQ value is automatically set. The default value is IRQ11. Allowed values are IRQ5, 10, 11 and 15.

Note: *If EZ-SCSI is used, do not set Interrupt Select as IRQ5.*

- **BIOS Configuration Options:** Enables or disables the following options:

  - **Support More than Two Drives:** When this option is enabled the BIOS supports more than two physical drives. If the option is disabled, the BIOS supports only one or two drives. MS-DOS 3.3 and 4.0 support only 2 drives and therefore the option can be "Disabled", whereas MS-DOS 5.0 and later releases, and other operating systems such as OS/2 and UNIX support more than 2 drives, therefore the parameter should be set as "Enabled".

  - **Support Removable Disk as Fixed Disk:** With this option the BIOS can be set to support all the removable disks as normal fixed disks (hard disk). The default value is disabled. The BIOS can also be set to support only a removable disk if this is the boot drive by selecting Boot Devices Only.

  - **Extended Translation for Device > 1 GByte:** With this option operating systems such as MS-DOS can exceed the maximum 1024 cylinder limit and therefore be able to support HDUs greater than 1 GB. For MS-DOS, this option must be set to Enabled when installing HDUs greater than 1 GB.

  - **Primary Channel Selection**. Selects which SCSI channel is to be used as primary channel. During initialization the primary channel is initialized before the secondary channel. The default selection is Channel B.

- **Host Adapter Interface Options:** contains the following options:
  - **Bus Release Time**: Sets the bus release time. The default value is 60 bckls.
  - **Data FIFO Threshold**: Sets the data FIFO threshold at 00%, 50%, 75% or 100%. The default value is 100%.

- **SCSI Channel B Configuration:** contains the following options:
  - **Host Adapter SCSI ID**: Sets the ID of the SCSI controller channel B. For most operating environments the SCSI controller ID is set at 7.

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  - **SCSI Bus Parity Check**: Enables or disables parity checking onthe SCSI bus. The default value is Enabled.
  - **SCSI Bus Reset at Power-on**: Enables or disables the SCSI bus reset at system power-on. The default value is Enabled.
  - **SCSI Selection Timeout**: Sets the timeout in milliseconds. The default value is 256 milliseconds.
  - **SCSI Bus Termination:** Displays whether the SCSI bus channel B, controller side, is terminated. The termination is carried out manually by setting the jumpers on the board. The termination rules are set out in Appendix E, in any case channel B on the SCSI controller is always terminated.
  - **Device Configuration**: Configures the following parameters for each SCSI ID (from 0 to 7) of channel B:

    Enable Disconnection: Enables or disables the SCSI device to disconnect it from the bus if there is a delay in the completion of the command. The default value is Yes.

    Initiate Sync Negotiations: Allows the SCSI controller to transfer the data to all the SCSI devices, in synchronous mode at the rate set by the Maximum Synch Xfer Rate parameter. The default value is Yes.

    Maximum Sync Xfer Rate: Limits the maximum synchronized transfer rate between controller and peripheral to a determined value when the Initiate Sync Negotiations option is enabled. The values that can be set for each peripheral range from 3.6 MB/s to 10 MB/s. The default value is 10 MB/s.

    Include in BIOS Scan: When this option is enabled, the BIOS will support a hard disk found at a determined ID. The default value is Yes.

    Error If Device Not Found: Enables or disables the POD cycle to record an error is an SCSI device is not found at a determined ID. The deafult value is No.

    Send Start Unit Command: Defines the disk initialization mode. As explained the HDUs are not automatically initialized at system power-on, but are only initialized after the relevant SCSI command is received from the controller, thus avoiding a power supply overload. In this way the SCSI controller progressively initializes all the HDUs and other units. To activate this initialization mode the HDU must be suitably jumpered (see Chapter 8), then this parameter must be set for each unit installed (each unit is identified by a progressive number from 0 to 6; ID 7 identifies the actual controller), onto Yes.
    The systems are already configured in the factory with the parameter on Yes for all the SCSI units connected to channel B.

- **SCSI Channel A Configuration:** this contains the same options as channel B. The Send Start Unit Command option referring to this channel is configured at the factory to No.

BOARD GO622B (P.c.b. Code 794114 Q) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
04/94	Nasc	935983 D	The board is introduced.	Factory

BOARD GO622C (P.c.b. Code 794126 L) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
06/94	Nasc	936007 P	This board replaces board GO622B and recovers the wirings made.	Factory

BOARD GO2051 (P.c.b. Code 794126 L) EVOLUTION

| DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
05/95	Nasc	562169 E	This board replaces board GO622C and recovers the wirings made. This new board is equipped with Adaptec's SCSI component AIC 7770 updates to REV. E.	Factory

SINGLE-CHANNEL PCI GO624 / GO2096 (DAGGER) SCSI NARROW CONTROLLER
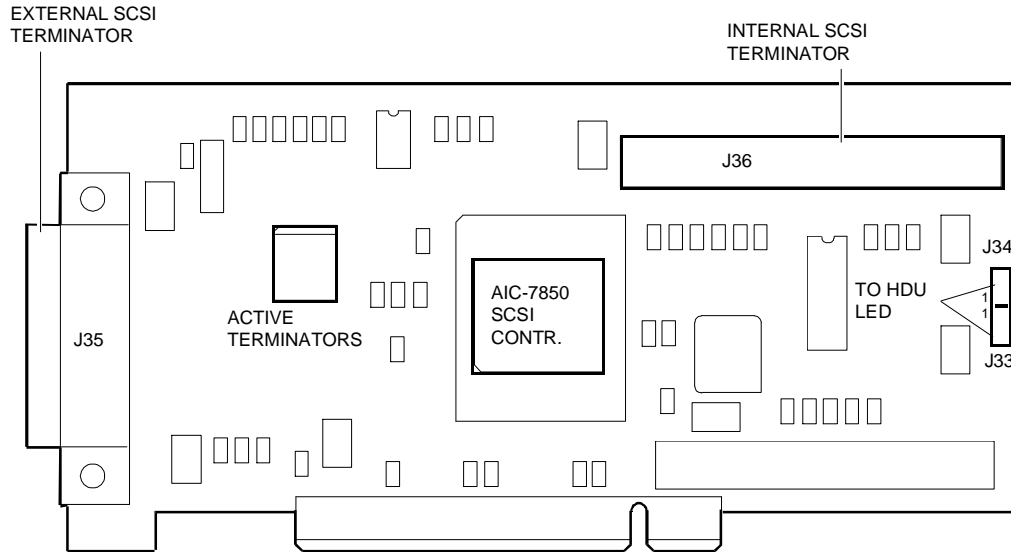
This controller provides a Fast Single-Ended SCSI Narrow channel and uses the Adaptec AIC-7850 (Dagger) chip. This chip is a bus master interface controller that can take control of the bus and transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 10 MB/sec. There are two 50-pin SCSI Narrow connectors available on this board: internal connector J36 and external connector J35 (high density). Internal connector J36 is used for the connection of the system internal peripherals while external connector J35 is used for the connection of external SCSI peripherals (such as the PEM Iron but not the PEM Silver). Up to eight devices can be connected to the SCSI Narrow channel, controller included, and are assigned IDs ranging from 0 to 7. The SCSI controller must always have an ID of 7. This board is configured by the ECU or Setup Utility for installation, and therefore there are no jumper settings to be made on the board. The SCSI terminators are on the board, are active and are usually enabled but are automatically disabled if both SCSI connectors (internal and external) are connected. The HDU activity LED on the console can be attached to connector J33 or J34, indifferently. Do not attach the connector deriving from this LED to the middle pins between J33 and J34. The HDU activity LED is not connected on the SNX 140/R, 160/R and on systems with a Silver box since the same LED functions are performed by HDU activity LEDs on the SCSI back plane and by the SCSI BUSY LED on the system console. This board's SCSI configurations are given in Appendices I and J.
The Dagger controller is available as an optional kit (SCC PCI 101) so that the system can be equipped with an additional SCSI Narrow channel.
Even though the configurator indicates that the Dagger controller effectively occupies 10 KB of system memory, the controller actually requires a 32 KB area which is usually assigned within the C8000-CFFFF range by the Configuration Manager Utility.
The DAGGER GO624 SCSI controller is installed on all SNX systems except for the SNX 140 75 MHz since it is not compatible. The SNX 140 75 MHz can only use the DAGGER GO2096 controller.

SINGLE-CHANNEL PCI GO2124 (DAGGER) SCSI NARROW CONTROLLER
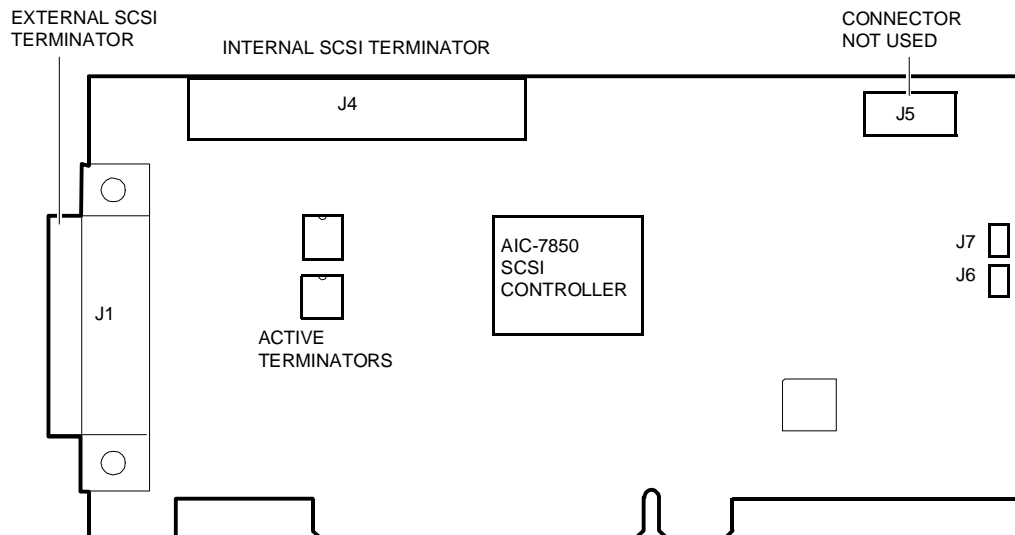
This controller replaces the GO624 and provides a Fast Single-Ended SCSI Narrow channel and uses the Adaptec AIC-7850 (Dagger) chip. This chip is a bus master interface controller that can take control of the bus and transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 10 MB/sec.
There are two 50-pin SCSI Narrow connectors available on this board: internal connector J4 and external connector J1 (high density). Internal connector J4 is used for the connection of the system internal peripherals while external connector J1 is used for the connection of external SCSI peripherals, excluding the PEM.

Up to eight devices can be connected to the SCSI Narrow channel, controller included, and are assigned IDs ranging from 0 to 7. The SCSI controller must always have an ID of 7. This board is configured by the ECU or Setup Utility for installation, and therefore there are no jumper settings to be made on the board. The SCSI terminators are on the board, are active and are usually enabled but are automatically disabled if both SCSI connectors (internal and external) are connected.

The HDU activity LED on the console can be attached to connector J6 or J7, indifferently. The HDU activity LED is not connected on the SNX 140/R, 160/R and on systems with a Silver box case since the same LED functions are performed by HDU activity LEDs on the SCSI back plane and by the SCSI BUSY LED on the system console. Also the Bus Fault connector J5 is currently not used.

This board's SCSI configurations are given in Appendices I, J and K.
The GO2124 controller is available as an optional kit (SCC PCI 101E) so that the system can be equipped with an additional SCSI Narrow channel.

Even though the configurator indicates that the GO2124 SCSI controller effectively occupies 10 KB of system memory, the controller actually requires a 32 KB area which is usually assigned within the C8000-CFFFF range by the Configuration Manager Utility.

CONFIGURATION OF DAGGER SCSI CONTROLLERS GO624, GO2096 AND GO2124

These PCI boards are automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the Setup Utility or, preferably, the ECU. The procedure with the use of the ECU is described below.

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- Activate the EISA Configuration Utility.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
  "Slot xx PCI SCSI Controller
  PCI Function x   Enabled.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is a Dagger board, Vendor ID 90045078 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

  – **Port Address**: displays the I/O address.

  – **Memory Address**: displays the memory address range.

  – **Memory Amount**: displays the amount of memory occupied.

  – **Interrupt**: displays the IRQ assigned to the SCSI controller.

  It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- Return to this SCSI controller's main menu. The related parameters are displayed in sequence.

- **Host Adapter Interface Options:** Has the following options:

  – **Bus Release Time**: Sets the bus release time. The default value is 40 bckls.

  – **Host Adapter SCSI ID**: Sets the SCSI controller ID. For most operating environments the SCSI controller ID is set at 7 and must not be changed.

  – **SCSI Bus Parity Check**: Enables or disables parity checking on the SCSI bus. The default value is Enabled.

  – **SCSI Bus Reset at Power-on**: Enables or disables SCSI bus reset at system power-on. The default value is Enabled.

- **BIOS Configuration Options:** Enables or disables the following options:

  – **Support More than Two Drives:** When this option is enabled the BIOS supports more than two physical drives. If the option is disabled, the BIOS supports only one or two drives. MS-DOS 3.3 and 4.0 support only 2 drives and therefore the option can be "Disabled", whereas MS-DOS 5.0 and later releases, and other operating systems such as OS/2 and UNIX support more than 2 drives, therefore the option should be set as "Enabled".

- **Support for Removable Media:** With this option the BIOS can be set to support all the removable disks as normal fixed disks (hard disks). The default value is disabled. The BIOS can also be set to support only one removable disk if this is the boot drive, by selecting Boot Devices Only.

- **Translation for Drives > 1 GByte:** With this option operating systems such as MS-DOS can exceed the maximum 1024 cylinder limit and therefore be able to support HDUs greater than 1 GB.

Note: *With the UnixWare 2.0x and Windows NT 3.51 operating systems and when the hard disks have a capacity greater than 1 GB, the "Translation for Drives > 1 GByte" parameter must be set to Disabled.*

- **Device Configuration**   **Press Enter to Configure**.
  Pressing Enter displays a window in which it is possible to configure the following parameters for each SCSI ID. SCS IDs range from 0 to 7.

  - **Enable Disconnection:** Enables or disables the SCSI device to disconnect it from the bus if there is a delay in the completion of the command. The default value is Yes.

  - **Initiate Sync Negotiations:** Allows the SCSI controller to transfer the data to all the SCSI devices, in synchronous mode, at the rate set by the Maximum Synch Xfer Rate parameter. The default value is Yes.

  - **Maximum Sync Xfer Rate:** Limits the maximum synchronized transfer rate between controller and peripheral to a determined value when the Initiate Sync Negotiations option is enabled. The values which can be set for each peripheral range from 3.6 MB/s to 10 MB/s. The default value is 10 MB/s.

  - **Include in BIOS Scan:** When this option is enabled, the BIOS will support a hard disk found at a determined ID. The default value is Yes.

  - **Error If Device Not Found**: Enables or disables the POD cycle to record an error if a SCSI device is not found at a determined ID. The default value is No.

  - **Send Start Unit Command**: Defines the disk initialization mode. The HDUs are not automatically initialized at system power-on, but are only initialized after the relevant SCSI command is received from the controller, thus avoiding a power supply overload. In this way the SCSI controller progressively initializes all the HDUs and other units. To activate this initialization mode, the HDU must first be properly jumpered and then this parameter set for each unit installed (each unit is identified by a progressive number from 0 to 6; ID 7 identifies the actual controller), to Yes. The systems are already shipped from the factory with the parameter set to Yes for all the SCSI drives.

BOARD GO624 (P.c.b. Code 794117 K) EVOLUTION

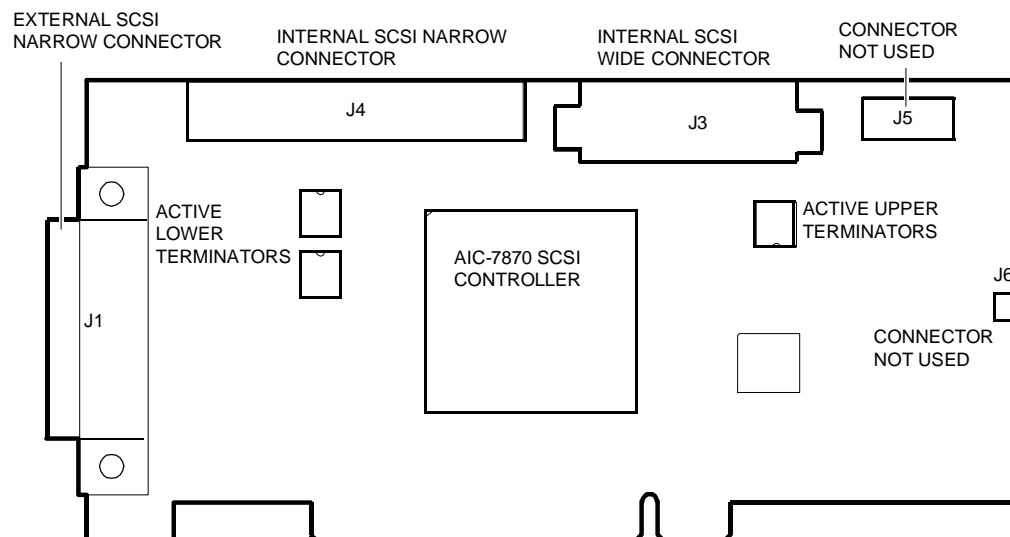| DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
09/94	Nasc	935991 D	New board. The board firmware is included in the system BIOS.	Factory
01/95	01AG		An adhesive label with the FCC/B (FCC ID : DYKGO624) mark identification is added.	Factory
06/96	02AG		Optimization of the supply of the parts for the subject board: introduction of a strategic B.O.M.	Factory
09/96	01		Evolution of component AIC7850 (pos. U2) from Rev. B to Rev. D. Rev. D allows component operation with both 25 MHz and 33 MHz PCI buses, without additional components.	Factory

BOARD GO2096 (P.c.b. Code 794117 K) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
11/95	Nasc	210836 W	New board which is also compatible with the SNX 140 75 MHz. In fact, the GO624 does not work with a 25 MHz PCI clock, due to an incorrect synchronization between the PCI clock (25 MHz) and the AIC7850 clock (40 MHz). The board firmware is included in the system BIOS. This board does not have the FCC mark.	Factory
09/96	01		Evolution of component AIC7850 (pos. U2) from Rev. B to Rev. D. This evolution eliminates the external work around required for this component to work with a 25 MHz PCI bus. Cuttings/wirings are eliminated and component 74F08 (pos. U4) is no longer mounted on the board.	Factory

BOARD GO2124 (P.c.b. Code 654491 W) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
12/96	Nasc	210925 X	New board which replaces the GO624 and GO2096. The board firmware is included in the system BIOS. This board does not have the FCC mark.	Factory

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SINGLE-CHANNEL PCI GO2109 (LANCE) SCSI WIDE CONTROLLER

EXTERNAL SCSI NARROW CONNECTOR

INTERNAL SCSI NARROW CONNECTOR

INTERNAL SCSI WIDE CONNECTOR

CONNECTOR NOT USED

J4

J3

J5

ACTIVE LOWER TERMINATORS

AIC-7870 SCSI CONTROLLER

ACTIVE UPPER TERMINATORS

J6

CONNECTOR NOT USED

J1

This controller provides a Fast Single-Ended SCSI Wide channel and uses the Adaptec AIC-7870 (Lance) chip. This chip is a bus master interface controller that can take control of the bus and transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 20 MB/sec during 16-bit transfers (Wide) instead of 8-bit transfers (Narrow).

There are three connectors available on this board: internal 68-pin SCSI Wide connector J3, internal 50-pin SCSI Narrow connector J4 and external 50-pin SCSI Narrow connector J1 (high density). Internal connector J3 is used for the connection of internal SCSI Wide HDUs, internal connector J4 is used for the connection of internal SCSI Narrow removable peripherals while external connector J1 is used for the connection of external SCSI Narrow peripherals excluding the PEM.

It is not possible to connect peripherals to all three connectors simultaneously. The maximum configuration allows the connection to two of the three connectors available: to both internal connectors (Wide and Narrow), to the internal and external Narrow connectors or to the internal Wide and external Narrow connectors.

Up to 16 devices can be connected to the SCSI Wide channel, controller included, and are managed with IDs ranging from 0 to 15; IDs from 8 to 15 are currently not used. The SCSI controller must always have an ID of 7. This board is configured by the ECU or Setup Utility for installation, and therefore there are no jumper settings to be made on the board. The SCSI terminators are on the board and are active. The upper terminators relating to the Wide bus are always enabled while the lower terminators, common for Narrow and Wide, are normally enabled but automatically disabled if two out of the three SCSI connectors on the controller are used.

HDU activity LED connector J6 and Bus Fault connector J5 are currently not used.

This board's SCSI configurations are given in Appendices J and K.

This controller is also available in an optional kit (SCC PCI 114W) so that the system can be equipped with an additional SCSI Wide channel for the connection of the internal HDUs.

ONBOARD LANCE SCSI CONTROLLER AND GO2109 SCSI WIDE CONTROLLER CONFIGURATION

These PCI devices are automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the Setup Utility or, preferably, the ECU. The procedure with the use of the ECU is described below.

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- Activate the EISA Configuration Utility.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
  "Embedded SCSI Controller
                PCI Function x   Enabled"
  in the case of the onboard controller, or
  "Slot xx PCI SCSI Controller
                PCI Function x   Enabled
  in the case of the GO2109 controller.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is a Lance board, Vendor ID 90047078 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

  - **Port Address**: displays the I/O address.

  - **Memory Address**: displays the memory address range.

  - **Memory Amount**: displays the amount of memory occupied.

  - **Interrupt**: displays the IRQ assigned to the SCSI controller.

  It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- Return to this SCSI controller's main menu. The related parameters are displayed in sequence.

- **Host Adapter Interface Options:** Has the following options:

  - **Bus Release Time**: Sets the bus release time. The default value is 40 bckls.

  - **Host Adapter SCSI ID**: Sets the SCSI controller ID. For most operating environments the SCSI controller ID is set at 7 and must not be changed.

  - **SCSI Bus Parity Check**: Enables or disables parity checking on the SCSI bus. The default value is Enabled.

  - **SCSI Bus Reset at Power-on**: Enables or disables SCSI bus reset at system power-on. The default value is Enabled.

- **BIOS Configuration Options:** Enables or disables the following options:

  – **Host Adapter BIOS:** This option must be enabled so that the system can be booted from a hard disk or CD-ROM drive connected to the related SCSI controller. When the option is enabled, BIOS AIC-78xx occupies 32 KB of system memory. This option can be disabled if the devices on the SCSI bus are controlled by the device drivers and therefore do not require a BIOS. This frees a memory area of about 16 KB and reduces the boot time by 60 seconds. The default setting is Enabled.

  – **Support More than Two Drives:** When this option is enabled the BIOS supports more than two physical drives. When the option is disabled, the BIOS supports only one or two drives. MS-DOS 3.3 and 4.0 support only 2 drives and therefore the option can be "Disabled", whereas MS-DOS 5.0 and later releases, and other operating systems such as OS/2 and UNIX support more than 2 drives, therefore the option should be set as "Enabled".

  – **Support for Removable Media:** With this option the BIOS can be set to support all the removable disks as normal fixed disks (hard disk). The default value is disabled. The BIOS can also be set to support only one removable disk if this is the boot drive, by selecting Boot Devices Only.

  – **Translation for Drives > 1 GByte:** With this option operating systems such as MS-DOS can exceed the maximum 1024 cylinder limit and therefore be able to support HDUs greater than 1 GB.

Note: *With the UnixWare 2.0x and Windows NT 3.51 operating systems and when the hard disks have a capacity greater than 1 GB, the "Translation for Drives > 1 GByte" parameter must be set to Disabled.*

- **BIOS Support for Bootable CD-ROM:** When this option is enabled, the system can be booted from CD-ROM. The option is only displayed if the controller's Host Adapter BIOS option is enabled. To boot the system from the hard disk or from another device, disable this option or make sure that there are no bootable CDs in the drive. The default value is Enabled.

- **BIOS Support for Int 13 Extension:** When this option is enabled, the SCSI controller BIOS supports Int 13 extensions required for the bootable CD-ROMs. This option and the previous one must be enabled in order to be able to boot from the CD-ROM drive. This option is only displayed if the BIOS Support for Bootable CD-ROM option is enabled. It can be disabled if the boot device is not a CD-ROM drive, however leaving this option enabled will have no effect.

- **Device Configuration**   **Press Enter to Configure.**
  Pressing Enter displays a window in which it is possible to configure the following parameters for each SCSI ID. SCS IDs range from 0 to 7.

  – **Enable Disconnection:** Enables or disables the SCSI device to disconnect it from the bus if there is a delay in the completion of the command. The default value is Yes.

  – **Initiate Sync Negotiations:** Allows the SCSI controller to transfer the data to all the SCSI devices, in synchronous mode at the rate set by the Maximum Synch Xfer Rate parameter. The default value is Yes.

  – **Maximum Sync Xfer Rate:** Limits the maximum synchronized transfer rate between controller and peripheral to a determined value when the Initiate Sync Negotiations option is enabled. The values which can be set for each peripheral range from 3.6 MB/s to 10 MB/s. The default value is 10 MB/s.

Note: *For Wide peripherals, the value displayed must be multiplied by two and therefore the default value will be 20 MB/sec. For external peripherals other than the PEM, set a speed of less than 5 MB/sec so as to avoid data transfer errors.*
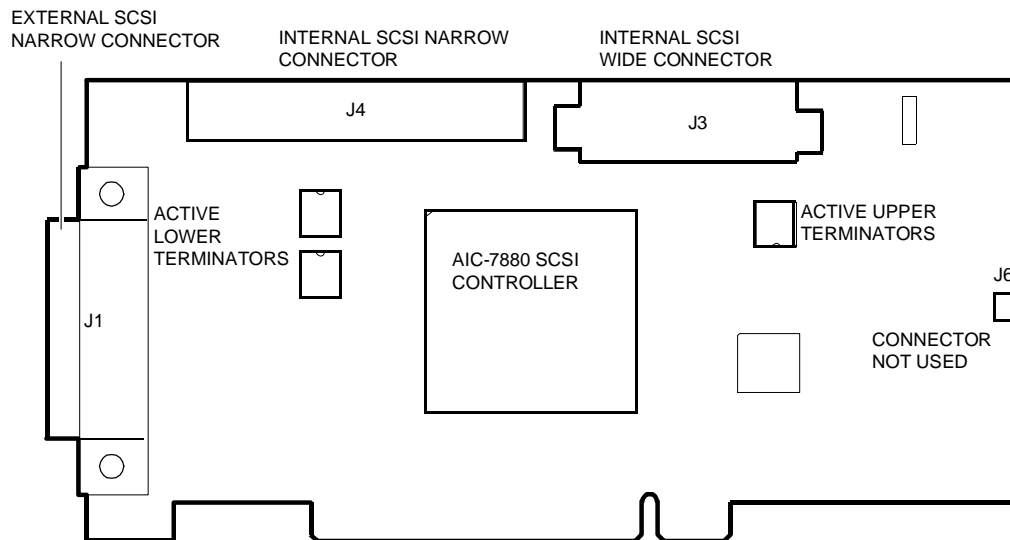
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– **Initiate Wide Negotiations:** Enables the SCSI device to exchange data with the board in the Wide mode (16-bit). This parameter is automatically set by the controller depending on the type of peripheral to which it is connected.

– **Include in BIOS Scan:** When this option is enabled, the BIOS will support a hard disk found at a determined ID. The default value is Yes.

– **Error If Device Not Found**: Enables or disables the POD cycle to record an error if a SCSI device is not found at a determined ID. The default value is No.

– **Send Start Unit Command**: Defines the disk initialization mode. In fact, the HDUs are not automatically initialized at system power-on, but are only initialized after the relevant SCSI command is received from the controller, thus avoiding a power supply overload. In this way the SCSI controller progressively initializes all the HDUs and other units. To activate this initialization mode, the HDU must first be properly jumpered and then this parameter set for each unit installed (each unit is identified by a progressive number from 0 to 6, 8 and 15; ID 7 identifies the actual controller), to Yes. The systems are already shipped from the factory with the parameter set to Yes for all the SCSI drives. IDs from 8 to 15 are not used.

BOARD GO2109 (P.c.b. Code 654491 W) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
05/96	Nasc	210860 J	New board. The board firmware is included in the system BIOS.	Factory

SINGLE-CHANNEL PCI ULTRA WIDE GO2172 SCSI CONTROLLER

EXTERNAL SCSI
NARROW CONNECTOR

INTERNAL SCSI NARROW
CONNECTOR

INTERNAL SCSI
WIDE CONNECTOR

J4

J3

ACTIVE
LOWER
TERMINATORS

AIC-7880 SCSI
CONTROLLER

ACTIVE UPPER
TERMINATORS

J6

J1

CONNECTOR
NOT USED

This controller provides a single-ended Ultra Wide SCSI channel and uses the Adaptec AIC-7880 chip. This chips is a bus master interface controller that can take control of the bus and transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec) while data is transferred from/to the SCSI bus at 40 MB/sc. The Ultra Wide SCSI controller is capable of doubling the data transfer rate with respect to a Fast Wide controller, always with 16-bit (Wide) operation.

There are three connectors available on this board: internal 68-pin SCSI Wide connector J3, internal 50-pin SCSI Narrow connector J4 and external 50-pin SCSI Narrow connector J1 (high density). Internal connector J3 is used for the connection of internal SCSI HDUs, internal connector J4 is used for the connection of internal SCSI Narrow removable peripherals while external connector J1 is used for the connection of external SCSI Narrow peripherals excluding the PEM.

Note: *Besides Ultra Wide HDUs, also the Fast Wide HDUs can be connected to connector J3; the controller adapts itself to the type of peripheral connected and automatically reduces the speed to 20 MB/sec.*

It is not possible to connect peripherals to all three SCSI connectors simultaneously. The maximum configuration allows the connection to two of the three connectors available: to both internal connectors (Wide and Narrow), to the internal and external Narrow connectors or to the internal Wide and external Narrow connectors. Up to 16 devices can be connected to the SCSI Wide channel, controller included, and are managed with IDs ranging from 0 to 15; IDs from 8 to 15 are currently not used.

The SCSI controller must always have an ID of 7. This board is configured for installation by the ECU or Setup Utility, and therefore there are no jumper settings to be made on the board. The SCSI terminators are on the board and are active. The upper terminators relating to the Wide bus are always enabled while the lower terminators, common for Narrow and Wide, are normally enabled but are automatically disabled if two out of the three SCSI connectors on the controller are used.

The board does not have a ROM BIOS since the SCSI firmware is stored in the system BIOS. HDU activity LED connector J6 is not used on these systems.

The board SCSI configurations are described in Appendix J.

This controller is also available in an optional kit (SCC PCI 114W) so that the system can be equipped with an additional SCSI Wide channel for the connection of the internal HDUs.

MAGNETIC PERIPHERAL CONTROLLERS

GO2172 SCSI CONTROLLER CONFIGURATION

This PCI board is automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the Setup Utility or, preferably, the ECU. The procedure with the use of the ECU is described below.

- Activate the EISA Configuration Utility.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
"Slot xx PCI SCSI Controller
                    PCI Function x   Enabled.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is an Ultra Wide version, Vendor ID 90048078 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

    – **Port Address**: displays the I/O address.

    – **Memory Address**: displays the memory address range.

    – **Memory Amount**: displays the amount of memory occupied.

    – **Interrupt**: displays the IRQ assigned to the SCSI controller.

    It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- Return to this SCSI controller's main menu. The related parameters are displayed in sequence.

- **Host Adapter Interface Options:** Has the following options:

    – **Bus Release Time**: Sets the bus release time. The default value is 40 bckls.

    – **Host Adapter SCSI ID**: Sets the SCSI controller ID. For most operating environments the SCSI controller ID is set at 7 and must not be changed.

    – **SCSI Bus Parity Check**: Enables or disables parity checking on the SCSI bus. The default value is Enabled.

    – **SCSI Bus Reset at Power-on**: Enables or disables SCSI bus reset at system power-on. The default value is Enabled.

- **Support for Ultra SCSI Speed:** Enables or disables the Ultra SCSI speed (40 MB/sec) at which the data are transferred from/to the SCSI bus. The default value is Enabled.

- **BIOS Configuration Options:** Enables or disables the following options:

    – **Host Adapter BIOS:** This option must be enabled so that the system can be booted from a hard disk or CD-ROM drive connected to the related SCSI controller. When the option is enabled, BIOS AIC-78xx occupies 32 KB of system memory. This option can be disabled if the devices on the SCSI bus are controlled by the device drivers and therefore do not require a BIOS. This frees a memory area of about 16 KB and reduces the boot time by 60 seconds. The default setting is Enabled.

- **Support More than Two Drives:** When this option is enabled the BIOS supports more than two physical drives. When the option is disabled, the BIOS supports only one or two drives. MS-DOS 3.3 and 4.0 support only 2 drives and therefore the option can be "Disabled", whereas MS-DOS 5.0 and later releases, and other operating systems such as OS/2 and UNIX support more than 2 drives, therefore the option should be set as "Enabled".

- **Support for Removable Media:** With this option the BIOS can be set to support all the removable disks as normal fixed disks (hard disk). The default value is disabled. The BIOS can also be set to support only one removable disk if this is the boot drive, by selecting Boot Devices Only.

- **Translation for Drives > 1 GByte:** With this option operating systems such as MS-DOS can exceed the maximum 1024 cylinder limit and therefore be able to support HDUs greater than 1 GB.

Note: *With the UnixWare 2.0x and Windows NT 3.51 operating systems and when the hard disks have a capacity greater than 1 GB, the "Translation for Drives > 1 GByte" parameter must be set to Disabled.*

- **BIOS Support for Bootable CD-ROM:** When this option is enabled, the system can be booted from CD-ROM. The option is only displayed if the controller's Host Adapter BIOS option is enabled. To boot the system from the hard disk or from another device, disable this option or make sure that there are no bootable CDs in the drive. The default value is Enabled.

- **BIOS Support for Int 13 Extension:** When this option is enabled, the SCSI controller BIOS supports Int 13 extensions required for the bootable CD-ROMs. This option and the previous one must be enabled in order to be able to boot from the CD-ROM drive. This option is only displayed if the BIOS Support for Bootable CD-ROM option is enabled. This option can be disabled if the boot device is not a CD-ROM drive, however leaving this option enabled will have no effect.

- **Device Configuration**   **Press Enter to Configure.**
  Pressing Enter displays a window in which it is possible to configure the following parameters for each SCSI ID. SCS IDs range from 0 to 15.

  - **Enable Disconnection:** Enables or disables the SCSI device to disconnect it from the bus if there is a delay in the completion of the command. The default value is Yes.

  - **Initiate Sync Negotiations:** Allows the SCSI controller to transfer the data to all the SCSI devices, in synchronous mode and at the rate set by the Maximum Synch Xfer Rate parameter. The default value is Yes.

  - **Maximum Sync Xfer Rate:** Limits the maximum synchronized transfer rate between controller and peripheral to a determined value when the Initiate Sync Negotiations option is enabled. The values which can be set for each peripheral range from 3.6 MB/sec to 20 MB/sec. The default value is 20 MB/sec.

Note: *For Wide (16-bit) peripherals, the value displayed must be multiplied by two and therefore the default value will be 40 MB/sec. For external peripherals other than PEMs, set a speed of less than 5 MB/sec to avoid data transfer errors.*

  - **Initiate Wide Negotiations:** Enables the SCSI device to exchange data with the board in the Wide mode (16-bit). This parameter is automatically set by the controller depending on the type of peripheral to which it is connected.

  - **Include in BIOS Scan:** When this option is enabled, the BIOS will support a hard disk found at a determined ID. The default value is Yes.

– **Error If Device Not Found**: Enables or disables the POD cycle to record an error if a SCSI device is not found at a determined ID. The default value is No.

– **Send Start Unit Command**: Defines the disk initialization mode. The HDUs are not automatically initialized at system power-on, but are only initialized after the relevant SCSI command is received from the controller, thus avoiding a power supply overload. In this way the SCSI controller progressively initializes all the HDUs and other units. To activate this initialization mode, the HDU must first be properly jumpered and then this parameter set for each unit installed (each unit is identified by a progressive number from 0 to 6, 8 and 15; ID 7 identifies the actual controller), to Yes. The systems are already shipped from the factory with the parameter set to Yes for all the SCSI drives. IDs from 8 to 15 are not used.

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Note: *A filter consisting of a 11.8 KOhm resistor and a 1000 pF capacitor C35 is fitted between pin 140 (USPEED) of the AIC-7880 and ground so that the component can work in the Ultra Wide mode. If R13 is replaced by a 0 Ohm jumper and capacitor C35 is not fitted (as for the Lance version on the GO2109), component AIC-7880 will work in the Fast Wide mode as component AIC-7870 Lance.*

Note: *The GO2172 is practically identical to the GO2109, the only difference being the chip on the SCSI controller*

BOARD GO2172 (P.c.b. Code 654491 W - 01) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
9/96	Nasc	212807 Y	New board. The board firmware is included in the system BIOS.	Factory

SINGLE-CHANNEL PCI ULTRA WIDE GO2180 (ADAPTEC AHA2940UW) SCSI CONTROLLER
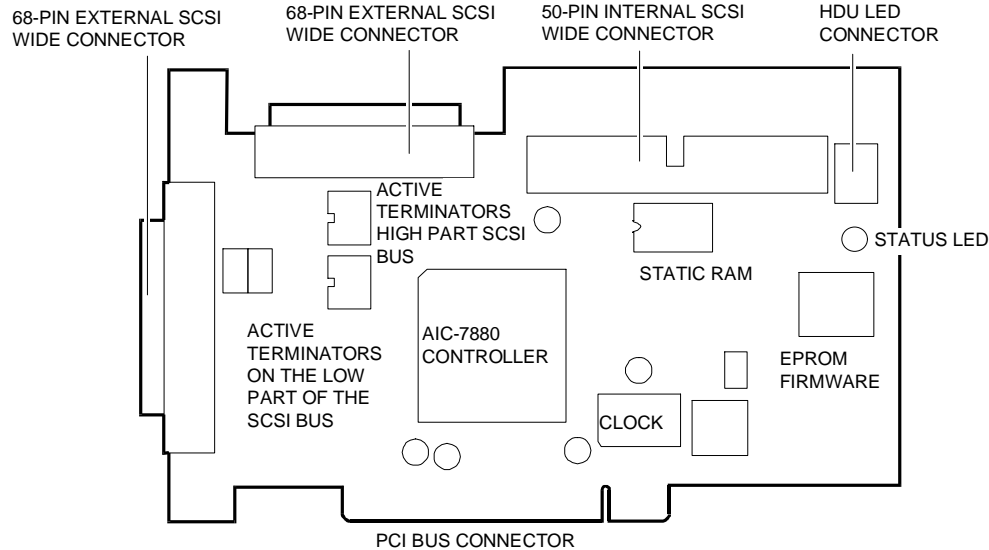
This controller provides a single-ended Ultra Wide SCSI channel and uses the Adaptec AIC-7880 chip. This chips is a bus master interface controller that can take control of the bus and transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec) while data is transferred from/to the SCSI bus at 40 MB/sc. The Ultra Wide SCSI controller is capable of doubling the data transfer rate with respect to a Fast Wide controller, always with 16-bit (Wide) operation.

There are three connectors available on this board: internal 68-pin SCSI Wide connector J1, internal 50-pin SCSI Narrow connector J4 and external 50-pin SCSI Narrow connector J5 (high density). Internal connector J1 is used for the connection of internal Wide/Ultra Wide SCSI HDUs, internal connector J2 is used for the connection of internal SCSI Narrow removable peripherals while external connector J5 is used for the connection of external SCSI Narrow peripherals excluding the PEM.

Note: *Besides Ultra Wide HDUs, also the Fast Wide HDUs can be connected to connector J3; the controller adapts itself to the type of peripheral connected and automatically reduces the speed to 20 MB/sec.*

It is not possible to connect peripherals to all three SCSI connectors simultaneously. The maximum configuration allows the connection to two of the three connectors available: to both internal connectors (Wide and Narrow), to the internal Narrow and external Wide connectors or to the internal Wide and external Wide connectors.

Note: *This controller is optional on the NetStrada 3000 (SCC PCI3000UW) and is only used in duplexing configurations or to connect external SCSI Narrow removable peripherals by means of adapter cable CBL 3000EXT. Therefore only internal connector J1 or only external connector J5 is used.*

Up to 16 devices can be connected to the SCSI Wide channel, controller included, and are managed with IDs ranging from 0 to 15; IDs from 8 to 15 are currently not used.
The SCSI controller must always have an ID of 7. This board is configured by the Setup Utility for installation, and therefore there are no jumper settings to be made on the board. The SCSI terminators are on the controller and are active; by means of the SCSI Select utility, they can be enabled or disabled on the entire bus (16-bit) or only on the high part (bits 8-15) or only on the low part (bits 0-7).
The board has a ROM BIOS containing the SCSI firmware and the SCSI Select Utility through which it is possible to configure the controller
HDU activity LED connector J3 is not used on these systems.
The board SCSI configurations are explained in Appendix L.

GO2180 (AHA 2940UW) SCSI CONTROLLER CONFIGURATION

This PCI controller is automatically configured during system power on when the default parameters or the parameters that have been changed by the SCSI Select Utility are loaded.
The SCSI Select Utility is used to configure the controller; it resides in the controller's ROM BIOS and can be activated directly from the keyboard by pressing **Ctrl-A** when the following system bootstrap message is displayed:

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Press <Ctrl><A> for SCSI Select (TM) Utility!

Note: *This utility has the same name and is very similar to the one that allows to configure the onboard SCSI controller of NetStrada 3000 and described in Appendix E. Both utilities are activated during system boot by pressing Ctrl-A. On the NetStrada 3000, the first message "Press <Ctrl><A> for SCSI Select (TM) Utility!" which is displayed makes it possible to activate the utility that allows the onboard SCSI controller to be configured while the second message makes it possible to activate the utility that allows the AHA 2940UW controller to be configured.*

The SCSI Select Utility has the following menus:

- Configure/View Host adapter Settings
    - Basic Host Adapter Settings
    - Boot Device Settings
    - SCSI Device Settings
    - Advanced Host Adapter Settings
- SCSI Disk Utilities
- Exit Menu

TO USE THE MENUS	PRESS
Exit from the menu or utility	<ESC>
Select an item	<Enter>
Return to the previous item	↑
Go to the next item	↓
Restore the default values	F6
Display in black/white or color	F5

The board settings are displayed by selecting "Configure/View Host Adapter Settings". The following table gives the board's default settings.

Basic Host Adapter Settings	Default
Host Adapter SCSI ID	7
SCSI Parity Checking	Enabled
Host Adapter SCSI Termination	Automatic
Boot Device Settings	**Default**
Boot Target ID	0
Boot LUN Number (see note 1)	0
SCSI Device Configuration	**Default**
Initiate Sync Negotiation	Yes (Enabled)
Maximum Sync Transfer Rate	20 MBytes/sec
Enable Disconnection	Yes (Enabled)
Initiate Wide Negotiation	Yes (Enabled)
Options Listed Below Have no Effect if the BIOS is Disabled	
Send Start Unit Command	No (Disabled)
Advanced Host Adapter Settings	**Default**
Plug and Play SCAM Support	Disabled
Host Adapter BIOS	Enabled
Support Removable Disks Under BIOS as Fixed Disks (see note 2)	Boot only
Extended BIOS Translator for DOS Drives > 1 GByte (see note 2)	Enabled
Display <Ctrl-A> Message During BIOS Initialization (see note 2)	Enabled
Multiple LUN Support (note 2)	Disabled
BIOS Support for More Than 2 Drives (see note 2)	Enabled
BIOS Support for Bootable CD-ROM (see note 2)	Enabled
BIOS Support for Int 13 Extensions (see note 2)	Enabled
Support for Ultra SCSI Speed	Disabled

Note 1: *The setting is only valid if "Multiple LUN Support" is enabled.*

Note 2: *The setting is only valid if "Host Adapter BIOS" is enabled.*

Basic Host Adapter Settings

Host Adapter SCSI ID - Each device on the SCSI bus, controller included, must have a unique ID. The ID defines the address of the device connected to the bus, and the reconnection priority when two or more devices try to use the bus at the same time. Each controller, 8- or 16-bit, has a default ID of 7 which means the highest priority.

Device	ID with highest priority	ID with lowest priority
8-bit devices (SCSI narrow)	7	0
16-bit devices (SCSI wide)	7 to 0	15 to 8

SCSI Parity Checking - When Enabled, the controller uses parity checking on the SCSI bus to check the correctness of the data transfer over the SCSI bus. This option must be disabled if a device on the bus does not have SCSI parity.

Host Adapter SCSI Termination — The setting of this option depends on how the SCSI channel is configured. The bus must be terminated on the first and last device connected to the SCSI bus. The possible configurations and configuration rules for this controller are described in Appendix L.
When Auto is selected, termination is enabled or disabled on the high part of the bus, on the low part of the bus or on the entire bus depending on the connectors used (all three connectors cannot be used simultaneously). The selections Low ON, High ON indicate that the termination is enabled on the low part (Low) and on the high part (High) of the SCSI bus. The selections Low OFF, High OFF indicate that the termination is disabled on the low part (Low) and on the high part (High) of the SCSI bus.

Boot Device Settings

Boot Target ID — The default boot device has a SCSI ID 0 and logical unit number (LUN) 0. To specify a different boot device, select a different SCSI ID (from 0 to 7 for 8-bit controllers, 0 to 15 for 16-bit controllers).

Boot LUN Number — If the boot device has multiple logical units, also the boot logical unit number (LUN) will have to be specified. This number can range from 0 to 7 (for 8-bit or 16-bit controllers). Multiple LUN Support can be disabled from the Advanced Host Adapter Settings menu.

SCSI Device Settings

Initiate Sync Negotiation — When enabled (Yes), the controller begins synchronous data transfer with the peripheral. Usually this parameter must always be set to Yes since the SCSI controller and the devices connected to it can transfer data faster in the synchronous mode than in the asynchronous mode. If a device does not support synchronous transfers, the controller will automatically transfer the data in asynchronous mode. If the device begins synchronous data transfer, the controller will always comply.

Initiate Wide Negotiation — When enabled (Yes), the controller transfers data in 16-bit mode instead of in 8-bit mode. When set to No, 8-bit data transfers are performed unless the peripheral requests 16-bit transfers.

Maximum Sync Transfer Rate — This setting determines the maximum data transfer rate between the controller and peripheral. if the initiate Sync Negotiation option is set to No, the maximum sync rate that can be selected is the one with which the controller accepts the data sent from the device; there is no negotiation.

Enable Disconnection — When set to Yes, the controller allows the SCSI device to temporarily disconnect itself from the bus, while the controller can continue with other operations on the bus. When set to No, the controller will not allow the SCSI device to disconnect itself.

- Leave this option set to Yes when there are two or more SCSI devices on the bus.

- Change to No when only one SCSI device is on the bus (besides the controller).

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Send Start Unit Command — Activated during system boot, it prevents all the hard disks from starting up at the same time so as to avoid overloading the power supply. The Start command for the HDUs is given sequentially and with a delay of a few seconds between the start up of one HDU and the next.

- When set to Yes (default), the controller will send the Start Unit Command individually to each SCSI device.

- When set to No, the controller will not send the Start command to the SCSI devices. The HDUs that are connected to the SCSI backplane are not jumpered to start upon reception of this command.

By enabling this option for more than one device, the controller will firstly send the command to the boot device (ID0) defined in the Boot Device Options menu. Upon reception of a responce from the first device, the controller will send the command to the remaining SCSI devices, starting from the one with the lowest SCSI ID.

Advanced Host Adapter Settings

Plug and Play SCAM Support — Determines whether the controller automatically assigns the SCSI ID to the SCSI devices connected that support the SCAM protocol. Many non-SCAM devices support the SCAM protocol any way and therefore this option can also be enabled for non-SCAM devices.

Host Adapter BIOS — Enables or disables the Host Adapter BIOS. When enabled, this option allows to:

- Boot from a SCSI hard disk connected to the host adapter

- Enable any one of the other options listed in the same menu (Advanced Host Adapter Settings), and explained further on.

- Boot from a SCSI CD-ROM. When IDE devices are selected in the boot order, these will have priority over the SCSI device.

This option can be disabled if the devices on the SCSI bus are controlled by device drivers and therefore not not require a BIOS. This frees a memory area of about 16 KB and reduces the boot by by 60 seconds. in any case, 2 KB of memory space are always reserved for PCI and P&P ISA.

Support Removable Disks Under BIOS as Fixed Disks — Controls the way in which the removable peripherals are supported by the Host Adapter BIOS. The settings are:

OPTION	DESCRIPTION
Boot Only (default**)**	Only the removable peripheral indicated as being a bootable device is regarded as a hard disk drive. The Host Adapter BIOS must be enabled.
All Disks	All the removables that are supported by the Host Adapter BIOS are regarded as hard disk drives. (For NetWare users, all the removable peripherals are automatically supported by NetWare as hard disks regardless of how this option is set.) The Host Adapter BIOS must be enabled.
Disabled	No removable peripheral is regarded as a hard disk. The software driver is required since the drives are not controlled by the Host Adapter BIOS.

WARNING: **Do not extract the support from a removable peripheral that is controlled by the Host Adapter BIOS.**

Extended BIOS Translation for DOS Drivers > 1 GByte — When enabled, the drives that are managed by the Host Adapter BIOS use Extended Translation (255 heads, 63 tracks per sector) if their formatted capacity exceeds 1 GB.

WARNING: **Backup the hard disks before changing this setting and, consequently, the translation scheme! The data are cancelled when switching from one translation scheme to the next.**

Display <Ctrl-A> Message During BIOS Initialization — When enabled, the prompt allowing the SCSI Select program to be run is displayed during the boot phase.

Multiple LUN Support — The default setting is Disabled. Enable this option if there are devices with multiple logical units.

BIOS Support for Bootable CD-ROM — When this option is enabled, the system can be booted from CD-ROM. The option is only displayed if the SCSI controller BIOS is configured to acknowledge it. To boot the system from the hard disk or from another device, disable this option or make sure that there are no bootable CDs in the drive. The default value is Enabled.

BIOS Support for Int 13 Extensions — When enabled, the Host Adapter supports HDUs with more than 1024 cylinders.

Support for Ultra SCSI Speed — The default setting is Disabled (20 MB/sec). This option is always displayed and must be enabled in order for this controller to be able to use Ultra SCSI speed (40 MB/sec).

SCSI Disk Utilities

When selecting SCSI Disk Utilities from the SCSI Select main menu, the utility will analyse the SCSI bus in search for the connected devices and will list the SCSI IDs and the devices that are associated to the bus. Select from this list the device to be formatted or verified. If the device has multiple logical units, a LUN menu will be displayed. Select the device to be formatted or verified. A small menu is displayed. Select Format Disk or Verify Disk.

UTILITY	FUNCTION	NOTE
Format Disk	Runs a low level format on the hard disk. Before it begins, a prompt is displayed asking you to confirm the hard disk formatting operation.	**WARNING:** Once formatting begins it cannot be stopped! DO NOT answer Yes unless you are absolutely sure you want to format the hard disk. Wait for the HDU LED to signal that all activies have stopped before powering off the system.
Verify Disk Media	Analyses the selected hard disk in search of faulty blocks and requests that they be reassigned.	Verification can be stopped at any time by pressing the <Esc> key.

Exiting SCSI Select

To exit from SCSI Select, press the ESC key until a message is displayed indicating that you can exit; if any parameter has been changed, save the changes made before exiting. At the prompt, select Yes to exit and the following message is displayed:
Please press any key to reboot
The changes made will take effect once the system has been booted.

BOARD GO2180 EVOLUTION

DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
12/96	Nasc	1.23	212859 B	New board. The SCSI BIOS resides on the board.	Factory

C

# SINGLE-CHANNEL EISA RAID DPT GO2044 NARROW SCSI CONTROLLER

This high performance SCSI controller consists of a main board and two additional boards inserted in the reserved connectors on the main board. These three boards are:

- Main board PM3122/90, EISA full size.
- Caching module CM4000.
- Disk array module DM4000.

When combined to the structures of the SNX 140/R, 160/R systems or to the PEM 100/R, this controller allows a faulty hard disk drive to be hot-swapped. This means that the disk can be replaced without halting system activities, and the data automatically reconstructed. The controller can manage HDU RAID-0, RAID-1 and RAID-5 arrays. The Storage Manager SCSI Utility is provided on diskette so that the subsystem hosting this controller can be correctly managed. It is suggested that the GO2044 boards be installed in the motherboard slots in sequence, in other words occupying adjacent slots without leaving any free slots between one board and the next, or without leaving a different board between two identical controllers. Any board between two controllers must be relocated. This controller is also available in an optional kit which can be used so that non-resilience systems can also be able to manage the hot-swapping of HDUs in an external PEM. This optional controller can also be purchased to simply connect the HDUs in the basic module of a non-resilience system. In this case only RAID features are used, and not the hot-swapping of hard disks.

Note: *This board's SCSI configurations are given in Appendix I.*

MAIN BOARD PM3122/90
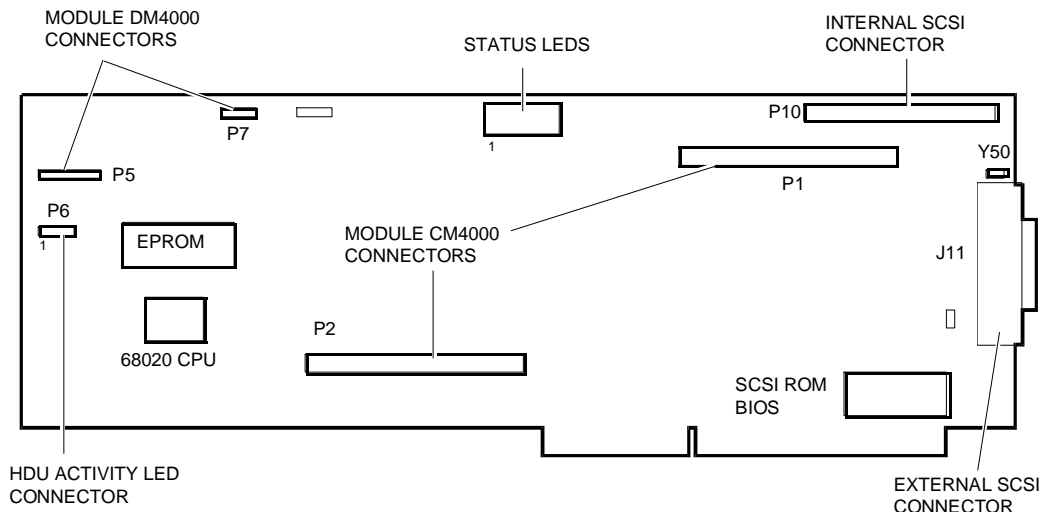
Two SCSI Narrow connectors are available on this board: internal 50-pin connector P10 and external (high density) connector J11. The internal connector is used for the connection of internal SCSI peripherals, while the external connector is only used for the connection of the optional external PEM 100/R. It is unadvised to connect removable external SCSI peripherals. During installation this controller is configured by means of the ECU and Storage Manager Utility. This board has only one configuration jumper which will be described further on.

The SCSI terminators are on the controller, are active and always enabled. The terminators can be enabled or disabled via software only through the ECU.
Connector P6 reserved for the HDU activity LED on the system console is connected only in non-resilience systems. This connector is not used in resilience systems or in systems attached to a PEM since the same function is performed by the SCSI BUSY LED on the system console.

JUMPERS

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On the controller there is only one configuration jumper called Y50. The controllers always supply power to their own on-board SCSI terminators and are configured by default to supply power to other devices through the TERMPWR signal. The terminators on resilience systems must be powered through the TERMPWR signal provided by the controller, and therefore jumper Y50 must always be inserted (ON position).

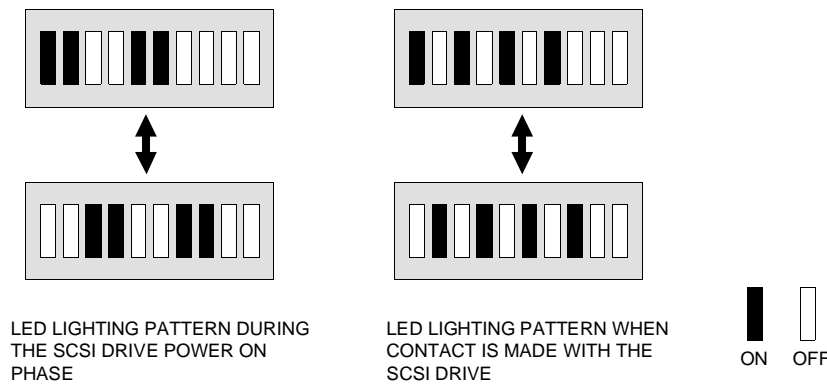| JUMPER Y50	DESCRIPTION
ON (default) OFF	The controller supplies power to the external terminators. The controller does not supply power to the external terminators.

STATUS LEDs

On the board there are 10 LEDs that indicate the state of the controller. The following states are indicated by these LEDs:
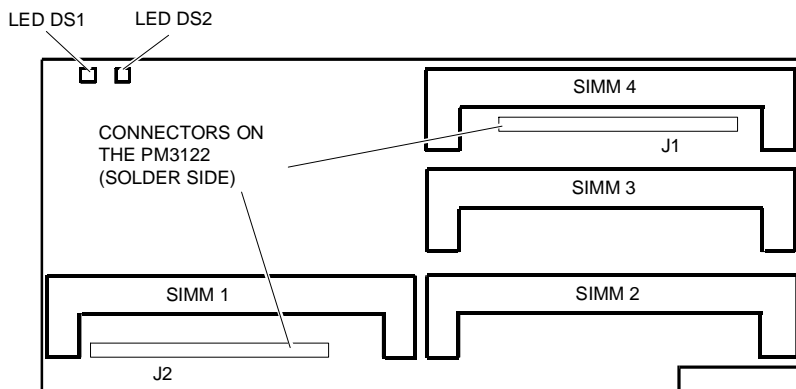
- **LED Display During Controller Idle State:** When there are no commands in progress and all SCSI activities have ceased, the controller enters the idle state. This is indicated by the sequential lighting of LEDs 1 to 8, and their successive turn off from LED 8 to 1.

- **LED Display During Controller Active State:** By viewing these LEDs, you can determine information on the following functions:
  - LED 1   Busy
  - LED 2   System bus transfer to the SCSI controller
  - LED 3   SCSI controller transfer to the system bus
  - LED 4   Cache Hit
  - LED 5   Disk Read-Ahead active
  - LED 6   Disk read
  - LED 7   Disk write
  - LED 8   SCSI controller reset
  - LED 9   Interrupt pending to system
  - LED 10   DRQ asserted

  Detailed information on how to interpret the meaning of the combination of these LEDs is given in the section entitled GO2044 SCSI Controller Troubleshooting.

- **LED Display During Power-On:** During the power on sequence, the 10 LEDs display the amount of cache memory present. The cache size in megabytes is displayed as a binary pattern of the LEDs on. LED 1, the left most LED, represents the least significant bit. For example, if 4 MB of cache memory are installed LED 3 will come on, if 12 MB are installed LEDs 3 and 4 will come on.
  After about one second the controller will enter a pre-configuration state. In this state, the LEDs will come on at a frequency of three times per second and in a rotating pattern. This rotating pattern will continue until the controller has been configured by the EISA BIOS power on routine. If the ECU has not yet been run after the installation of the controller, the fast rotating pattern of the LEDs will continue. If the controller has been properly installed and the ECU run, the configuration will last from 2 to 10 seconds after power on. After this phase all the controllers will enter a 15-second waiting period in order to give all the SCSI peripherals time to power on. During this period LEDs 1, 2, 5, 6 and LEDs 3, 4, 7, 8 will alternately flash. After this 15-second waiting period, the controller then attempts to establish contact with the SCSI drives. During this period LEDs 1, 3, 5, 7 and LEDs 2, 4, 6, 8 will alternately flash.
  Once contact has been established with the drives or after a 20-second time-out, the controller will enter the idle state and all LEDs will flash in a slower rotating pattern with a frequency of one time per second.

LED LIGHTING PATTERN DURING THE SCSI DRIVE POWER ON PHASE

LED LIGHTING PATTERN WHEN CONTACT IS MADE WITH THE SCSI DRIVE

ON   OFF

CM4000 CACHING MODULE

LED DS1   LED DS2

CONNECTORS ON THE PM3122 (SOLDER SIDE)

SIMM 4

J1

SIMM 3

SIMM 1

SIMM 2

J2

This caching module has four sockets that can accomodate either standard, 36-bit, single-sided SIMMs with parity checking or ECC SIMMs. 1 MB, 4 MB or 16 MB standard SIMMs can be installed, while 4 MB or 16 MB ECC SIMMs can be installed to reach a maximum 64 MB capacity.
If a memory error is detected while using standard SIMMs, the controller will report an error to the system and continue its own operations with the DS1 red fault LED on. If a memory error is detected while using ECC SIMMs, the green DS2 LED will come on and all the data in transit through the memory are proteted by ECC and all errors are automatically corrected by the controller.

The caching module can also use SIMMs of other sizes as long as socket number 1 contains the ones with higher capacity. It is also possible to combine ECC SIMMs and SIMMs with parity checking; in this case only the data stored in ECC memory will be protected, so make sure that only SIMMs with parity checking are installed in socket 1.

These systems have a 4 MB basic cache memory capacity which is provided by a 4 MB ECC SIMM installed in socket number 1. Other expansion SIMMs (each SIMM kit is named RACME 04) can be installed in sockets 2, 3 and 4 to reach a maximum 16 MB cache memory. Only 4 MB or 16 MB configurations are supported.

DM4000 DISK ARRAY MODULE
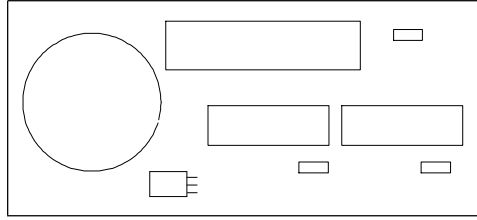
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With the DM4000 disk array module and the CM4000 disk caching module, SCSI controllers can configure hard disk drives into RAID-0, RAID-1 (mirroring) or RAID-5 arrays, providing high performance and disk-fault tolerance. The DM4000 disk array module works only if the CM4000 disk caching module is installed. The following table lists the characteristics offered by the different types or arrays supported:

RAID Level	Disk-Fault Tolerant	Storage Efficiency	Performance	Cost	Number of Drives
RAID-0	No	Best	Best	Minimal	Two or more
RAID-1	Yes	Poor	Best read, good write performance	High	Even number
RAID-5	Yes	Good	Good read, poor write performance	Average	Three or more

To configure the drives in RAID-0, RAID-1 and RAID-5 arrays, provided with the system's User Diskette are the diskettes containing the SCSI Storage Manager Utility. This utility makes it possible to setup the disk array by means of a graphical interface.

GO2044 CONTROLLER TROUBLESHOOTING AND ERROR MESSAGES

PROBLEM	POSSIBLE SOLUTION
The message "SCSI BIOS ROM copyright" appears twice at power on.	1. The system BIOS may be incorrectly shadowing the SCSI BIOS ROM as a video BIOS ROM. Disable all shadowing through the system's setup. If the problem is still present, then re-enable shadowing. 2. More than one GO2044 controller is installed in the system, but only one of these must have its SCSI BIOS ROM enabled. Check by running the ECU.
When the SCSI BIOS displays the SCSI devices at power on, one device appears at all seven SCSI IDs.	One of the SCSI devices has been set to the same ID as the SCSI controller. The ID of the controller must always be set to 7, so make sure that all the other devices have a different ID.
The message "Warning: SCSI BIOS ROM version is later than this driver version" is displayed during the DOS bootstrap routine.	This message is displayed when the revision of the SCSI BIOS is newer than the revision of DPTDDL.SYS. The revision level of DPTDDL.SYS must be equal to or newer than the SCSI BIOS ROM revision. Update the revision of DPTDDL.SYS.
During normal operations under Novell Netware, the message "DPT CTRL **h** DISK **d** resetting controller" is displayed where **h** is the number of the SCSI controller and **d** is the SCSI device ID.	Whenever a SCSI device does not respond to a request from the SCSI controller, the controller will reset the device, retry the request and display the message. Check the connections of the SCSI cable and its terminations, otherwise it may be that the SCSI device or cable is probably faulty.

PROBLEM	POSSIBLE SOLUTION
The SCSI controller does not respond during bootstrap after the message "SCSI BIOS ROM copyright" is displayed, and LEDs 1 and 2 or 1, 2 and 10, remain lit on the controller.	The SCSI bus is improperly terminated, so proceed and check.
The message "Cannot Enable A20" is displayed when running Storage Manager under DOS.	Load HIMEM.SYS by adding the following string to the CONFIG.SYS file: 　　DEVICE = HIMEM.SYS
LEDs 1-8 rotate light in a very fast back and forth rotating pattern and the message "EISA Configuration Error" is displayed.	This LED pattern indicates the the SCSI controller has not been configured by the ECU. Proceed with configuration. The LED pattern is also displayed when the SCSI controller is correctly configured but the SCSI bus is not properly terminated.
Different LEDs in the 1-4 range on the SCSI controller flash once per second and the controller does not respond.	This LED pattern indicates an internal error in the SCSI controller's microprocessor. Remove all SCSI devices connected to the controller, the SCSI cable and try again. If the error is cleared, reconnect the devices, one at a time, until the faulty cable or device is identified. This LED pattern can also be displayed in case a faulty firmware EPROM is detected during normal operation. Check the EPROM's contacts on the socket. If the error persists, replace the SCSI controller.
LEDs 1, 2 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that there are no SIMMs in socket 1 of the CM4000 caching module. Socket 1 must always contain SIMMs with the higher capacity.
LED 9 (and any other LEDs) remains lit on the SCSI controller but the controller does not respond. This may occur when Microsoft Windows 3.1 is loaded.	LED 9 indicates that the controller's IRQ is pending. This usually means that there is an interrupt conflict with another controller. Make sure that a different IRQ is assigned to each board. When running Windows 3.1, add the following string to the SYSTEM.INI file, under the 386ENH section: 　　VirtualHDIrq=OFF Alternatively, if you do not want to modify the SYSTEM.INI file, Windows can be started with WIN /D:V.
LEDs 2 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that socket 1 on the CM4000 caching module does not contain SIMMs with the higher capacity. Reinstall the SIMMs so that socket 1 contains those of higher capacity.
LEDs 3 and 8 on the SCSI controller light up once per second at power on and the controller does not respond.	This LED pattern indicates that SIMMs with parity and ECC SIMMs are installed on the CM4000 caching module and socket 1 does not contain those with parity. Reinstall the SIMMs so that socket 1 contains those with parity, or avoid mixing SIMMs with parity and ECC SIMMs.
Other LED patterns on the SCSI controller not indicated above light up once per second at power on and the controller does not respond.	This indicates an error has occurred in the firmware of the SCSI controller. To determine the cause, activate storage manager (from floppy disk, if necessary) while the LEDs are still flashing. A description of the problem and possible solutions will be displayed upon entering the program.

EISA RAID DPT GO2044 SCSI CONTROLLER CONFIGURATION

The GO2044 controller's configuration file is stored in the System Configuration diskette and is called !DPTA410.CFG. Configuration is performed by activating the EISA Configuration Utility from User Disk, and the configuration parameters displayed when selecting the GO2044 SCSI controller are listed below. Other parameters needed to correctly configure the SCSI subsystem are contained in the Storage Manager Utility, described in Appendix F.

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- **WD1003 Boot Address   Disabled (Secondary)**
  Alternate setting: Enabled at Primary.
  By default, the controller will not respond to the standard ISA addressing for WD1003 controllers of 1F0-1F7h. However, some operating systems will require the controller to be configured for WD1003 emulation (see the note at the end of this section).

- **Interrupt Number   15 Level**
  Alternate settings: 11 Level, 14 Level, 15 Edge, 11 Edge, 14 Edge.
  Most operating systems share level-triggered IRQ15 between among all the GO2044 controllers in the system. However, some operating systems require alternate settings (see the note at the end of this section).

- **SCSI BIOS ROM Address   Enabled at C8000h**
  Alternate settings: Disabled, Enabled at D8000h.
  Each controller has its own SCSI BIOS ROM. If more than one GO2044 controller is installed in the system, the SCSI BIOS ROM of only one of these controllers will be used. Therefore, make sure that this setting is enabled on only one of these controllers and disabled on all the others.
  The GO2044 controller's default address is C8000h. To avoid conflicts with other other boards, change this address to D8000h. In case an HDU controller is mapped at a lower address than the GO2044, it will become the boot controller. On the contrary, for the GO2044 to become the boot controller its ROM has to be mapped at lower addresses than the other HDU controllers.
  Go to the Advanced Configuration Method to set this new parameter.

- **Host Bus Adapter SCSI ID   7**
  Alternate settings: 0, 1, 2, 3, 4, 5, 6.
  By default, the SCSI ID adapter is set to 7 and must not be changed.

- **Maximum Transfer Rate   10 MB/s**
  Alternate settings: 8 MB/s, 5 MB/s, Asyncronous.
  The controller can handle SCSI peripherals with different transfer speeds, as well as both synchronous and asynchronous protocols, on the same bus. At power on the controller and peripheral automatically determine the optimum transfer speed, which coincides with the default value which is usually
  10 MB/s. This setting should not be changed except during troubleshooting of SCSI bus errors. Setting the maximum transfer speed down to 5 MB/s will eliminate errors on the SCSI bus; this usually means that a SCSI cable of the wrong length is used or that there are termination problems.

- **External Cable Detection   Disabled - 10 MB/s**
  Alternate settings: Enabled - 5 MB/s.
  When Enabled, if the controller detects the presence of an external SCSI cable, it will automatically reduce he maximum transfer speed to 5 MB/s for internal and external peripherals. This option is useful since many external connections made with long connection cables are unable to guarantee the integrity of the data on the SCSI bus at transfer speeds above 5 MB/s. These systems will only connect externally to PEMs which only support maximum transfer speeds of 10 MB/s (depending on the length of the cable). In this case the External Cable Detection parameter must be set to Disabled.

- **SCSI Termination**   **Enabled**
  Alternate setting: Disabled.
  The terminators on the controller must always be enabled unless internal peripherals or an external PEM are connected. Turn to the termination rules given in Appendix I.

- **Command Queuing**   **Enabled**
  Alternate setting: Disabled.
  The controller supports command queuing. This feature allows the controller to transfer up to 64 SCSI commands to a single device if that device will accept queued commands. The alternate setting Disabled is not necessary in the majority of cases since the controller and peripheral will together determine the possibility of using the command queuing feature.

- **Command Timeout**   **Enabled**
  Alternate setting: Disabled.
  The controller automatically defines a timeout period within which it will wait for a reply from the SCSI device that received the SCSI command sent by the controller itself. If there is no reply, then the controller will reset the bus and send the command once again. If this feature is disabled, the controller will continue to wait an undetermined period of time for a reply from the SCSI device.

- **Cache**   **Read and Write Caching (Write-Back)**
  Alternate settings: Read Caching Only (Write-Through), Caching Disabled.
  The default setting offers the best performance as it enables the controller's read and write caching functions and allows the controller to immediately respond to write commands from the system, postponing the transfer of data to disk.
  Read Caching Only (Write-Through) enables the controller's read caching functions so that any write data sent to the controller will be immediately written to the hard disk, just as if there was no cache on the controller. Caching Disabled actually disables all caching functions and is equivalent to physically removing the cache from the controller.

- **Maximum Percentage Dirty**   **80%**
  Alternate setting: 50%.
  Dirty data is data which have been sent to the controller by the system but have not yet been copied to disk. Whenever the controller is in the idle state, all dirty data in the cache will be automatically copied onto disk. However, when the controller is performing other operations, the controller cache will begin to fill up with dirty data. This option determines the maximum amount of controller cache memory which can contain dirty data before forcing write operations to disk. Once the limit is reached, the controller will copy all the data onto disk until the limit is reached once again.

- **Max. Percentage Read-Ahead**   **30%**
  Alternate setting: 80%
  Read-ahead is a feature that allows to speed-up the system's read operations. When data are read from disk, the SCSI controller will not only read the data requested by the system but will perform a number of successive reads with the supposition that the system will eventually request this data to be then cached. In this way the next time the system requests data, this data, if already cached, will be immediately sent to the system thus reducing the operating times to the simple transfer of data from cache to the system. This operation determines the maximum percentage of cache memory which can contain read-ahead data.

- **Read-Ahead**   **Enabled**
  Alternate setting: Disabled.
  This parameter enables or disables the controller's read-ahead function. Eight blocks of read-ahead data are transferred into the controller cache following a normal read operation.

- **Long Record Caching   Disabled**
  Alternate setting: Enabled.
  This option determines the longest read or write request that will be cached by the
  controller, to prevent long I/O operations. The default setting disables the read or write
  caching of more than 16 blocks (8 KB). The alternate setting Enabled allows any
  cache I/O operation to be accepted.

- **Caching Parameters   EISA Config Override**
  Alternate setting: Use Values Stored on Device.
  If the Storage Manager SCSI utility is used to set caching parameters (feature
  currently not available), this option must be set to "Use Values Stored on Device". If
  the ECU is used, this option must be set to EISA Config Override.

- **!DPTA410.CFG Version**
  Displays the release of the configuration file.

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Notes on operating systems when more than one GO2044 controller are used

Most operating systems, including those listed below, can support an unlimited number of
GO2044 controller boards. The IRQ value for all controllers must be set to its default
level-triggered IRQ15. (Refer to the READ.ME or OLIREAD.ME files for any changes with
respect to the information in this manual.)

- OS/2 2.x.

- Windows NT.

- Novell NetWare.

- SCO Unix 3.2.4.2 or later.

- UnixWare.

- Olivetti Unix System V Rel. 4.0.

Also SCO Unix 3.2.2 and 3.2.4.0 and Banyan VINES 5.53 or later, can support an
unlimited number of GO2044 controllers. These operating systems, however, use the
WD1003 emulation during bootstap. In this case, launch the ECU and set the WD1003
boot addresses as "Enabled at Primary" for the boot controller or as "Disable" for all other
controllers, then set the IRQ as indicated below:

- First controller: IRQ14 Edge
- All other controllers: IRQ15 Level

BOARD GO2044 (P.c.b. Code PM3122: pc-0215-005-A1) EVOLUTION

DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
2/95	Nasc	6C2	588864 S	Smart ROM rel. 002.D8	Factory
3/95	AG	6C2		The "BIFIFO" VLSI component has been replaced with the "BIFIFO" LSI Logic component and some wrings have been made on the CM4000 board.	Factory
5/95	01	6C4		The firmware "Hot Spare" function and RAID 0 management have been introduced.	Factory
8/95	02	6C7		Firmware replaced to solve the following problems: - Random system hangs during the boot phase caused by incorrect routine timer programming. - In the NT environment some DATs were not identified and consequently declared as being non operational.	Factory

PCI RAID DPT SINGLE/TRI-CHANNEL GO2061 SCSI NARROW CONTROLLER

This high performance PCI SCSI controller consists of a single-channel main board PM3224 to which the following can be added:

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- Board SX4000/1 (IF2020) providing an additional SCSI Narrow channel to the main board.
- Board SX4000/2 (IF2021) providing two additional SCSI Narrow channels to the main board.
- 4 MB SM4000/4 (ME 2027 code 562227 Y) cache expansion ECC SIMMs.

In the basic system configuration, this controller provides a Fast Single-Ended SCSI Narrow channel and uses the Motorola 68030 microprocessor. This microprocessor is a bus master interface controller that can transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 10 MB/sec.
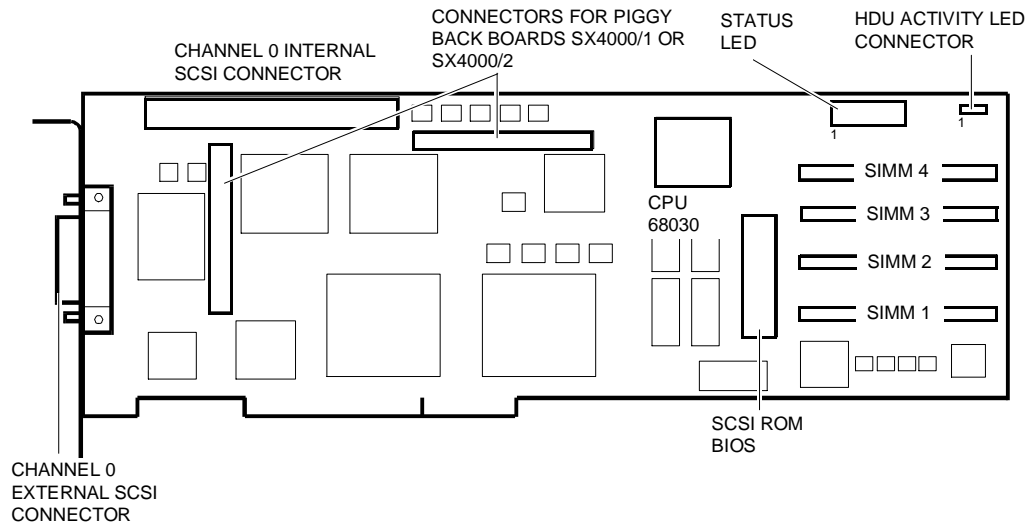
When combined to the structures of resilience systems or to the PEM, this controller allows a faulty hard disk drive to be hot-swapped. This means that the disk can be replaced without halting system activities, and the data automatically reconstructed on the new disk. The controller can manage HDU RAID-0, RAID-1 and RAID-5 arrays. The Storage Manager SCSI Utility is provided on diskette so that the subsystem hosting this controller can be correctly managed.

The controller SCSI ROM BIOS is installed on the board. If more than one GO2061 controllers are installed in the system, the SCSI ROM BIOS of only one of these boards will be used. The system BIOS will take care of optimizing the area in which the ROM is mapped so as to avoid conflicts with other boards.

This controller is also available in an optional kit (DCR PCI1/3) to manage a greater number of HDUs in PEM modules or to convert a non-resilience system into a resilience version. This optional controller can also be purchased to simply connect the HDUs in the basic module of a non-resilience system. In this case only RAID features are used, and not the hot-swapping of hard disks.

Note: *This board's SCSI configurations are given in Appendices I and J .*

MAIN BOARD PM3224

CHANNEL 0 INTERNAL SCSI CONNECTOR

CONNECTORS FOR PIGGY BACK BOARDS SX4000/1 OR SX4000/2

STATUS LED

HDU ACTIVITY LED CONNECTOR

SIMM 4
SIMM 3
SIMM 2
SIMM 1

CPU 68030

SCSI ROM BIOS

CHANNEL 0 EXTERNAL SCSI CONNECTOR

Two 50-pin SCSI Narrow connectors are available on this board: an internal connector and an external (high density) connector. The internal connector is used for the connection of internal SCSI peripherals while the external connector is only used for the connection of the optional external Narrow PEM. It is not possible to connect to external peripherals other than the PEM.

Up to eight devices can be connected to the SCSI Narrow channel, controller included. These devices are assigned IDs ranging from 0 to 7, where the SCSI controller must always have an ID of 7. During installation this board is configured by means of the DPT Configuration Utility which is activated during the system bootstrapping phase. There are no jumper settings to be made on the board.
SCSI terminators are on the board. These are active and are usually always enabled. The terminators can only be enabled or disabled by means of the DPT Configuration Utility.
The connector reserved for the HDU activity LED on the system console is only connected in non-resilience systems. This connector is not used in resilience systems or in systems attached to a PEM since the same function is performed by the SCSI BUSY LED on the system console.
This controller has four sockets which can host 4 MB ECC SIMMs for a maximum board memory capacity of 16 MB.
The amount of cache present in the module can be checked by running the Storage Manager Utility or by reading the POD messages at system power on.
This system has a basic 4 MB cache capacity provided by a single 4 MB ECC SIMM installed in socket 1. This memory capacity can be expanded to 16 MB by installing other expansion SIMMs (each kit with a single SIMM is denominated RACME 04) in sockets 2, 3 and 4. Only 4 MB or 16 MB memory configurations are handled.
The PM3224 controller can configure the hard disk drives in RAID-0, RAID-1 (mirroring) or RAID-5 arrays, providing high performance and fault tolerance. The following table lists the characteristics offered by the different types of arrays supported:

RAID Level	Disk-Fault Tolerant	Storage Efficiency	Performance	Cost	Number of Drives
RAID-0	No	Best	Best	Minimal	Two or more
RAID-1	Yes	Poor	Best write, good read	High	Even number
RAID-5	Yes	Good	Good read, poor write	Average	Three or more

To configure the drives in RAID-0, RAID-1 and RAID-5 arrays, provided with the system's User Diskette are the diskettes containing the SCSI Storage Manager Utility. This utility makes it possible to setup the disk array by means of a graphical interface (turn to Appendix F).

STATUS LEDS

On the board there are 10 LEDs that indicate the state of the controller. The following states are indicated by these LEDs:
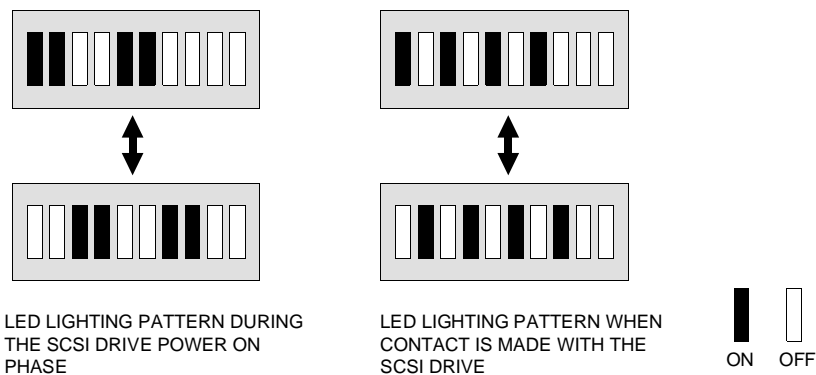
- **LED Display During Controller Idle State:** When there are no commands in progress and all SCSI activities have ceased, the controller enters the idle state. This is indicated by the sequential lighting of LEDs 1 to 8, and their successive turn off from LEDS 8 to 1.

- **LED Display During Controller Active State:** By viewing these LEDs, you can determine information on the following functions:
  - LED 1   Busy
  - LED 2   System bus transfer to the SCSI controller
  - LED 3   SCSI controller transfer to the system bus
  - LED 4   Cache Hit
  - LED 5   Disk Read-Ahead active
  - LED 6   Disk read
  - LED 7   Disk write
  - LED 8   SCSI controller reset
  - LED 9   Interrupt pending to system
  - LED 10   DRQ asserted

  Detailed information on how to interpret the meaning of the combination of these LEDs is given in the section entitled GO2061 SCSI Controller Troubleshooting and Error Messages.
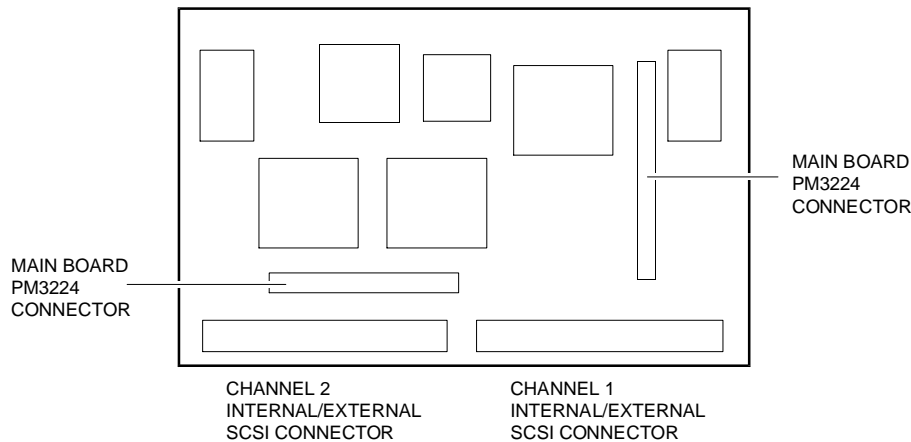
- **LED Display During Power-On:** During the power on sequence, the 10 LEDs display the amount of cache memory present. The cache size in megabytes is displayed as a binary pattern of the LEDs on. LED 1, the left most LED, represents the least significant bit. For example, if 4 MB of cache memory are installed LED 3 will come on, if 12 MB are installed LEDs 3 and 4 will come on.
  After about one second the controller will enter a pre-configuration state. In this state, the LEDs will come on at a frequency of three times per second and in a rotating pattern. After this phase all the controllers will enter a 15-second waiting period in order to give all the SCSI peripherals time to power on. During this period LEDs 1, 2, 5, 6 and LEDs 3, 4, 7, 8 will alternately flash. After this 15-second waiting period, the controller then attempts to establish contact with the SCSI drives. During this period LEDs 1, 3, 5, 7 and LEDs 2, 4, 6, 8 will alternately flash.
  Once contact has been established with the drives or after a 20-second time-out, the controller will enter the idle state and all LEDs will flash in a slower rotating pattern with a frequency of one time per second.

LED LIGHTING PATTERN DURING THE SCSI DRIVE POWER ON PHASE

LED LIGHTING PATTERN WHEN CONTACT IS MADE WITH THE SCSI DRIVE

ON   OFF

PIGGY BACK BOARDS SX4000/1 (IF2020) AND SX4000/2 (IF2021)

Note: *The SCSI channel 2 connector is not available on the SX4000/1 board.*

Piggy Back Boards SX4000/1 and SX4000/2 make it possible to upgrade the PM3224 board with one or two SCSI Narrow channels. The additional channels have the same characteristics as the primary channel, and are used as external channels for connecting the Narrow PEM. The board is plugged into the two reserved connectors on the main board, while the configuration of the board with the two additional channels (SCSI ID, termination, etc.) is made by running the DPT Configuration Utility during the system POD.

The configuration of the disks (RAID 0, 1, 5) connected to the controller's SCSI channels is always made using the Storage Manager Utility. Mirroring (RAID-1) is possible, for example, between HDUs connected to channel 0 and those connected to channel 1.

Kit EXP 2NDSCSI contains the SX4000/1 board, the EPROM with the updated firmware for the PM3224 board, the connector and the internal SCSI cable for connecting the board to the rear of the case.

Kit EXP 2&3SCSI contains the SX4000/2 board, the EPROM with the updated firmware for the PM3224 board, two connectors and two internal SCSI cables for connecting the board to the rear of the case.

Note: *The first version of the GO2061 controller uses firmware release 6C6 and is a single-channel version only. Firmware release 7EB or later is required for multi-channel management. The updated firmware is stored in a 256 KB EPROM (the 6C6 firmware is stored in a 128 KB EPROM) which is provided in all Piggy Back board kits.*

GO2061 CONTROLLER TROUBLESHOOTING AND ERROR MESSAGES

PROBLEM	POSSIBLE SOLUTION
Data errors occur during transfer.	Using the DPT Configuration Utility, set the SCSI Xfer Rate parameter to 5 MHz. If the errors are cleared, this may indicate an inappropriate termination or SCSI cable length.
The message "SCSI BIOS ROM copyright" appears twice at power on.	The system BIOS may be incorrectly shadowing the SCSI BIOS ROM as a video BIOS ROM. Disable all shadowing through the system's setup. If the problem is still present, then re-enable shadowing.
When the SCSI BIOS displays the SCSI devices at power on, one device appears at all seven SCSI IDs.	One of the SCSI devices has been set to the same ID as the SCSI controller. The ID of the controller must always be set to 7, so make sure that all the other devices have a different ID.

PROBLEM	POSSIBLE SOLUTION
The message "Warning: SCSI BIOS ROM version is later than this driver version" is displayed during the DOS bootstrap routine.	This message is displayed when the revision of the SCSI BIOS is newer than the revision of DPTDDL.SYS. The revision level of DPTDDL.SYS must be equal to or newer than the SCSI BIOS ROM revision. Update the revision of DPTDDL.SYS.
During normal operations under Novell Netware, the message "DPT CTRL **h** DISK **d** resetting controller" is displayed where **h** is the number of the SCSI controller and **d** is the SCSI device ID.	Whenever a SCSI device does not respond to a request from the SCSI controller, the controller will reset the device, retry the request and display the message. Check the connections of the SCSI cable and its terminations, otherwise it may be that the SCSI device or cable is probably faulty.
The SCSI controller does not respond during bootstrap after the message "SCSI BIOS ROM copyright" is displayed, and LEDs 1 and 2 or 1, 2 and 10, remain lit on the controller.	The SCSI bus is improperly terminated, so proceed and check.
The message "Cannot Enable A20" is displayed when running Storage Manager under DOS.	Load HIMEM.SYS by adding the following string to the CONFIG.SYS file: DEVICE = HIMEM.SYS
LED 9 (and any other LEDs) remains lit on the SCSI controller but the controller does not respond. This may occur when Microsoft Windows 3.1 is loaded.	LED 9 indicates that the controller's IRQ is pending. This usually means that there is an interrupt conflict with another controller. Make sure that a different IRQ is assigned to each board. When running Windows 3.1, add the following string to the SYSTEM.INI file, under the 386ENH section: VirtualHDIrq=OFF If you do not want to modify the SYSTEM.INI file, Windows can be started with WIN /D:V.
Different LEDs in the 1-4 range on the SCSI controller flash once per second and the controller does not respond.	This LED pattern indicates an internal error in the SCSI controller's microprocessor. Remove all SCSI devices connected to the controller, the SCSI cable and try again. If the error is cleared, reconnect the devices, one at a time, until the faulty cable or device is identified. This LED pattern can also be displayed in case a faulty firmware EPROM is detected during normal operation. Check the EPROM's contacts on the socket. If the error persists, replace the SCSI controller.
LEDs 1, 2 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that there are no SIMMs in socket 1 of the CM4000 caching module. Socket 1 must always contain SIMMs with the higher capacity.
LEDs 2 and 8 onthe SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that socket 1 on the CM4000 caching module does not contain SIMMs with the higher capacity. Reinstall the SIMMs so that socket 1 contains those of higher capacity.
LEDs 3 and 8 on the SCSI controller light up once per second at power on and the controller does not respond.	This LED pattern indicates that SIMMs with parity and ECC SIMMs are installed on the CM4000 caching module and socket 1 does not contain those with parity. Reinstall the SIMMs so that socket 1 contains those with parity, or avoid mixing SIMMs with parity and ECC SIMMs.
Other LED patterns on the SCSI controller not indicated above light up once per second at power on and the controller does not respond.	This indicates an error has occurred in the firmware of the SCSI controller. To determine the cause, activate storage manager (from floppy disk, if necessary) while the LEDs are still flashing. A description of the problem and possible solutions will be displayed upon entering the program.
The controller has access to the SCSI HDU but the amber HDU Fault LED does not flash during boot and the controller does not detect HDU swapping or cabinet errors.	The status signals are not correctly received by the controller. One reason may be that the another SCSI device is connected to the external SCSI cable. In this case the device will usually put these signals to ground.

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PCI RAID DPT GO2061 SCSI CONTROLLER CONFIGURATION

These PCI boards are automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the following configuration programs:

- EISA Configuration Utility, which allows the modification of the resources assigned

- DPT Configuration Utility, which allows the configuration to be changed.

It is suggested that you use the ECU instead of the ROM Setup Utility.

EISA Configuration Utility

- Activate the EISA Configuration Utility.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
  "Slot xx PCI SCSI Controller
  PCI Function x   Enabled.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is a RAID DPT board, Vendor ID 1004a400 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

  – **Port Address**: displays the I/O address.

  – **Memory Address**: displays the memory address range.

  – **Memory Amount**: displays the amount of memory occupied.

  – **Interrupt**: displays the IRQ assigned to the SCSI controller.

  It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- The other controller configuration parameters can be accessed by means of the DPT Configuration Utility.

DPT Configuration Utility

Note: *The default values can be automatically set by means of the F9 key.*

Note: *Some of the configuration values of each single RAID controller are stored in a non-volatile memory on the controller itself.*

The configuration utility for RAID DPT controllers can only be activated at power on. Upon completion of the DPT controller autodiagnostics, the following message is displayed for a few seconds:

<Ctrl-D> for DPT Configuration Utility

Pressing the CTRL-D key while the system is in idle activates the board's Configuration Utility which displays all the RAID DPT SCSI boards installed in the system. Select the board to be configured and press Enter.

The following options are available:

- **HBA I/O Address**:   **Auto**
  Alternate settings: 170 H, 230 H, 330 H, 1C88 H, 2C88 H, 3C88 H, ... FC88 H
  The default Auto setting allows the board to be self-configured by the Plug & Play
  BIOS to any I/O address as long as the operating system is equipped with the Plug &
  Play driver. If it is not, select one of the alternative addresses. In case problems occur
  with the OS/2 operating system, select address 330 H instead of Auto.

- **PCI Parity**:   **Enabled**
  Alternate setting: Disabled.
  Parity checking on the PCI bus is enabled by default by the RAID controller.

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- **SCSI Cmd Queing**:   **Enabled**
  Alternate setting: Disabled.
  The RAID controller supports SCSI command queuing. This feature makes it possible
  to transfer up to 64 SCSI commands to a single SCSI device if it accepts the
  command queue.

- **PCI Xfers/Burst**   **Auto**
  Alternate settings: 32, 64, 128
  This parameter specifies the minimum number of 4-byte words which can be
  transferred by the RAID controller to the peripheral by means of a PCI bus master
  burst. The controller will wait until enough transfer data has been accumulated before
  requesting the bus.

- **Extended PCI REQ**   **Disabled**
  Alternate setting: Enabled.
  This setting controls the duration of the PCI bus request. The Disabled default setting
  forces the RAID controller to release the bus more frequently. The alternate setting
  enables the bus request signal for the entire duration of the transfer, but occupies the
  bus until either the transfer is completed or until the controller is forced to relinquish
  the control of the bus to another bus master or to the latency timer.

- **HBA SCSI ID - Bus 0**   **7**
  HBA SCSI ID - Bus 1   **7**
  HBA SCSI ID - Bus 2   **7**
  Alternate settings: 0, 1, 2, 3, 4, 5, 6
  The controller ID of each SCSI channel on the controller is set by default to 7 and
  must not be changed. If the SX4000 piggy back board is not present, the settings for
  channels 1 and 2 are ignored.

- **SCSI Termination - Bus 0**   **Enabled**
  SCSI Termination - Bus 1   **Enabled**
  SCSI Termination - Bus 2   **Enabled**
  Alternate setting: Disabled
  Enables or disables the termination of the SCSI channels on the controller. The
  termination rules are described in Appendices I and J. If the SX4000 piggy back board
  is not present, the settings for channels 1 and 2 are ignored.

- **SCSI TERMPWR - Bus 0**   **Enabled**
  SCSI TERMPWR - Bus 1   **Enabled**
  SCSI TERMPWR - Bus 2   **Enabled**
  Alternate setting: Disabled
  The RAID controller always provides power to its own board terminators and is
  configured by default to also provide power to the terminators of the other devices by
  means of the TERMPWR SCSI signal. If the SX4000 piggy back board is not present,
  the settings for channels 1 and 2 are ignored.

- **SCSI Xfer Rate - Bus 0   10 MHz**
  SCSI Xfer Rate - Bus 1   10 MHz
  SCSI Xfer Rate - Bus 2   10 MHz
  Alternate setting: Asynchronous, 5 MHz, 8 MHz
  The RAID controller is capable of handling SCSI devices on different SCSI buses, at different speeds and with synchronous or asynchronous protocol. During the power on phase, the controller determines with each SCSI device the maximum possible transfer rate. This value can be changed to limit the maximum data transfer rate over the SCSI bus and can be useful during the troubleshooting phase on this bus. In fact, if data errors are cleared by setting the SCSI Xfer Rate at 5 MHz, this may mean that the termination or the length of the SCSI cable are inappropriate. If the SX4000 piggy back board is not present, the settings for channels 1 and 2 are ignored.

- **Ext Cable Detect   OFF - 10 MHz**
  Alternate setting: ON 5 MHz
  The RAID controller is capable of detecting the presence of an external SCSI cable, in which case the maximum transfer rate over the SCSI bus is reduced to 5 MHz (for all internal and external channels). The configurations supported by this system include the HDUs installed in the basic module and in the PEM, so the default value is OFF - 10 MHz.

BOARD GO2061 (P.c.b. Code SM0290-001-A) EVOLUTION

DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
5/95	Nasc	6C6	562228 H	The board is introduced. Smart ROM rel. 003.B1. Firmware 6C6 only controls the single-channel version and therefore does not handle expansion boards IF2020 and IF2021.	Factory
6/95	AG	6C6		Component IC-0199 (32 Kx8 12 nsec SRAM) is replaced by IC-0196 (32 Kx8 15 nsec SRAM) due to low supply.	Factory
6/95	01	6CX		New firmware to solve the scatter/gather problem with 4 CPU boards (SNX 400), highlighted in UnixWare. A new 2 Mbit EPROM is used.	Factory
8/95	02	7E5		New firmware to solve data corruption in SCO, RAID 1 configuration when the "Command Queuing" mode is enabled. Conversion from "Global RAID Table" (FW 6CX) to "Private RAID Table" is automatic and irreversable. Smart ROM rel. 3C4.	Factory
11/95	03	7EB		New firmware: - Introduction of multichannel management. - The "Reassign block" command is no longer generated in the event of a Write fault "Recovered error". - Controller RAM error indication with Server View active under Windows NT.	Factory
11/95	04	7EE		New firmware to solve controller failures in the NT environment during the simulation of disk errors. This problem occured with cyclical resets to the insufficient timeout given by NT to the FW to correct the error. This modification has been implemented on systems with a 133 MHz CPU from the first machine, while for the others this modification is to be applied until the stock lasts. Citibank systems will continue to be equipped with FW 7EB until customer consent is received.	Factory
6/96	05	7GD		New firmware: - Excessive logoff execution time under Windows NT 3.51 - Low performance values detected during sequential write accesses to RAID-5 disks. Integrated Smart ROM release 3C4.	Factory

BOARD IF2020 (P.c.b. Code SM0315-001-2) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
5/95	Nasc	562229 A	The board is introduced.	Factory

BOARD IF2021 (P.c.b. Code SM0315-001-2) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
5/95	Nasc	562230 F	The board is introduced.	Factory

SINGLE/TRI-CHANNEL GO2098 PCI RAID DPT SCSI WIDE CONTROLLER

This high performance SCSI Wide controller has a PCI interface and consists of a single-channel PM3334W main board to which the following options can be added:

- Board SX4030/1W (IF2048) providing the main board with an additional SCSI Wide channel

- Board SX4030/2W (IF2049) providing the main board with two additional SCSI Wide channels

- 4 MB SM4000/4 (ME 2027 code 562227 Y) cache expansion ECC SIMMs.

In the basic system configuration, this controller provides a Fast Single-Ended SCSI Wide channel and uses the Motorola 68040 microprocessor that can transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 20 MB/sec since the transfer is at 16 bits instead of at 8 bits.

When combined with the Silver Wide, Rack Wide or PEM Wide box, this controller allows a faulty hard disk drive to be hot-swapped. This means that the disk can be replaced without halting system activities, and the data automatically reconstructed on the new disk. The controller can manage HDU RAID-0, RAID-1 and RAID-5 arrays.
The Storage Manager SCSI Utility is provided on diskette so that the subsystem hosting this controller can be correctly managed.

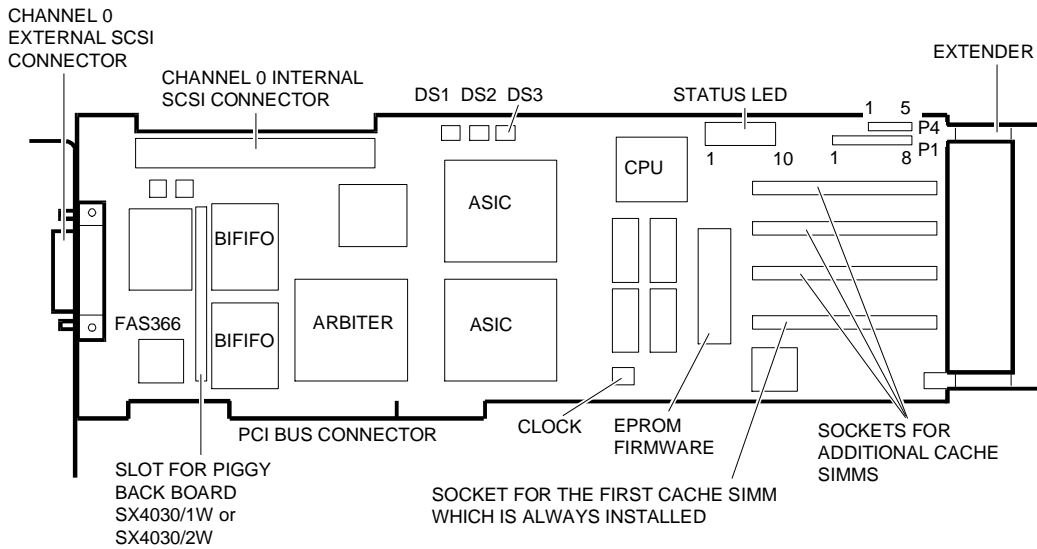This board also supports the Dual Host environment.

On the same channel, this controller can manage SCSI devices with different transfer rates and with synchronous or asynchronous protocol. At power on it determines the best synchronous transfer rate with each device; if the device does not accept the mode, it switches to asynchronous. The transfer rate used at power on is the value set using the DPT Configuration Utility, but if the device does not support this rate it will be automatically reduced. During connection with the PEM the maximum transfer rate of 10 MHz, in other words 20 MB/sec, is used.

The controller SCSI ROM BIOS is installed on the board. If more than one GO2098 controllers are installed in the system, the SCSI ROM BIOS of only one of these boards will be used. The system BIOS will take care of optimizing the area in which the ROM is mapped so as to avoid conflicts with other boards.

This controller is also available in an optional kit (DCR PCI1/3W) to manage a greater number of HDUs in PEM Wide modules or to convert a non-resilience system into a resilience version.

Note: *The board SCSI configurations are described in Appendices J and K.*

MAIN BOARD PM3334W

CHANNEL 0 EXTERNAL SCSI CONNECTOR
CHANNEL 0 INTERNAL SCSI CONNECTOR
DS1 DS2 DS3
STATUS LED
EXTENDER
CPU
ASIC
ARBITER
ASIC
FAS366
BIFIFO
BIFIFO
SLOT FOR PIGGY BACK BOARD SX4030/1W or SX4030/2W
PCI BUS CONNECTOR
CLOCK
EPROM FIRMWARE
SOCKET FOR THE FIRST CACHE SIMM WHICH IS ALWAYS INSTALLED
SOCKETS FOR ADDITIONAL CACHE SIMMS

This board has two 68-pin SCSI Wide connectors: one internal connector which is used for the connection of the Wide back plane to the internal structure and an external, high density connector used only for the connection to a Wide PEM.

Up to 16 devices can be connected to the SCSI Wide channel, controller included. These devices are managed with IDs ranging from 0 to 15; IDs from 8 to 15 are, however, currently not used. The SCSI controller ID in non-Dual Host configurations must always be set to 7. During installation this board is configured by means of the DPT Configuration Utility which is activated during system bootstrap. There are no jumper settings to be made on the board.
The SCSI terminators are on the board. These are active and are usually always enabled. The terminators can only be enabled or disabled by means of the DPT Configuration Utility.
Remote alarm connector P4 and HDU activity LED connector P1 are not used. The HDU activity LED function is taken on by the SCSI BUSY LED on the system and PEM consoles. The DS1 LED indicates that ECC is enabled on the cache, DS2 indicates an ECC failure on the cache and DS3 indicates a parity error; usually only the green DS1 LED is on to indicate that ECC is enabled.
This controller has four sockets which can host 4 MB ECC SIMMs for a maximum board memory capacity of 16 MB.
The amount of cache present in the module can be checked by running the Storage Manager Utility or by reading the POD messages at system power on.
This system has a basic 4 MB cache capacity provided by a single 4 MB ECC SIMM installed in socket 1. This memory capacity can be expanded to 16 MB by installing other expansion SIMMs (each kit with a single SIMM is denominated RACME 04) in sockets 2, 3 and 4. Only 4 MB or 16 MB memory configurations are handled.
The PM3334W controller can configure the hard disk drives in RAID-0, RAID-1 (mirroring) or RAID-5 arrays, providing high performance and fault tolerance. The following table lists the characteristics offered by the different types of arrays supported:

RAID Level	Disk-Fault Tolerant	Storage Efficiency	Performance	Cost	Number of Drives
RAID-0	No	Best	Best	Minimal	Two or more
RAID-1	Yes	Poor	Best write, good read	High	Even number
RAID-5	Yes	Good	Good read, poor write	Average	Three or more

To configure the drives in RAID-0, RAID-1 and RAID-5 arrays, provided with the system's User Diskette are the diskettes containing the SCSI Storage Manager Utility. This utility makes it possible to setup the disk array by means of a graphical interface (turn to Appendix F).

STATUS LEDS

On the board there are 10 LEDs that indicate the status of the controller. The statuses that are displayed are identical to those already seen for the GO2061 controller so refer to the related section for information.

PIGGY BACK BOARDS SX4030/1W (IF2048) AND SX4030/2W (IF2049)
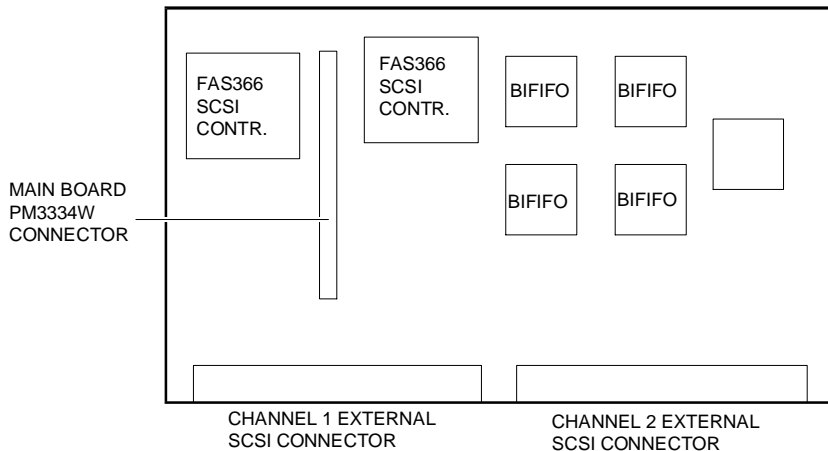
Note: *The SCSI channel 2 connector is not available on the SX4030/1W board with has 2 BIFIFOs and 1 FAS366 installed.*

Piggy Back Boards SX4030/1W and SX4030/2W make it possible to upgrade the PM3334W board with one or two SCSI Wide channels. The additional channels have the same characteristics as the primary channel, and are used as external channels for connecting the Wide PEM. The board is plugged into the two reserved connectors on the main board, while the configuration of the board with the two additional channels (SCSI ID, termination, etc.) is made by running the DPT Configuration Utility during the system POD.
The configuration of the disks (RAID 0, 1, 5) connected to the controller's SCSI channels is always made using the Storage Manager Utility. Mirroring (RAID-1) is possible, for example, between HDUs connected to channel 0 and those connected to channel 1.
Kit EXP 2NDSCSIW contains the SX4030/1W board, the connector and the internal SCSI Wide cable for connecting the board to the rear of the case.
Kit EXP 2&3SCSIW contains the SX4030/2W board, two connectors and two internal SCSI Wide cables for connecting the board to the rear of the case.

GO2098 CONTROLLER TROUBLESHOOTING AND ERROR MESSAGES

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PROBLEM	POSSIBLE SOLUTION
Data errors occur during transfer.	Using the DPT Configuration Utility, set the SCSI Xfer Rate parameter to 5 MHz. If the errors are cleared, this may indicate an inappropriate termination or SCSI cable length.
The message "SCSI BIOS ROM copyright" appears twice at power on.	The system BIOS may be incorrectly shadowing the SCSI BIOS ROM as a video BIOS ROM. Disable all shadowing through the system's setup.
When the SCSI BIOS displays the SCSI devices at power on, one device appears at all seven SCSI IDs.	One of the SCSI devices has been set to the same ID as the SCSI controller. The ID of the controller must always be set to 7, so make sure that all the other devices have a different ID.
The message "Warning: SCSI BIOS ROM version is later than this driver version" is displayed during the DOS bootstrap routine.	This message is displayed when the revision of the SCSI BIOS is newer than the revision of DPTDDL.SYS. The revision level of DPTDDL.SYS must be equal to or newer than the SCSI BIOS ROM revision. Update the revision of DPTDDL.SYS.
During normal operations under Novell Netware, the message "DPT CTRL **h** DISK **d** resetting controller" is displayed where **h** is the number of the SCSI controller and **d** is the SCSI device ID.	Whenever a SCSI device does not respond to a request from the SCSI controller, the controller will reset the device, retry the request and display the message. Check the connections of the SCSI cable and its terminations, otherwise it may be that the SCSI device or cable is probably faulty.
The SCSI controller does not respond during bootstrap after the message "SCSI BIOS ROM copyright" is displayed, and LEDs 1 and 2 or 1, 2 and 10, remain lit on the controller.	The SCSI bus is improperly terminated, so proceed and check.
The message "Cannot Enable A20" is displayed when running Storage Manager under DOS.	Load HIMEM.SYS by adding the following string to the CONFIG.SYS file: DEVICE = HIMEM.SYS
LED 9 (and any other LEDs) remains lit on the SCSI controller but the controller does not respond. This may occur when Microsoft Windows 3.1 is loaded.	LED 9 indicates that the controller's IRQ is pending. This usually means that there is an interrupt conflict with another controller. Make sure that a different IRQ is assigned to each board. When running Windows 3.1, add the following string to the SYSTEM.INI file, under the 386ENH section: VirtualHDIrq=OFF If you do not want to modify the SYSTEM.INI file, Windows can be started with WIN /D:V.
Different LEDs in the 1-4 range on the SCSI controller flash once per second and the controller does not respond.	This LED pattern indicates an internal error in the SCSI controller's microprocessor. Remove all SCSI devices connected to the controller, the SCSI cable and try again. If the error is cleared, reconnect the devices, one at a time, until the faulty cable or device is identified. This LED pattern can also be displayed in case a faulty firmware EPROM is detected during normal operation. Check the EPROM's contacts on the socket. If the error persists, replace the SCSI controller.
LEDs 1, 2 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that there are no SIMMs in socket 1. Socket 1 must always contain SIMMs with the higher capacity. This system only uses 4 MB ECC SIMMs.
LEDs 2 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that socket 1 does not contain SIMMs with the higher capacity. Reinstall the SIMMs so that socket 1 contains those of higher capacity. This system only uses 4 MB ECC SIMMs.

PROBLEM	POSSIBLE SOLUTION
LEDs 1, 2, 3, 4 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that both parity and ECC SIMMs are installed. Remove the parity SIMMs; this system can only use 4 MB ECC SIMMs.
LEDs 4 and 8 on the SCSI controller light up once per second during power on and the controller does not respond.	This LED pattern indicates that the controller has detected a problem with the termination of the SCSI channel. Check
Other LED patterns on the SCSI controller not indicated above light up once per second at power on and the controller does not respond.	This indicates an error has occurred in the firmware of the SCSI controller. To determine the cause, activate storage manager (from floppy disk, if necessary) while the LEDs are still flashing. A description of the problem and possible solutions will be displayed upon entering the program.
The controller has access to the SCSI HDU but the amber HDU Fault LED does not flash during boot and the controller does not detect HDU swapping or cabinet errors.	This indicates that the status signals have not been received correctly by the controller. One cause could be that another SCSI device is connected to the external SCSI cable. In this case the device usually puts these signals to ground.

CONFIGURATION OF THE GO2098 PCI RAID DPT SCSI CONTROLLER

These PCI boards are automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the following configuration programs:

- EISA Configuration Utility, which allows the modification of the resources assigned

- DPT Configuration Utility, which allows the configuration to be changed.

It is suggested that you use the ECU instead of the ROM Setup Utility.

EISA Configuration Utility

- Activate the EISA Configuration Utility.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
  "Slot xx PCI SCSI Controller
                      PCI Function x   Enabled.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is a RAID DPT board, Vendor ID 1004a400 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

    - **Port Address**: displays the I/O address.

    - **Memory Address**: displays the memory address range.

    - **Memory Amount**: displays the amount of memory occupied.

    - **Interrupt**: displays the IRQ assigned to the SCSI controller.

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    It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- The other controller configuration parameters can be accessed by means of the DPT Configuration Utility.

DPT Configuration Utility

Note: *The default values can be automatically set using the F9 key.*

Note: *Some of the configuration values of each single RAID controller are stored in a non-volatile memory on the controller itself.*

The configuration utility for RAID DPT controllers can only be activated at power on. Upon completion of the DPT controller autodiagnostics, the following message is displayed for a few seconds:

<Ctrl-D> for DPT Configuration Utility

Pressing the CTRL-D key while the system is in idle activates the board's Configuration Utility which displays all the RAID DPT SCSI boards installed in the system. Select the board to be configured and press Enter.

The following options are available:

- **HBA I/O Address**:   **Auto**
  Alternate settings: 170 H, 230 H, 330 H, 1C88 H, 2C88 H, 3C88 H, ... FC88 H
  The default Auto setting allows the board to be self-configured by the Plug & Play BIOS to any I/O address as long as the operating system is equipped with the Plug & Play driver. If it is not, select one of the alternative addresses. In case problems occur with the OS/2 operating system, select address 330 H instead of Auto.

- **PCI Parity**:   **Enabled**
  Alternate setting: Disabled.
  Parity checking on the PCI bus is enabled by default by the RAID controller.

- **SCSI Cmd Queing**:   **Enabled**
  Alternate setting: Disabled.
  The RAID controller supports SCSI command queuing. This feature makes it possible to transfer up to 64 SCSI commands to a single SCSI device if it accepts the command queue.

- **PCI Xfers/Burst**   **Auto**
  Alternate settings: 32, 64, 128
  This parameter specifies the minimum number of 4-byte words which can be transferred by the RAID controller to the peripheral by means of a PCI bus master burst. The controller will wait until enough transfer data has been accumulated before requesting the bus.

- **Extended PCI REQ   Disabled**
  Alternate setting: Enabled.
  This setting controls the duration of the PCI bus request signal. The Disabled default setting forces the RAID controller to release the bus more frequently. The alternate setting enables the bus request signal for the entire duration of the transfer, but occupies the bus until either the transfer is completed or until the controller is forced to relinquish the control of the bus to another bus master or to the latency timer.

- **HBA SCSI ID - Bus 0   7**
  HBA SCSI ID - Bus 1   7
  HBA SCSI ID - Bus 2   7
  Alternate settings: 0, 1, 2, 3, 4, 5, 6
  The controller ID of each SCSI channel on the controller is set by default to 7 and must not be changed, unless in the case of Dual Host configurations. IDs from 8 to 15 are currently not used. If the SX4030 piggy back board is not present, the settings for channels 1 and 2 are ignored.

- **Termination - Bus 0   Enabled**
  Termination - Bus 1   Enabled
  Termination - Bus 2   Enabled
  Alternate settings: Disabled, High Only
  Enables or disables the termination of the SCSI channels on the controller.
  By default the terminators are enabled for all channels and this setting must not be changed, unless in the case of Dual Host configurations.
  The High Only parameter enables termination only for the signals that are present on the 16-bit SCSI Wide bus, and must not be set on these systems. The parameters for channels 1 and 2 are not displayed if piggy back board SX4030 is not present.

- **TERMPWR - Bus 0   Enabled**
  TERMPWR - Bus 1   Enabled
  TERMPWR - Bus 2   Enabled
  Alternate setting: Disabled
  The RAID controller always provides power to its own board terminators and is configured by default to also provide power to the terminators of the other devices by means of the TERMPWR SCSI signal. If the SX4030 piggy back board is not present, the settings for channels 1 and 2 are ignored or not displayed.

- **SCSI Xfer Rate   10 MHz**
  Alternate settings: Asynchronous, 5 MHz, 8 MHz
  The RAID controller is capable of handling SCSI devices at different speeds, with synchronous or asynchronous protocol, on the same bus. During the power on phase, the controller determines with each SCSI device the maximum possible transfer rate. This value can be changed to limit the maximum data transfer rate over the SCSI bus and can be useful during the troubleshooting phase on this bus. In fact, if data errors are cleared by setting the SCSI Xfer Rate at 5 MHz, this may mean that the termination or the length of the SCSI cable are inappropriate.

- **Ext Cable Detect   Disabled - 10 MHz**
  Alternate setting: Enabled 5 MHz
  The RAID controller is capable of detecting the presence of an external SCSI cable, in which case the maximum transfer rate over the SCSI bus is reduced to
  5 MHz (for all internal and external channels). The configurations supported by this system include the HDUs installed in the basic module and in the PEM, so the default value is Disabled - 10 MHz.

BOARD GO2098 (P.c.b. Code PC-0475-004) EVOLUTION

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DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
2/96	Nasc	7FY	210842 C	Introduction of board revision 4 (HA-0479-004). Smart ROM rel. 3.CR. The firmware has code 212724 T Lev. Nasc.	Factory
5/96	01	7FY		Possible board locks at system power on due to an incorrect management of the PCI reset: - Replacement of boot code 1C contained in the Flash EPROM with new code 1D. The boot code cannot be modified by means of the Flash EPROM programming utility and therefore the EPROM chip needs to be physically replaced. As an alternative solution on SNX 200/400 systems, BIOS release 1.10 or later needs to be used.	Factory
5/96	02	7FY		Rejects during factory testing at DPT which result in board hangs the first time the SCSI bus is accessed: - Wire between pin 47 (DIFFSENS) and pin 46 (GND) of the SCSI controller chip FAS336 in position U45.	Factory
5/96	02	F74		Firmware replaces to solve the problems with possible data corruption when reading from disk during stress tests with data reconstruction underway. Smart ROM release is updated from 3.CR to 3.D0. The code of FW 212724 T is updates to Lev. 01.	Factory
6/96	03	F74		New Q-logic FAS366 (Fast & Wide SCSI) chip version. The chip IC-0179-001 (mask number 2400154) at location U45 is replaced by chip IC-0179-002 (mask number 2405058). The mask number is found on the chip box.	Factory
7/96	03	F76		Firmware replacement for lack of DPT SCSI controller performance under Windows NT due to a non-optimized management of the cache sync commands. Smart ROM release moves from 3.D0 to 3DK and introduces the possibility of relocating the Extended BIOS Data Area (EBDA), function which is however disabled by default. FW rel. F76 allows dual processing with SCO 3.2.4.2 and UnixWare 2.0x. FW 212724 T code is upgraded to lev. 02.	Factory
7/96	04	F76		Critical SCSI bus in dual host configurations when the system partner is powered off. Mount a 1.2 KOhm 5% SMD 0805 pull-down resistor in position R43 on the signal enabling the terminator on the high part of the SCSI bus; with the machine powered off, the terminator results as being enabled instead of disabled. This modification is needs to be made on all the boards used in a dual host configuration.	Factory

DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
3/97	04		210842 C	Firmware replacement: - Frequent faults on the first disk of the first array caused by an inadequate timeout value on the start command with respect to the startup times during the power on of 9 GB hard disk drives. The new firmware extends this timeout from 30 seconds to 50 seconds on the motor start command. - Impossible to install Windows NT in the unattended mode due to an automatic system reset that does not allow a correct management of the data in the write-back cache. The Smart ROM "3E2" integrated in FW 7H05 gives the possibility, with the Configuration Utility activated with CTRL-D, of choosing the write-through cache mode for unattended Windows NT installations. FW code 212724 T goes to level 03.	Factory

Note: *Firmware release 7GK.3 has been only released for dual host configurations on the SNX 400/RS/RM*

BOARD IF2048 (P.c.b. Code PC-0470-003) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
2/96	Nasc	210843 D	New board (HA-0471-003).	Factory
6/96	01		Rejects during production testing at DPT, occurring as board hangs during the first SCSI access (failure never highlighted in Olivetti). Wire between pin 47 (DIFFSENS) and pin 46 (GND) of the FAS366 SCSI controller chip at location U9.	Factory
6/96	02		New Q-logic FAS366 (Fast & Wide SCSI) chip version. Replacement of chip IC-0179-001 (mask number 2400154) at location U9 with chip IC-0179-002 (mask number 2405058). The mask number is found on the chip box.	Factory

BOARD IF2049 (P.c.b. Code PC-0470-003) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
2/96	Nasc	210844 E	New board (HA-0470-003).	Factory
6/96	01		Rejects during production testing at DPT, occurring as board hangs during the first SCSI access (failure never highlighted in Olivetti). Wire between pin 47 (DIFFSENS) and pin 46 (GND) of the FAS366 SCSI controller chip at locations U9 and U12.	Factory
6/96	02		New Q-logic FAS366 (Fast & Wide SCSI) chip version. Replacement of chips IC-0179-001 (mask number 2400154) at locations U9 and U12 with chips IC-0179-002 (mask number 2405058). The mask number is found on the chip box.	Factory

SINGLE/TRI-CHANNEL GO2173 PCI RAID DPT ULTRA-WIDE SCSI CONTROLLER

This high performance Ultra Wide SCSI controller has a PCI interface and consists of a single-channel PM3334UW main board to which the following options can be added:

- Board SX4030/1UW (IF2065) providing the main board with an additional Ultra Wide SCSI channel

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- Board SX4030/2UW (IF2066) providing the main board with two additional Ultra Wide SCSI channels

- 4 MB SM4000/4 (ME 2027 code 562227 Y) cache expansion ECC SIMMs.

In the basic system configuration, this controller provides a 16-bit Single-Ended Ultra Wide SCSI channel and is equipped with a 4 MB ECC cache. It uses the Motorola 68040 microprocessor that can transfer information to system memory at the maximum speed allowed on the PCI bus (133 MB/sec), while data is transferred from/to the SCSI bus at 40 MB/sec, double the rate of a Fast Wide SCSI controller, always with 16-bit data transfers.

When combined with the Silver Wide, Rack Wide, Copper or PEM Wide box, this controller allows a faulty hard disk drive to be hot-swapped. This means that the disk can be replaced without halting system activities, and the data automatically reconstructed on the new disk.
The controller can manage HDU RAID-0, RAID-1 and RAID-5 arrays.
The Storage Manager SCSI Utility is provided so that the subsystem hosting this controller can be correctly managed.

This board also supports the Dual Host and SIREN environments.

On the same channel, this controller can manage SCSI devices with different transfer rates and with synchronous or asynchronous protocol. At power on it determines the best synchronous transfer rate with each device; if the device does not accept the mode, it switches to asynchronous. The transfer rate used at power on is the value set using the DPT Configuration Utility, but if the device does not support this rate it will be automatically reduced. Although unadvised, Fast Wide and Ultra Wide SCSI HDUs can be connected on the same channel; in the first case the transfer rate will be 20 MB/sec, 40 MB/sec in the case of Ultra Wide HDUs. In connection with the PEM, the transfer rate must always be 10 MHz, in other words 20 MB/sec.
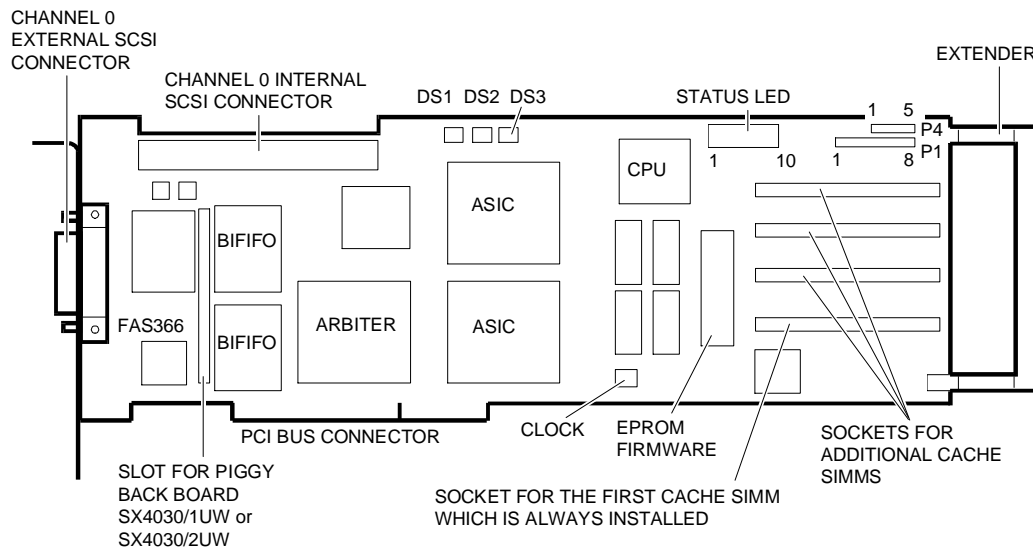
Note: *Due to problems with the length of SCSI cables, the PEM Wide currently cannot work in the Ultra mode (40 MB/sec) but can only work in the Fast Wide mode (20 MB/sec). Therefore the GO2173 controllers are factory-set to work in the Fast Wide mode on all channels. Run the DPT Configuration Utility to change the mode of operation to Ultra Wide, which is only possible for the disks inside the basic module.*

The controller SCSI ROM BIOS is installed on the board. If more than one RAID DPT controller is installed in the system, the SCSI ROM BIOS of only one of these boards will be used. The system BIOS will take care of optimizing the area in which the ROM is mapped so as to avoid conflicts with other boards.

This controller is also available in an optional kit (DCR PCI1/3UW) to manage a greater number of HDUs in PEM Wide modules or to convert a non-resilience system into a resilience version.

Note: *The board SCSI configurations are described in Appendices J and L.*

MAIN BOARD PM3334UW

CHANNEL 0
EXTERNAL SCSI
CONNECTOR

EXTENDER

CHANNEL 0 INTERNAL
SCSI CONNECTOR

DS1 DS2 DS3

STATUS LED

1   5

P4
P1

CPU

1   10   1   8

ASIC

BIFIFO

ASIC

FAS366

ARBITER

BIFIFO

PCI BUS CONNECTOR

CLOCK

EPROM
FIRMWARE

SOCKETS FOR
ADDITIONAL CACHE
SIMMS

SLOT FOR PIGGY
BACK BOARD
SX4030/1UW or
SX4030/2UW

SOCKET FOR THE FIRST CACHE SIMM
WHICH IS ALWAYS INSTALLED

This board has two 68-pin SCSI Wide connectors: one internal connector which is used for the connection of the Wide backplane to the internal structure and an external, high density connector used only for the connection to a Wide PEM.

Up to 16 SCSI devices can be connected to the SCSI Wide channel, controller included. These devices are managed with IDs ranging from 0 to 15; IDs from 8 to 15 are, however, currently not used. The SCSI controller ID in non-Dual Host configurations must always be set to 7. During installation this board is configured by means of the DPT Configuration Utility which is activated during system bootstrap. There are no jumper settings to be made on the board.
The SCSI terminators are on the board. These are active and are usually always enabled. The terminators can only be enabled or disabled by means of the DPT Configuration Utility.
Remote alarm connector P4 and HDU activity LED connector P1 are not used. The HDU activity LED function is taken on by the SCSI BUSY LED on the system and PEM consoles. The DS1 LED indicates that ECC is enabled on the cache, DS2 indicates an ECC failure on the cache and DS3 indicates a parity error; usually only the green DS1 LED is on to indicate that ECC is enabled.
This controller has four sockets which can host 4 MB ECC SIMMs for a maximum board memory capacity of 16 MB.
The amount of cache present in the module can be checked by running the Storage Manager Utility or by reading the POD messages at system power on.
This system has a basic 4 MB cache capacity provided by a single 4 MB ECC SIMM installed in socket 1. This memory capacity can be expanded to 16 MB by installing other expansion SIMMs (each kit with a single SIMM is denominated RACME 04) in sockets 2, 3 and 4. At least one cache SIMM is required for the board to work correctly. Only 4 MB or 16 MB memory configurations are handled.
The PM3334W controller can configure the hard disk drives in RAID-0, RAID-1 (mirroring) or RAID-5 arrays, providing high performance and fault tolerance. The following table lists the characteristics offered by the different types of arrays supported:

| RAID Level	Disk-Fault Tolerant	Storage Efficiency	Performance	Cost	Number of Drives
RAID-0	No	Best	Best	Minimal	Two or more
RAID-1	Yes	Poor	Best write, good read	High	Even number
RAID-5	Yes	Good	Good read, poor write	Average	Three or more

The SCSI Storage Manager Utility is provided to configure the drives in RAID-0, RAID-1 and RAID-5 arrays. This utility makes it possible to setup the disk array by means of a graphical interface (turn to Appendix F).

STATUS LEDS

On the board there are 10 LEDs that indicate the status of the controller. The statuses that are displayed are identical to those already seen for the GO2061 controller so refer to the related section for information.

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PIGGY BACK BOARDS SX4030/1UW (IF2065) AND SX4030/2UW (IF2066)

CHANNEL 1 EXTERNAL SCSI CONNECTOR

CHANNEL 2 EXTERNAL SCSI CONNECTOR
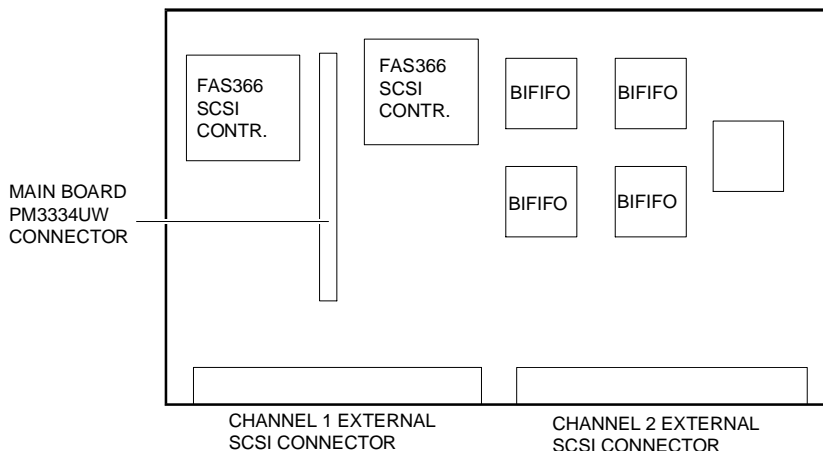
Note: *The SCSI channel 2 connector is not available on the SX4030/1UW board which has 2 BIFIFOs and 1 FAS366 installed.*

Piggy Back Boards SX4030/1UW and SX4030/2UW make it possible to upgrade the PM3334UW board with one or two Ultra Wide SCSI channels. The additional channels have the same characteristics as the primary channel, and are used as external channels for connecting the Wide PEM. The board is plugged into the two reserved connectors on the main board, while the configuration of the board with the two additional channels (SCSI ID, termination, etc.) is made by running the DPT Configuration Utility during the system POD.
The configuration of the disks (RAID 0, 1, 5) connected to the controller's SCSI channels is always made using the Storage Manager Utility. Mirroring (RAID-1) is possible, for example, between HDUs connected to channel 0 and those connected to channel 1.
Kit EXP 2NDSCSIUW contains the SX4030/1UW board, the connector and the internal SCSI Wide cable for connecting the board to the rear of the case.
Kit EXP 2&3SCSIUW contains the SX4030/2UW board, two connectors and two internal SCSI Wide cables for connecting the board to the rear of the case.

GO2173 CONTROLLER TROUBLESHOOTING AND ERROR MESSAGES

Troubleshooting and error messages for this controller are the same as for the GO2098 controller so refer to the related section for information.

CONFIGURATION OF THE PCI RAID DPT GO2173 SCSI CONTROLLER

This PCI board is automatically configured by the system BIOS at power on. The values set automatically can be changed by activating the following configuration programs:

- EISA Configuration Utility, which allows the modification of the resources assigned

- DPT Configuration Utility, which allows the configuration to be changed.

It is suggested that you use the ECU instead of the ROM Setup Utility.

EISA Configuration Utility

- Activate the EISA Configuration Utility from Orchestra.

- Select the "Standard Configuration" option first, then "View or Edit Details".

- Scroll through the different items until reaching:
  "Slot xx PCI SCSI Controller
  PCI Function x   Enabled.

- Press Enter. A window is displayed in which it is possible to disable the controller (by selecting Disabled).

- In this window it is possible to check which type of controller has been selected by pressing F7 (Advanced Menu). When the new window is displayed, select "View Additional System Information Menu" and then "Board Specification". If the SCSI controller is a RAID DPT board, Vendor ID 1004a400 will be displayed.

- Return to the activation window, disable the controller and press F6 to display the resources assigned by the BIOS during the automatic configuration of the PCI device. The following resources are displayed:

  – **Port Address**: displays the I/O address.

  – **Memory Address**: displays the memory address range.

  – **Memory Amount**: displays the amount of memory occupied.

  – **Interrupt**: displays the IRQ assigned to the SCSI controller.

  It is possible to change the values displayed in any field by pressing the (+) and (-) keys. If, at the next POD, the new values set do not generate conflicts they will be maintained, otherwise the previous values will be redefined by the BIOS.

- The other controller configuration parameters can be accessed by means of the DPT Configuration Utility.

DPT Configuration Utility

The configuration utility for RAID DPT controllers can only be activated at power on. Upon completion of the DPT controller autodiagnostics, the following message is displayed for a few seconds:

<Ctrl-D> for DPT Configuration Utility

Pressing the CTRL-D key while the system is in idle activates the board's Configuration Utility which displays all the RAID DPT SCSI boards installed in the system. Select the board to be configured and press Enter.

The following options are available:

- **HBA I/O Address**:   **Auto**
  Alternate settings: 170 H, 230 H, 330 H, 1C88 H, 2C88 H, 3C88 H, ... FC88 H
  The default Auto setting allows the board to be self-configured by the Plug & Play
  BIOS to any I/O address as long as the operating system is equipped with the Plug &
  Play driver. If it is not, select one of the alternative addresses. In case problems occur
  with the OS/2 operating system, select address 330 H instead of Auto.

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- **PCI Parity Detected**:   **Enabled**
  Alternate setting: Disabled.
  Parity checking on the PCI bus is enabled by default by the RAID controller.

- **PCI Xfers/Burst**   **Auto**
  Alternate settings: 1 126
  This parameter specifies the minimum number of 4-byte words which can be
  transferred by the RAID controller to the peripheral by means of a PCI bus master
  burst. The controller will wait until enough transfer data has been accumulated before
  requesting the bus.

- **Extended PCI REQ**   **Disabled**
  Alternate setting: Enabled.
  This setting controls the duration of the PCI bus request signal. The Disabled default
  setting forces the RAID controller to release the bus more frequently. The alternate
  setting enables the bus request signal for the entire duration of the transfer, but
  occupies the bus until either the transfer is completed or until the controller is forced to
  relinquish the control of the bus to another bus master or to the latency timer.

- **SCSI Cmd Queing**:   **Enabled**
  Alternate setting: Disabled.
  The RAID controller supports SCSI command queuing. This feature makes it possible
  to transfer up to 64 SCSI commands to a single SCSI device if it accepts the
  command queue. In the majority of cases, the alternate setting Disabled is not
  required since the controller interrogates all the devices connected to its own SCSI
  bus to determine whether they are able to support the Command Queuing feature.

- **HBA SCSI ID - Bus 0**   **7**
  HBA SCSI ID - Bus 1   **7**
  HBA SCSI ID - Bus 2   **7**
  Alternate settings: N/A, 0, 1, 2, 3, 4, 5, 6
  The controller ID of each SCSI channel on the controller is set by default to 7 and
  must not be changed, unless in the case of Dual Host configurations. IDs from 8 to 15
  are currently not used. If the SX4030 piggy back board is not present, the settings for
  channels 1 and 2 are ignored.

- **EBDA Relocation**   **Disabled**
  Alternate setting: Enabled
  By default, the Extended Bios Data Area Relocation for the PM3334UW controller is
  set to Disabled. If other additional SCSI controllers are also installed in the system,
  such as older controllers, a conflict will occur during the boot phase in which case try
  again after setting this parameter to Enabled.

- **Boot Order**   **Normal**
  Alternate settings: Last, None
  With this parameter set to Normal, the system will perform the normal boot sequence
  when more than one SCSI controller is installed. By setting this parameter to Last, all
  the DPT PM3334 controllers are put at the end of the boot sequence queue. by setting
  this parameter to None, all the DPT PM3334 controllers are ignored by the boot
  sequence.

- **Termination - Bus 0**   **ON**
  Termination - Bus 1   **ON**
  Termination - Bus 2   **ON**
  Alternate selections: OFF, High Only, N/A
  This parameter enables (ON) or disables (OFF) SCSI channel termination on the controller. Usually the terminators must be enabled, but are disabled only in Dual Host environments. The High Only selection, which must not be set on these systems, enables termination only for the signals present on the 16-bit SCSI Wide bus. If the SX4030 piggy back board is not installed, the channel 1 and channel 2 parameters are not displayed.

- **TERMPWR - Bus 0**   **Enabled**
  TERMPWR - Bus 1   **Enabled**
  TERMPWR - Bus 2   **Enabled**
  Alternate setting: Disabled
  The RAID controller always provides power to its own board terminators and is configured by default to also provide power to the terminators of the other devices by means of the TERMPWR SCSI signal. If the SX4030 piggy back board is not present, the settings for channels 1 and 2 are not displayed.

- **SCSI Xfer Rate 0**   **10 MHz**
  SCSI Xfer Rate 1   **10 MHz**
  SCSI Xfer Rate 2   **10 MHz**
  Alternate settings: N/A, Asynchronous, 5 MHz, 8 MHz, 10 MHz, 20 MHz
  The RAID controller is capable of handling SCSI devices at different speeds, with synchronous or asynchronous protocol, on the same bus. During the power on phase, the controller determines with each SCSI device the optimum transfer rate and mode. This value can be changed to limit the maximum data transfer rate over the SCSI bus and can be useful during the troubleshooting phase on this bus. In fact, if data errors are cleared by setting the SCSI Xfer Rate at 5 MHz, this may mean that the termination or the length of the SCSI cable are inappropriate. The default value is 10 MHz (20 MB/sec) for operation in the Fast Wide mode; to activate Ultra-Wide operation, (currently only possible with the disks inside the system), the SCSI Xfer Rate parameter for the desired channel must be set to 20 MHz (40 MB/sec). If the SX4030 piggy back board is not installed, the parameters for channels 1 and 2 are not displayed.

Note: *Fast Wide disks can also be connected to a channel set to the 20 MHz (40 MB/sec) Ultra Wide mode. The controller will automatically change the transfer rate to those disks only, to 10 MHz.*

- **Ext Cable Detect**   **Disabled**
  Alternate setting: Enable
  The RAID controller is capable of detecting the presence of an external SCSI cable, in which case the maximum transfer rate over the SCSI bus is reduced to 5 MHz (for all internal and external channels). The only external peripheral that can be connected to the RAID controller is the PEM in which case the default value is Disabled.

Note: *- N/A = Not Available.*
     - The default values can be set automatically by pressing the F9 key.
     - The configuration values of each single RAID controller are stored in a non-volatile
      memory located on the controller itself.

BOARD GO2173 (P.c.b. Code PC-0475-006) EVOLUTION

DATE	LEV.	FW	VIMO CODE	REASON FOR CHANGE	APPLIC.
10/96	Nasc	7H0	212803 U	New board revision HA-0650-006-B or HA-0652-006-A. SCSI ROM BIOS rel. 3.DS Boot code rev. 1.C. The firmware code is 212861 V lev. Nasc.	Factory
12/96	01	7H0		Replacement of the mask of the Ultra Wide SCSI Controller FAS366U chip in position U45 by the supplier Q Logic. The new mask does not solve any of the problems encountered but improves the signal levels.	Factory
3/97	01	7H05		Firmware replacement: - Frequent faults on the first disk of the first array caused by an inadequate timeout value on the start command with respect to the startup times during the power on of 9 GB hard disk drives. The new firmware extends this timeout from 30 seconds to 50 seconds on the motor start command. - Impossible to install Windows NT in the unattended mode due to an automatic system reset that does not allow a correct management of the data in the write-back cache. The Smart ROM "3E2" integrated in FW 7H05 gives the possibility, with the Configuration Utility activated with CTRL-D, of choosing the write-through cache mode for unattended Windows NT installations. FW code 212724 T goes to level 03.	

BOARD IF2065 (P.c.b. Code PC-0470-006) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
10/96	Nasc	212804 V	New board (HA-0661-006-A).	Factory
12/96	01		Replacement of the mask of the Ultra Wide SCSI Controller FAS366U chip in position U9 by the supplier Q Logic. The new mask does not solve any of the problems encountered but improves the signal levels.	Factory

BOARD IF2066 (P.c.b. Code PC-0470-006) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
10/96	Nasc	212805 W	New board (HA-0660-006-A).	Factory
12/96	01		Replacement of the mask of the Ultra Wide SCSI Controller FAS366U chip in positions U9 and U12 by the supplier Q Logic. The new mask does not solve any of the problems encountered but improves the signal levels.	Factory

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