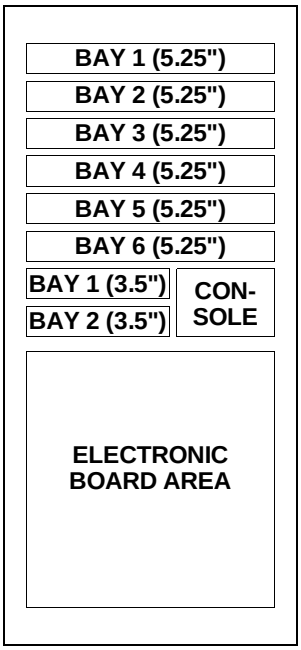
CONFIGURATION OF IRON BOX PERIPHERALS

CONFIGURATION OF THE PERIPHERALS ON SNX 140 / 160 / 160E SYSTEMA

PERIPHERALS INSTALLABLE IN THE BASIC MODULE

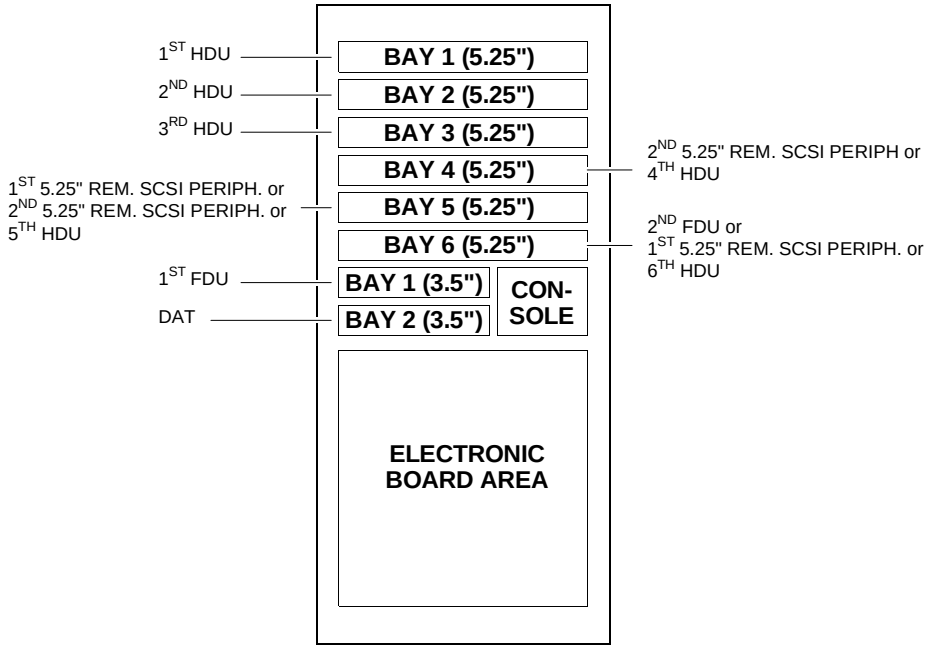


BAY	INSTALLABLE PERIPHERALS	NOTES
BAY 1 (3.5")	1.44 MB FDU (3.5")	3.5" Bay 1 always hosts the system first 3.5" 1.44 MB FDU.
BAY 2 (3.5")	DAT (3.5")	3.5" Bay 2 can only host the optional SCSI DAT.
BAY 1 (5.25") BAY 2 (5.25") BAY 3 (5.25")	HDU (3.5"x1/1.6")	- 5.25" Bay 1 always hosts the system first SCSI HDU in which the operating system is installed. - 5.25" Bays 1 to 3 can only host SCSI HDUs.
BAY 4 (5.25") BAY 5 (5.25")	STU (5.25" HH) or CD-ROM (5.25" HH) or HDU (3.5"x1/1.6")	5.25" Bays 4, 5 and 6 can host removable peripherals. Up to two removable SCSI peripherals can be installed in the system. The only non-SCSI peripheral which can be installed in the system is the second 5.25" 1.2 MB FDU which can be accomodated in Bay 6.
BAY 6 (5.25")	1.2 MB FDU (5.25" HH) or STU (5.25" HH) or CD-ROM (5.25" HH) or HDU (3.5"x1/1.6")	

Note: *Due to problems with the system's internal temperature, 1.6" high 3.5" HDUs cannot be installed in adjacent bays and therefore the maximum number of these kind of HDUs which can be installed in the system is restricted to three. There is no restriction whatsoever for the other drives.*

Note: *The peripherals that can be installed in the PEM, the respective bay filling sequence and SCSI channel configuration are explained in the section entitled "Configuration of Peripherals on SNX 140/R, 160/R Systema and PEM 100/R".*

BAY FILLING SEQUENCE



Notes:

- *The first 5.25" removable SCSI peripheral (STU or CD-ROM) is installed in bay 6 otherwise in Bay if the second FDU is installed. If the DAT is not installed, the second SCSI peripheral (max. two in the system) is installed in the next bay: either bay 4 or bay 5.*
- *Actually the bay filling sequence for the installation of removable peripherals in 5.25" bays starts at the lowest bay (bay 6) and proceeds upwards, while the bay filling sequence for HDUs starts at the highest bay (bay 1) and proceeds downwards.*

SCSI CHANNEL CONFIGURATION

Basic systems can be configured with non-RAID or RAID SCSI controllers.
The DAGGER or ARROW SCSI controller is used in non-RAID configurations, to which removable peripherals and HDUs can be connected. SCSI controller GO2044, or also the GO2061 on the SNX 160E and SNX 140 75 MHz, are used in RAID configurations (bear in mind that the RAID controller in basic systems can only support RAID array features and not the hot-swapping of faulty HDUs). These controllers are reserved for HDUs but can also connect removable peripherals. To avoid hindering system performance, it is suggested, however, to also have a non-RAID controller available for removable peripherals.

The SCSI channel configuration rule is that all connected units (max 8, controller included) have a different identification number (SCSI ID) and that the bus be terminated at its ends only.

In all configurations where there are peripherals connected to the SCSI bus, it is necessary to respect the maximum length available for the SCSI channel, which is 6 meters.

RULES FOR SETTING A SCSI ID

Besides assigning a different address to the peripherals connected on the bus the SCSI ID defines priority, where an ID 0 is the lowest priority and an ID 7 the highest.

The primary condition is that the first system HDU connected to the SCSI controller (HDU containing the operating system and located in bay 1), has SCSI ID 0 (lowest priority), and that the SCSI controller has SCSI ID 7 (highest priority).

Following the bay filling sequence, the successive SCSI peripherals are set with an increasing SCSI ID (from 1 to 6) in the case of HDUs, or with decreasing SCSI ID (from 6 to 1) in the case of removable peripherals, unless in the case of the first STU in SCO 3.2 environment, in which case this drive must have ID = 2.

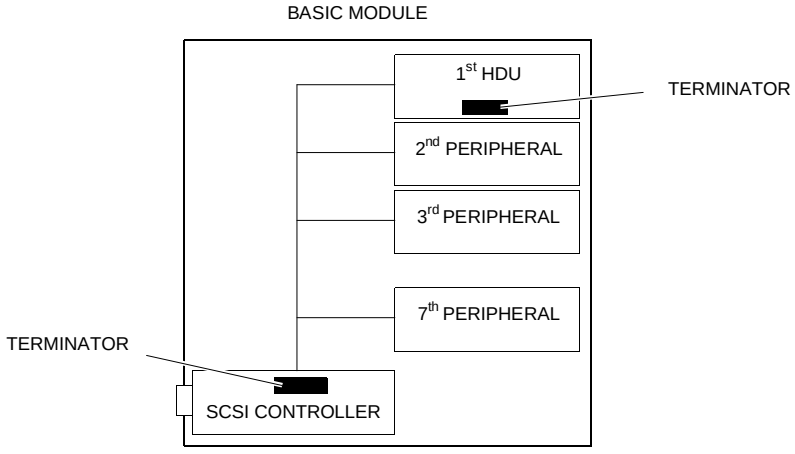
SCSI ID	0	1	2	3	4	5	6	7
Peripherals	1st HDU	2nd PER.	3rd PER.	4th PER.	5th PER.	6th PER.	7th PER.	SCSI Controller

This condition is valid for all SCSI controllers, basic and additional (in the case of an additional controller, not necessarily does an HDU have to be present). For the RAID GO2061 SCSI controller especially, this condition is valid for all three channels while for the GO622 controller this condition is valid for both SCSI channel B (primary) and SCSI channel A, bearing in mind that channel A in this system is preferably used to connect external SCSI peripherals only.

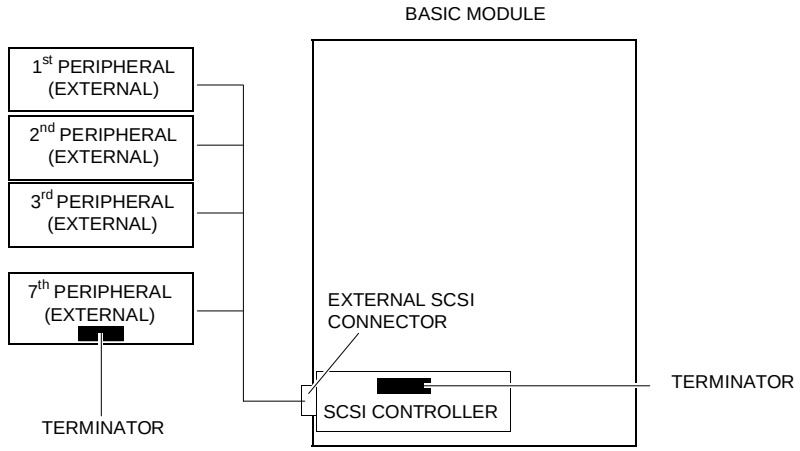
The SCSI ID of each peripheral is assigned by physically setting the jumpers or DIP-Switches on each peripheral. The SCSI firmware automatically acknowledges the peripheral ID so it is not necessary to indicate this value through the EISA Configuration Utility.
The SCSI controller ID is, on the other hand, set only by software through EISA Configuration Utility, or through the DPT Configuration Utility in the case of the GO2061 controller. The default value for all controllers, and for all channels in the case of multichannel controllers, is ID 7; this value must not be altered.

TERMINATION RULES

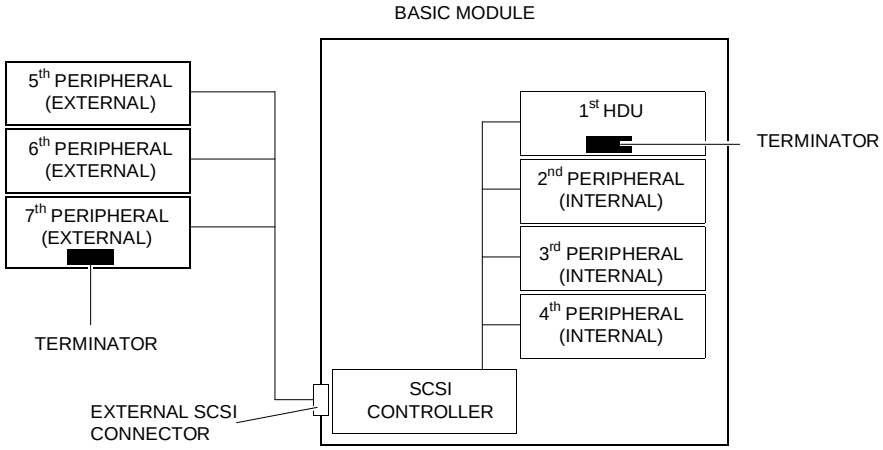
The SCSI channel must be terminated only at its ends (the first and the last devices on the bus), while the terminator must be removed from all the intermediate peripherals. Therefore if there are no external SCSI peripherals present, only the primary HDU installed in bay 1 and the primary channel of the SCSI controller (channel B for the GO622), must always be terminated.



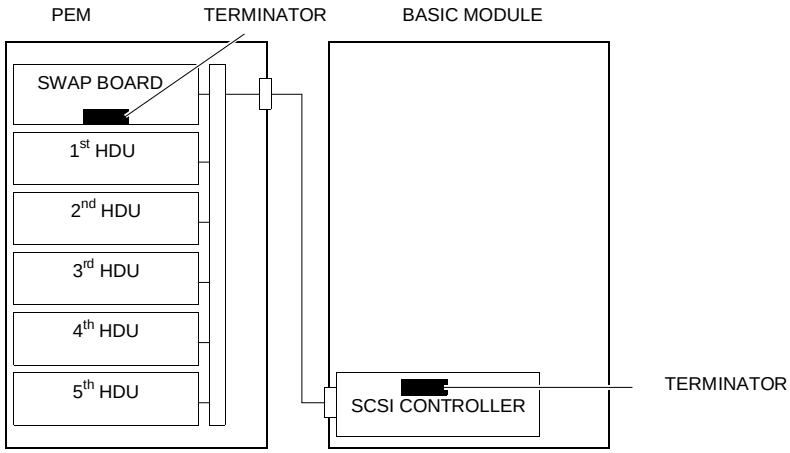
If the SCSI channel is used exclusively for the connection of external peripherals other than the PEM (only for the DAGGER and for channel A of ARROW), the terminator must be present on the controller and on the last external peripheral connected to the system.



If internal and external SCSI peripherals are connected on the same channel (for the DAGGER only), the termination must be removed from the controller but must be present on the primary HDU installed in bay 1 and on the last external peripheral connected to the system.



If an external PEM is connected, the terminator must be present on the controller (for the respective channel) and on the PEM (the terminator is always present on the swap board).



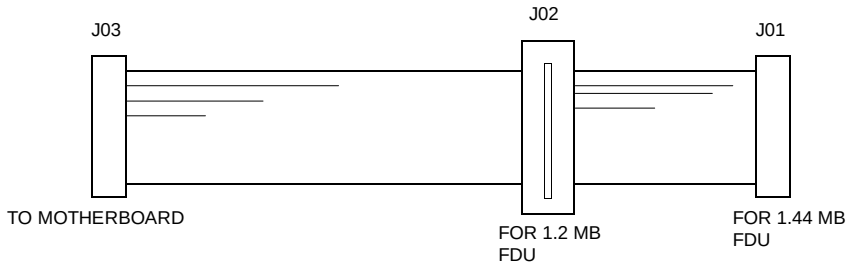
If the additional controller is used to connect internal peripherals only, or both internal and external peripherals, the same termination rules explained for the primary controller apply with the only difference that the terminated peripheral does not necessarily have to be an HDU.
As explained in the previous sections, the rules for teminating SCSI controllers can be summarized into the following points:

- For the GO622 controller, the teminators are all on the board, are active and always enabled for channel A. The terminators become enabled for channel B by simply inserting jumper SP31.
- For the GO624/2096 controller, the terminators are all on the board, are active and are always enabled. They are automatically disabled when connection is made to both internal and external SCSI connectors simultaneously.
- For the GO2044 controller, the teminators are all on the board, are active and can be enabled or disabled via software through the ECU. The default setting is "SCSI Termination Enabled" which must not be changed since internal peripherals and PEM cannot be connected at the same time.
- For the GO2061 controller, the terminators are all on the board, are active and can be enabled or disabled for each channel on the controller by means of the DPT Configuration Utility. The default setting for all channels is "SCSI Termination Enabled" which must not be changed since internal peripherals and PEM cannot be connected to the same channel.

The system first HDU must always be terminated internally (already terminated at the factory) by means of a resistor pack.
All other SCSI HDUs and removable peripherals internally connected to the system and on the same channel as the first HDU, are never terminated. During the installation phase a check must be made to make sure that all internal terminators present on the drive are removed (turn to Chapter 8 for the location of these teminators).
In configurations where the internal SCSI peripherals are not connected on the same channel as the first HDU, the termination must be made internally on the last drive of the SCSI channel (turn to Chapter 8 for the location of the terminators on the drive).
Any external SCSI peripheral, excluding the PEM, connected to the system is terminated internally and directly on the peripheral itself (refer to the documentation supplied with the peripheral for terminator locations).
The termination of the external PEM is always made on the swap board and cannot be removed.

CABLING OF PERIPHERALS

The motherboard has a channel that allows the management of 2 floppy interface peripherals. The interface cable is a flat cable with 3 connectors that links up on one side (J03) to motherboard connector CN2 and ends with two sockets for the connection of up to 2 FDUs.
The third connector (J01) is for the 1.44 MB primary FDU, the intermediate connector (J02) is for the optional 1.2 MB second FDU; this intermediate connector is card-edge type already prepared for 1.2 MB FDU connection and therefore does not require an adapter cable.

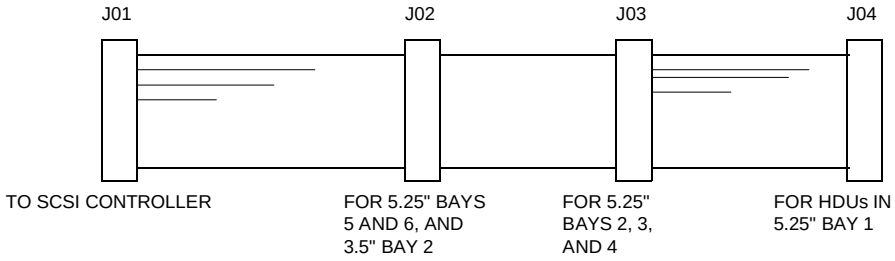


The internal SCSI peripherals are controlled by the dual-channel GO622 controller, the single-channel DAGGER controller, the single-channel GO2044 RAID controller or by the single-/tri-channel GO2061 RAID controller.

Two factory-fitted internal SCSI cables are available:

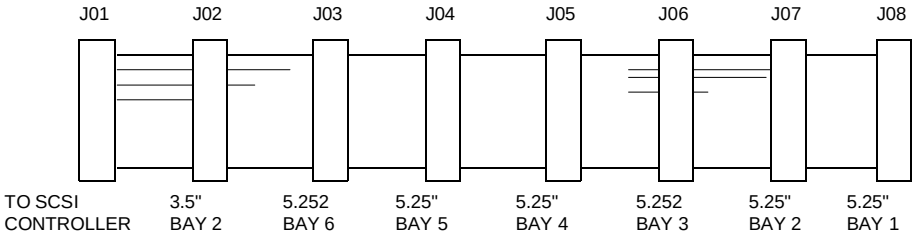
- A 4-connector cable capable of connecting up to three internal SCSI peripherals. This cable is only fitted on the first series SNX 140/160 Systema models.
- An 8-connector cable capable of connecting up to 72 internal SCSI peripherals (maximum configuration). This cable is fitted on second series SNX 140/160 Systema models, available starting from 1995, and on the SNX 160E Systema.

One end of the 4-connector SCSI cable is attached to the SCSI controller, the other end (J04) must be connected to the first HDU installed in the system 5.25" bay 1. The two middle connectors attach up to two peripherals installed in 5.25" bays 2 to 6 and in 3.5" bay 2.



If more than two SCSI peripherals other than the primary HDU need to be installed in the system, the 4-connector SCSI cable must be replaced by the optional 8-connector SCSI cable. The optional SCSI cable is supplied with the MEC 7000 kit which also contains 4 mechanical supports for the installation of HDUs and the screws needed to install 4 peripherals. Even if a removable peripheral which does not require the mechanical support is installed, it is still necessary to order MEC 7000 since this kit comes with the 8-connector SCSI cable.

Already fitted on more recent systems, the 8-connector SCSI cable is attached at one end to the SCSI controller and at the other end (connector J08) to the first HDU installed in the system 5.25" bay 1. The six connectors in between are used to connect the SCSI peripherals installed in the 5.25" bays 2 to 6, and in 3.5" bay 2.



The systems equipped with the 4-connector SCSI cable can configure a second HDU in 5.25" bay 2 (the mechanical support for this bay is already installed at the factory) and a removable SCSI peripheral in 3.5" bay 2 (DAT) or in 5.25" bays 5 or 6.
For any other installations, besides the peripheral, MEC 7000 must be ordered and the standard cable replaced by the 8-connector cable; in this case if, for example, an HDU is added it must be installed on the mechanical support and fitted in the next bay below the last one occupied, then connected to the SCSI cable connector that corresponds to the bay.

Second series SNX 140 / 160 Systema models, available from 1995, and the SNX 160E Systema, are already set at the factory to support the maximum configuration in terms of number of peripherals installed (8-connector SCSI cable and mechanical supports for each bay) and therefore do not require mechanical kit MEC 7000.

Note: *The MEC 7000 kit will not longer be available from 1995.*

As stated in the Termination Rules section, only the first HDU is terminated internally, therefore whenever peripherals are added to the BU, their internal terminators must be removed.

For the wiring of the internal peripheral power supply cables, see Chapter 4 where the power supply is described.

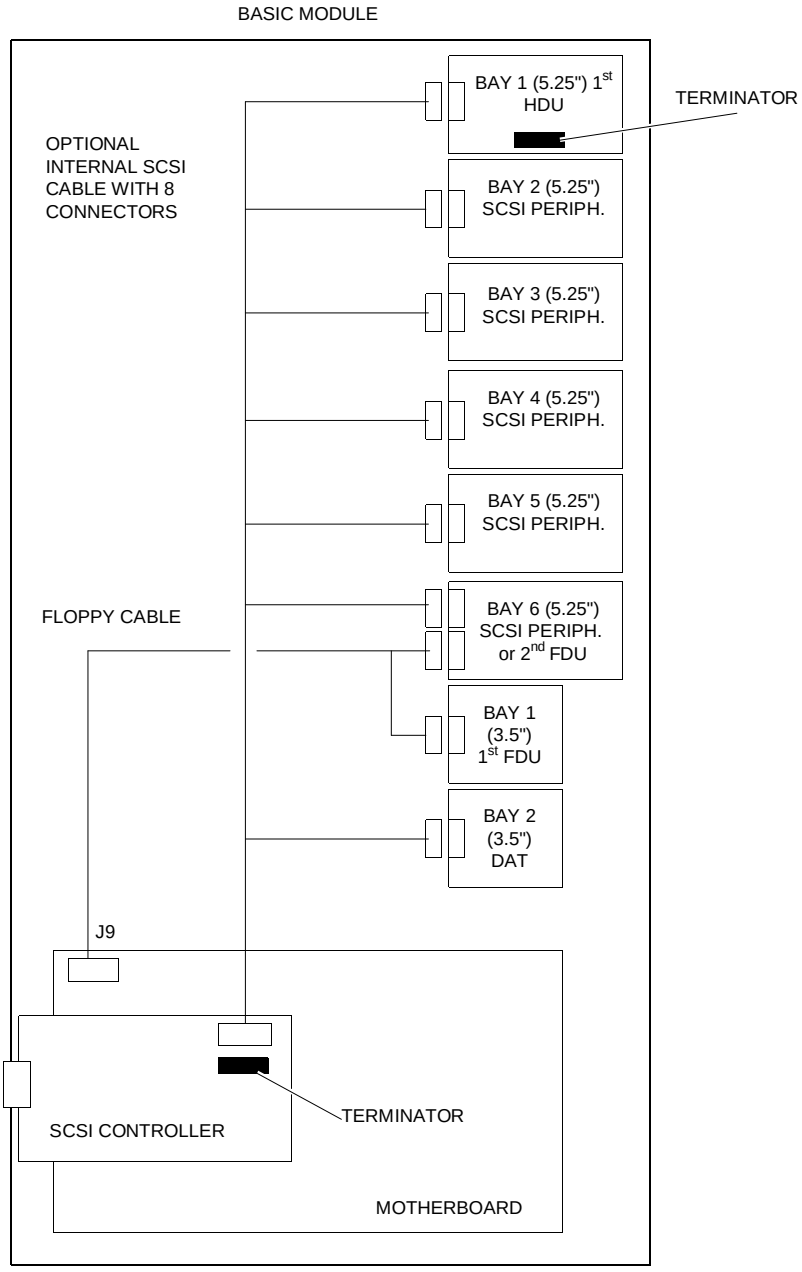
If an additional SCSI controller is used for connecting internal peripherals, you will need to order the 4-connector internal SCSI cable CBLI SNX-3 to be able to attach up to three SCSI peripherals, the 3-connector CBLI SNX-2 to be able to attach up to two SCSI peripherals or, for earlier systems, mechanical kit MEC 7000 which contains the 8-connector cable. The procedure for connecting to peripherals and to the controller is the same as the procedure explained for the primary SCSI controller, the only difference being that the connector on one end of the cable does not necessarily have to be connected to an HDU.

External peripherals can be connected to the system's external high density SCSI-2 connector using SCSI cable CBL 5350 if the external peipheral is a PEM, otherwise using SCSI cable CBL 5365. Any additional peripheral can connect in daisy-chain formation using cable CBL 8917; the maximum length of 6 meters allowed for a SCSI channel must be respected.

SCSI CABLES

PDG	VAR.	DESCRIPTION	LENGTH (m)
CBL 5365		External SCSI cable which adapts high density (SCSI-2) 50-pin SCSI connectors to low density (SCSI-1) 50-pin connectors.	1.5
CBL 8917		External SCSI cable used for the daisy-chaining of external SCSI peripherals.	0.4
CBL 5350	CAV 231	External SCSI cable used for connecting the system basic module to the first or second PEM. This cable has two high density 50-pin SCSI connectors.	0.75
	CAV 232	External SCSI cable used for connecting the system basic module to the third or fourth PEM. This cable has two high density 50-pin SCSI connectors.	1.1
CBLI SNX-3		Internal SCSI cable used for connecting up to three magnetic peripherals. This cable is identical to the 4-connector internal SCSI cable used on the basic systems and is only used when performing internal connections with an additional SCSI controller.	
CBLI SNX-2		Internal SCSI cable used for connecting up to two magnetic peripherals. This cable is used only when performing internal connections with an additional SCSI controller.	

The following figure shows how the internal magnetic peripherals are cabled using the 8-connector SCSI cable.



CONFIGURATION OF PERIPHERALS ON THE SNX 140/R 160/R SYSTEMA AND ON THE PEM 100/R

STRUCTURE FOR DISCONNECTING HDUs (HOT SWAPPING)

A structure integrated in SNX 1XX/R Systema models and in the PEM makes it possible to handle the Hot Swapping feature with the help of the RAID SCSI controller. Hot swapping is the possibility of automatically replacing a faulty hard disk drive without

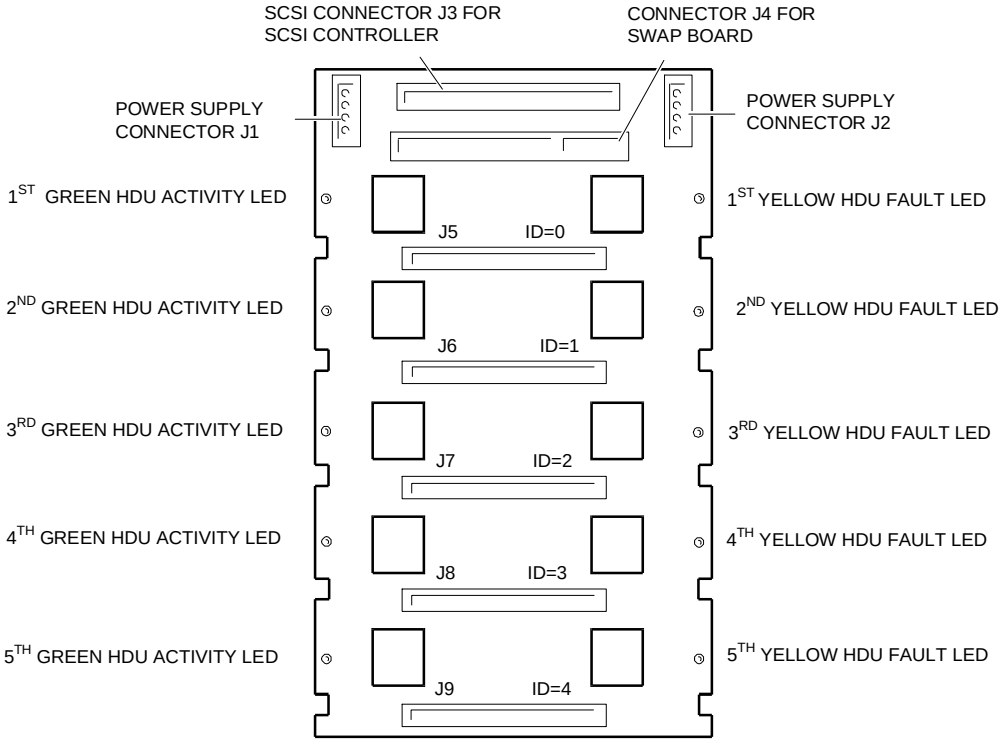
stopping system operations, and of automatically rebuilding the lost data on the new hard disk. This structure consists of the following modules:

- IF556 SCSI back plane.
- IF557 swap board.
- Mechanical structure.
- HDU support frame.

SCSI BACK PLANE IF556

Notes:

- *SCSI connectors J5, J6, J7, J8 and J9 are where the HDUs are connected. These connectors make it possible to directly connect the back plane to the hard disk drive. They are 80-pin connectors that, besides supplying the standard signals, also supply power, the SCSI ID and some control signals. An identifier (SCSI ID) for each HDU is set on the back plane in increasing order from top to bottom (J5=ID0, J6=ID1, J7=ID2, J8=ID3, J9=ID4). This ID cannot be changed.*
- *In each disk area there are two springs which guarantee connection to reference ground and allow the generation of a Swap signal when an HDU is inserted or removed.*



- *Disks that are not connected to the SCSI back plane must be completely removed from the system. Even though disconnected from the bus, the disks maintain their ground connection as long as they are installed in the peripheral rack.*

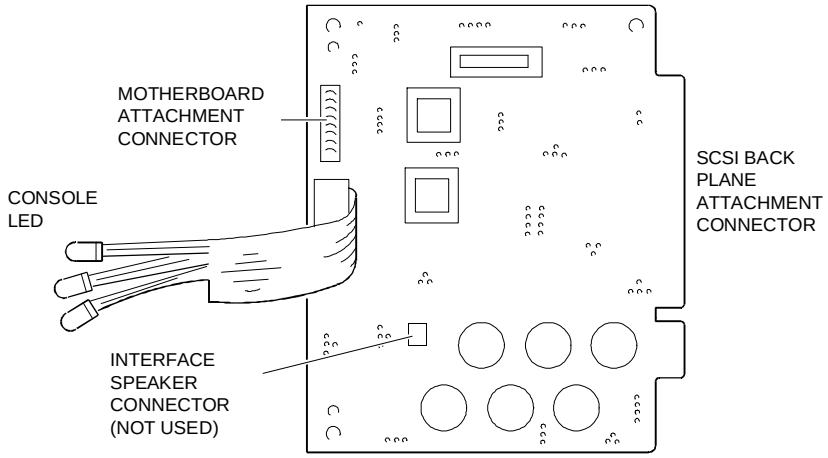
BOARD IF556 (P.c.b. Code 794119 V) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
7/95	Nasc	935994 G	The board is introduced.	Factory

SWAP BOARD IF557

This board has the following functions:

- **Management of Bus Fault Signals -** These signals are: MSWAP (pin 20); MSHOK (pin 22); MFCLK (pin 30); MFDAT (pin 34) and are compatible with the Digital for Storage Works specifications.
- **Temperature Control** - The swap board detects the temperature of the disk area (by means of a sensor on the swap board) and of the board area (by means of a sensor on the motherboard), and signals any error to the operator through the SYS FAULT LED on the console.



Temperature sensing in the disk area is also valid for the PEM.
The system's Starter Kit contains two diskettes with the drivers that control the temperature sensor. When the sensor detects a high temperature in the board or disk areas, the drivers will carry out the following operations:

- Send messages to the user indicating an overtemperature condition.
- Store the error condition in an error log file.
- Automatically shutdown the system.

If the system is also equipped with an external UPS and the software PowerChute plus 4.2 or later, besides the shutdown the system is also powered off to prevent the hardware from getting damaged.

- **Console LED Control** - There are three LEDs on the front of the box:
  - SCSI BUSY: This green LED indicates SCSI channel activity.
  - HDU FAULT: This yellow LED indicates when a disk is faulty. The faulty disk is identified by the corresponding yellow LED on the back plane.
  - SYS FAULT: This yellow LED indicates an incorrect temperature in the board and disk areas.
- **SCSI Bus Termination** - The swap board provides an active SCSI bus termination which is always present and which cannot be disabled.

BOARD IF557 (P.c.b. Code 794125 K) EVOLUTION

DATE	LEV.	VIMO CODE	REASON FOR CHANGE	APPLIC.
7/94	Nasc	936006 N	The board is introduced.	Factory
10/94	01		Incorrect Disk Fault indications are signalled: make a few wirings and interruptions.	Factory
3/95	02		Addition of a two-way J6 speaker connector, required for SNX 160/RS systems.	Factory

MECHANICAL STRUCTURE

The mechanical structure consists of a rack capable of accomodating five 3.5"x1" HDUs, the swap board and the console LED support. The back plane is fitted at the top of the rack while the panel that prevents unauthorized access to the disk area is fitted on the front. This panel has a lock that can only be opened with the appropriate key.

HDU SUPPORT

HDU support consists of a metal box capable of accomodating a 3.5" hard disk with an 80-pin SCA (Single Connector Attachment) connector designed to be directly connected to the back plane. This support has two light conveyors used to route the light indications from the LEDs on the back plane to the front of the box. It is equipped with a handle that simplifies disk insertion and removal, and a support blocking cursor to secure the disk installed.

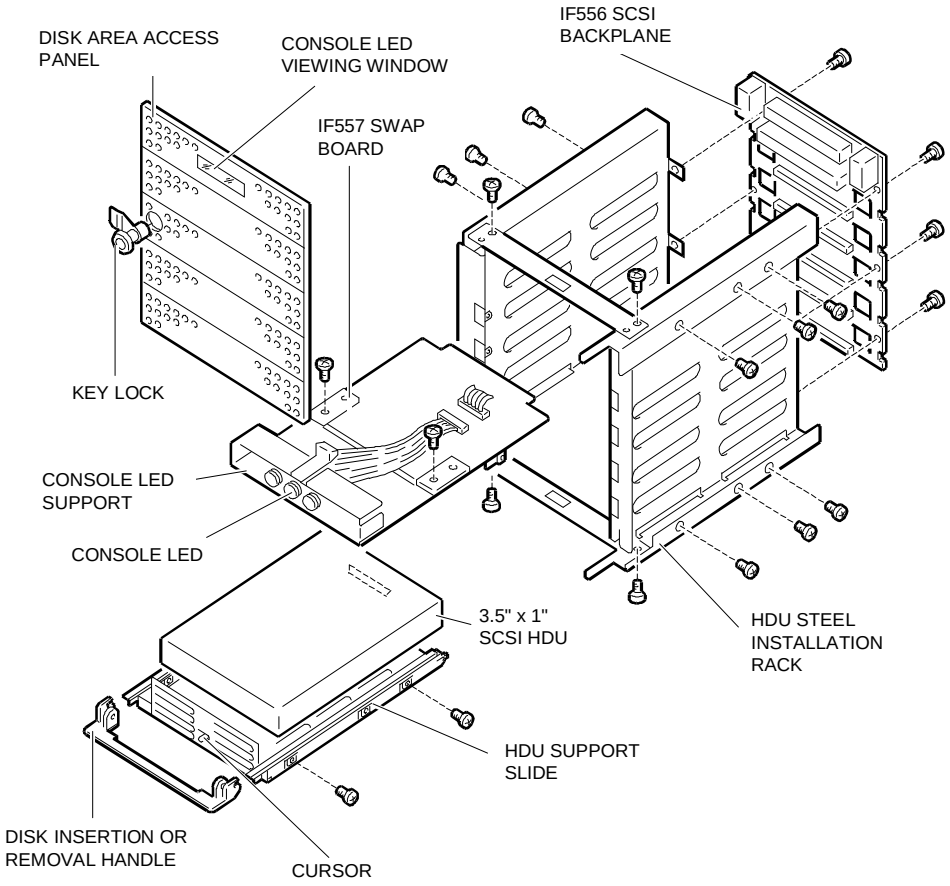
Note: *The support blocking cursor is not fitted on more recent systems.*

FAULTY HARD DISK REPLACEMENT PROCEDURES

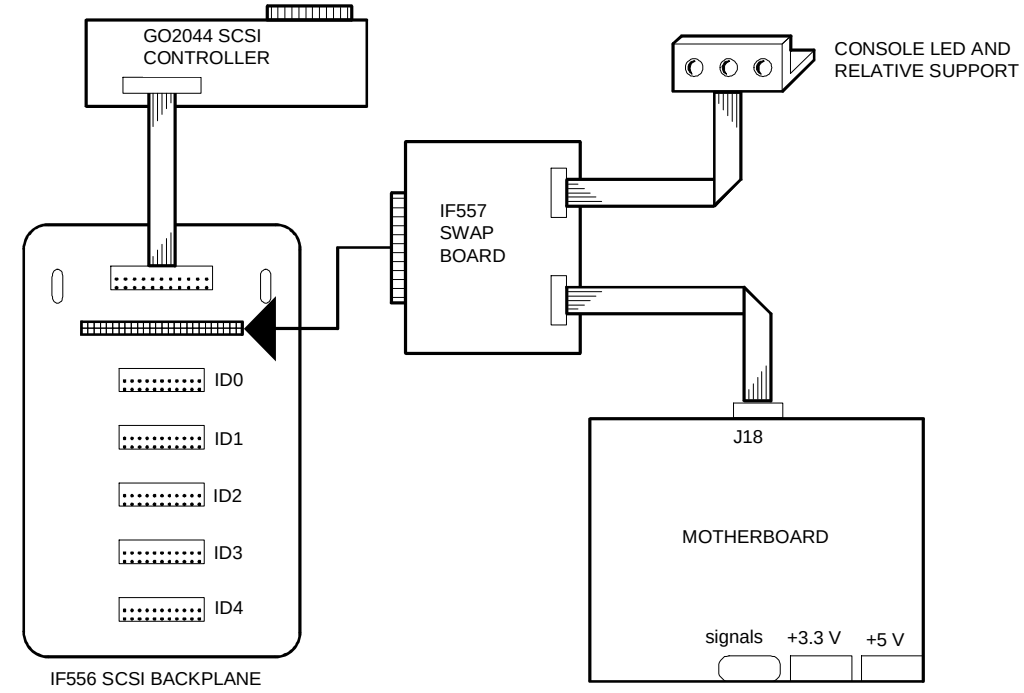
- The RAID SCSI controller finds a faulty hard disk and sends the swap board a command to light the HDU FAULT LED on the console.
- From the hard disk area the operator removes the HDU whose corresponding yellow LED is on, without powering off the system nor interrupting any activity underway.
- The swap board generates the swap signal and sends this to the SCSI controller.
- The operator inserts the new hard disk which must have the same capacity and physical characteristics as the one removed. In other words it must be a 1" high 3.5" drive with an 80-pin SCA interface.
- The swap board generates the swap signal and sends this to the SCSI controller.
- If the faulty HDU was part of a fault toleant disk aray (RAID 1 or RAID 5), the SCSI controller will begin to reconstruct the data of the old hard disk onto the new one. The HDU FAULT LED flashes during this data reconstruction phase.
- Upon completion of data reconstruction the SCSI controller sends the swap board a command to turn off the HDU FAULT LED on the system console.

Note: *When adding or replacing a system HDU with one which has already been used on another system equipped with a RAID controller, make sure that the hard disk is clear of all logic RAID markers, in other words the hard disk must be cancelled (ZAPPED).*
To cancel a hard disk, boot the system from the Storage Manager Utility diskette and press the CTRL-C key sequence to prevent the bootstrapping routine from automatically loading the utility. Manually activate the utility by typing the "dptmgr / ZAP" command at the DOS prompt. The utility will display the list of drives connected and will ask which one needs to be ZAPPED. Another method of cancelling one or more hard disks is by activating the CLEANHDU Utility. This utility comes on diskette and makes it possible to recover via software hard disks considered as being unrecoverable (see Appendix M).

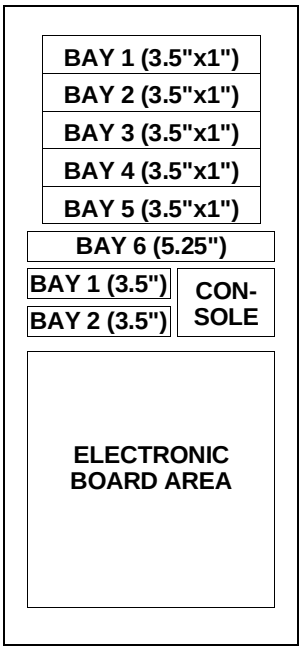
HOT SWAPPING DIAGRAM



HOT SWAPPING CONNECTIONS



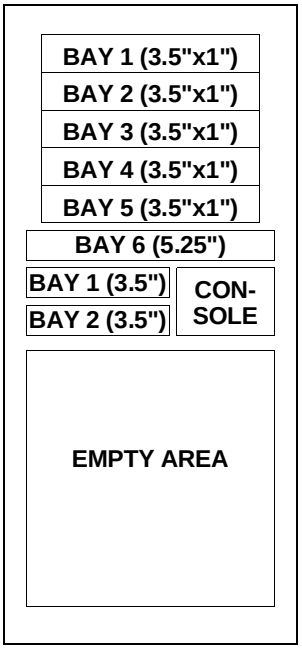
PERIPHERALS INSTALLABLE IN THE BASIC MODULE



BAYS	INSTALLABLE PERIPHERALS	NOTES
BAY 1 (3.5")	1.44 MB FDU (3.5")	3.5" bay 1 always hosts the system first 3.5" 1.44 MB FDU.
BAY 2 (3.5")	DAT (3.5")	3.5" bay 2 can only host an optional SCSI DAT drive.
BAY 1 (3.5"x1") BAY 2 (3.5"x1") BAY 3 (3.5"x1") BAY 4 (3.5"x1") BAY 5 (3.5"x1")	Hot Swap HDU (3.5"x1")	3.5"x1" bays 1, 2, 3, 4 and 5 can only host 3.5"x1" hot-swappable SCSI HDUs. The hard disks can have different capacitites except in RAID arrays where paired HDUs must be identical. Hot spare or replacement HDUs can have capacities greater than the drives replaced.
BAY 6 (5.25")	1.2 MB (5.25" HH) FDU or STU (5.25" HH) or CD-ROM (5.25" HH)	5.25" bay 6 can only host removable peripherals. Up to two removable SCSI peripherals can be installed in the system. The second 5.25" 1.2 MB FDU is the only non-SCSI peripherals that can be installed in the system.

Note: *There are no rules to follow as far as the bay filling sequence for HDUs is concerned. A few restrictions, however, do exist: for example, when using the SCO operating system in a channel that shares removable peripherals and HDUs, HDU bay 3 (ID=2) must be kept free since this ID is assigned to an STU. The bays are usually filled from top (bay 1) to bottom (bay 5).*

PERIPHERALS INSTALLABLE IN THE PEM 100/R



BAYS	INSTALLABLE PERIPHERALS	NOTES
BAY 1 (3.5") BAY 2 (3.5") BAY 6 (5.25")	Not used	The front bays which on the basic module are used to host removable peripherals, are empty on the PEM.
BAY 1 (3.5"x1") BAY 2 (3.5"x1") BAY 3 (3.5"x1") BAY 4 (3.5"x1") BAY 5 (3.5"x1")	HDU (3.5"x1") with SCA connector	3.5"x1" bays 1 to 5 can only host 3.5"x1" SCA SCSI HDUs. The bay filling sequence starts at bay 1 and proceeds down to bay 5.

SCSI CHANNEL CONFIGURATION

SNX 140/R and 160/R can only use configurations which include the GO2044 SCSI controller. Removable peripherals and HDUs can both be connected to this board; to avoid reducing system performance, however, it is suggested to connect the removable peripherals to a non-RAID controller.

The rules for configuring the SCSI channel state that all the devices connected (max. eight, controller included) must have a different identifier (SCSI ID) and that the bus be terminated at its ends only.

In all configurations where the peripherals are connected to the SCSI bus, the maximum length of the SCSI channel is 6 meters.

RULES FOR ASSIGNING THE SCSI ID

The particular structure of these systems automatically assigns the SCSI ID to the HDUs according to their position in the system rack. The following table therefore gives the SCSI ID assignments.

SCSI ID	0	1	2	3	4	5	6	7
Peripherals	1st HDU	2nd HDU	3rd HDU	4th HDU	5th HDU	2nd REM. PER	1st REM. PER	SCSI Controller

This condition applys for each GO2044 SCSI controller installed in the system. Bear in mind that additional SCSI controllers are preferably used only for connecting PEMs (with a maximum of five HDUs per module) and therefore removable peripherals cannot be connected.

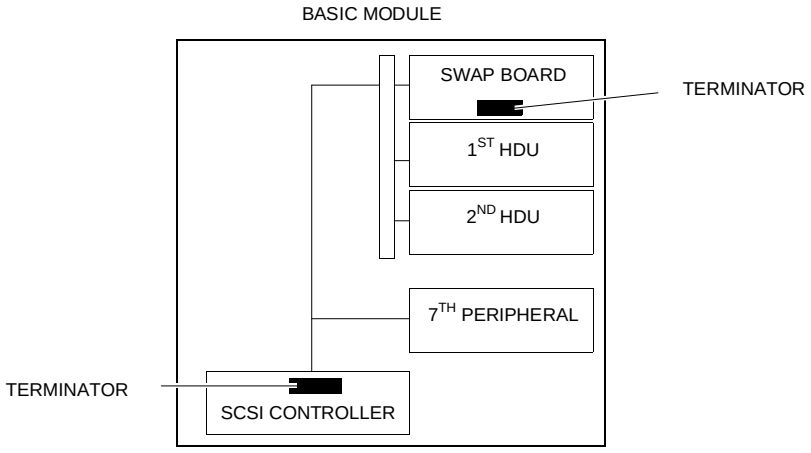
Note: *When using the SCO 3.2 operating system, the STU must be connected on the same channel as the HDUs and its ID set to 2. This results in the loss of an HDU bay.*

The SCSI ID s automatically assigned to the HDUs, while the ID is maually assigned to removable peripherals by setting the appropriate jumpers or DIP-Switches on each peripheral. Since the SCSI firmware will automatically recognize the ID for a determined peripheral, there is no need to reassign this value via software.
On the other hand, the SCSI controller's ID can only be set via software using the ECU. The default value for this controller is ID=7, which must not be changed.

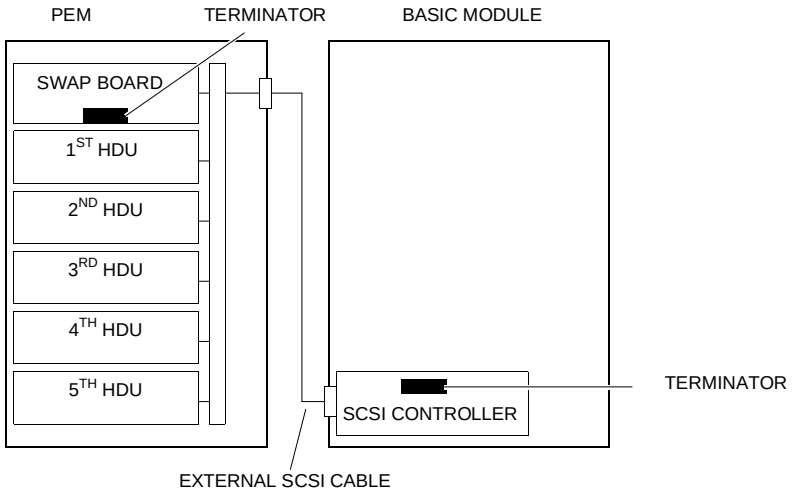
TERMINATION RULES

The SCSI channel must only be terminated at its ends (on the first and last device on the bus), while the terminator must be removed from all the peripherals inbetween. On these systems, the termination at the peripheral end is always made on the swap board and is a fixed termination. The termination at the SCSI controller end is made via software, through the ECU; the default setting is "SCSI Termination Enabled" which must not be changed since internal peripherals and an external PEM both cannot be connected to the same controller.

If connected to the same channel as the HDUs, the internal removable peripherals are never terminated, therefore during installation make sure that the peripheral's internal terminators are removed.



Even when connecting the external PEM, the terminator is always present on the SCSI controller and on the PEM's swap board.

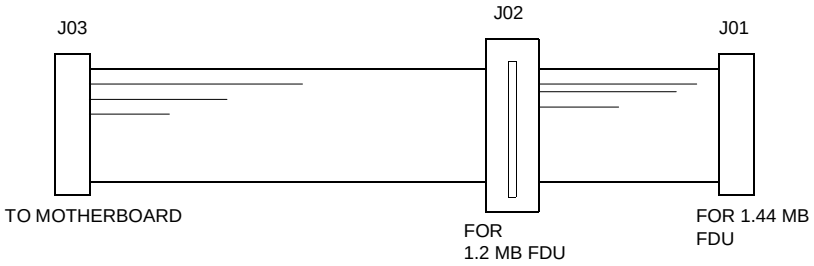


If internal removable peripherals are connected to the SCSI Dagger controller, the termination rules are the same as those explained for the additional GO624 controller, in other words both the controller and the last removable peripheral connected are terminated (by means of the peripheral's internal terminators).

CABLING OF PERIPHERALS

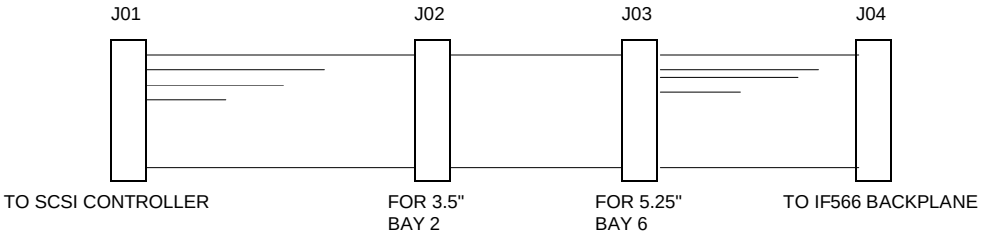
The motherboard has a channel that allows two floppy interface peripherals to be handled. The interface cable is a flat cable with 3 connectors that links up on one side (J03) to motherboard connector J9 and ends with two female sockets for the connection of up to two FDUs.

The third connector (J01) is for the primary 1.44 MB FDU, the intermediate connector (J02) is for the optional second 1.2 MB FDU; this intermediate card-edge connector is already prepared for connection to 1.2 MB FDUs and therefore does not require an adapter cable.



As far as the connection of SCSI peripherals is concerned, a four-connector internal SCSI cable, always present in the system, will be used. This cable allows the SCSI controller to be connected to the SCSI backplane and to two internal removable peripherals.

On one end the SCSI cable is attached to connector P10 on the GO2044 controller, connector J04 on the other end of the cable is attached to connector J3 on the IF556 SCSI backplane, while the two middle connectors are attached to two removable SCSI peripherals installed in the 5.25" bay 6 and in the 3.5" bay 2, respectively.



As far as the cabling of the power supply cables for the internal periperals is concerned, see Appendix A which explains the power supply.

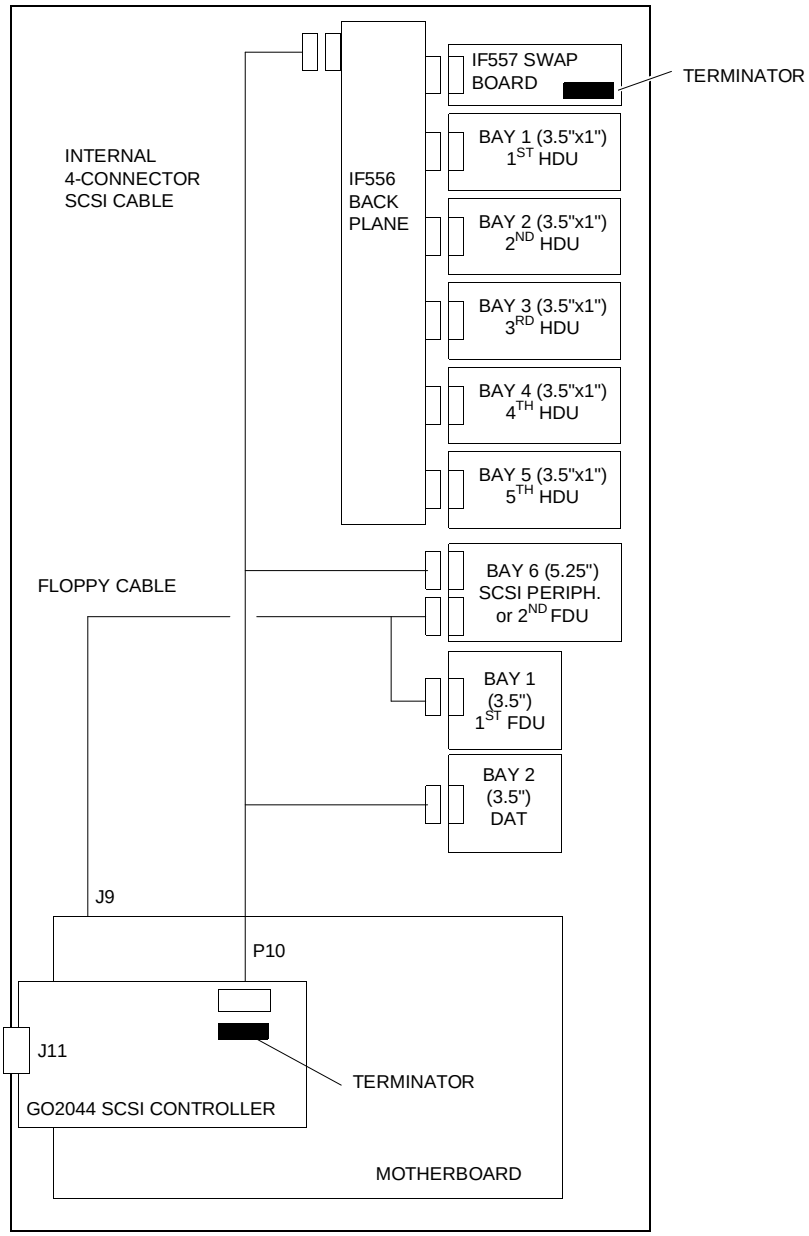
The external PEM is attached to the system's rear, high-density, SCSI-2 connector by means of external SCSI cable CBL 5350.

SCSI CABLES

PDG	VAR.	DESCRIPTION	LENGTH (m)
CBL 5365		External SCSI cable which adapts high density (SCSI-2) 50-pin SCSI connectors to low density (SCSI-1) 50-pin connectors.	1.5
CBL 8917		External SCSI cable used for the daisy-chaining of external SCSI peripherals.	0.4
CBL 5350	CAV 231	Extenal SCSI cable used for connecting the system basic module to the first or second PEM. This cable has two high density 50-pin SCSI connectors.	0.75
	CAV 232	External SCSI cable used for connecting the system basic module to the third PEM. This cable has two high density 50-pin SCSI connectors.	1.1
	CAV 265	Not used for the PEM 100/R	1.5
CBLI SNX-3		Internal SCSI cable used for connecting up to three magnetic peripherals. This cable is identical to the 4-connector internal SCSI cable used on the basic systems and is only used when performing internal connections with an additional SCSI controller.	
CBLI SNX-2		Internal SCSI cable used for connecting up to two magnetic peripherals. This cable is used only when performing internal connections with an additional SCSI controller.	

The following figure shows the internal cabling of magnetic peripherals.

BASIC MODULE



PEM 100/R

The PEM 100/R is an external expansion cabinet derived from the IRON box case. It is physically identical to the SNX 140/R 160/R Systema basic module and helps increase the number of hard disks that the system can use. This self-powered cabinet cannot be remotely powered on, and connects to the basic module only by means of an external SCSI cable. Having a resilience structure, the PEM can only hold up to five hot-swappable SCSI HDUs, the same type of drives that can be installed in the basic module. The basic module hosts the controller board that handles the HDUs. One of the following can be used: GO2044, GO2061, GO622, GO624/2096.

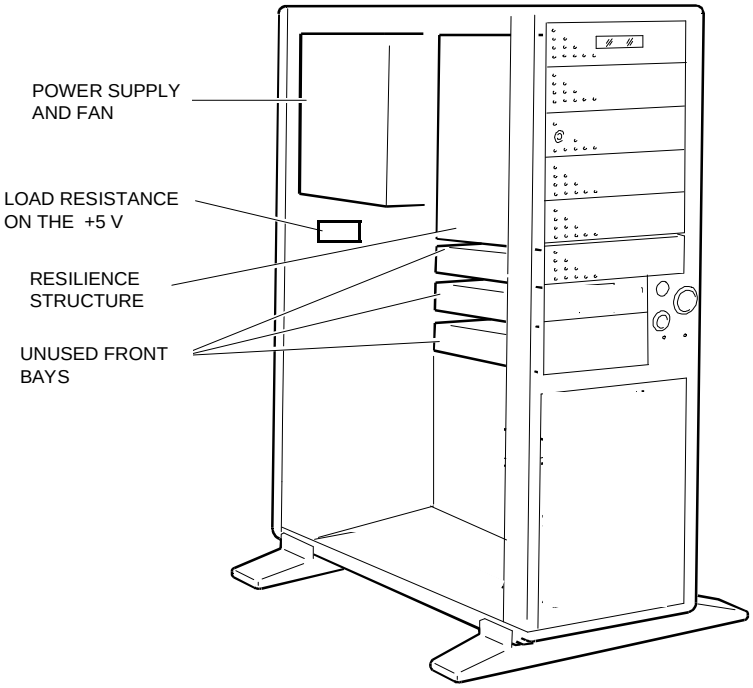
RAID array features, and therefore the hot swapping of hard disks (Holiplug), are only available if the PEM is connected to the GO2044 or GO2061 SCSI controller board. If instead the PEM is connected to the GO622 or GO624/2096 SCSI controller, the HDUs inside the PEM will only be seen as additional disks with respect to those in the basic module. In this case the LEDs on the resilience system will always remain off, with the exception of the HDU activity LED, and the hot swapping of hard disks will not be possible.

Since the PEMs cannot be powered on remotely by the basic module, a PEM cabinet power on sequence must be followed, whereby all the PEMs are powered on before the basic module. In this way, during the POD routine the SCSI controllers in the basic module will be able to detect the presence of the connected HDUs.

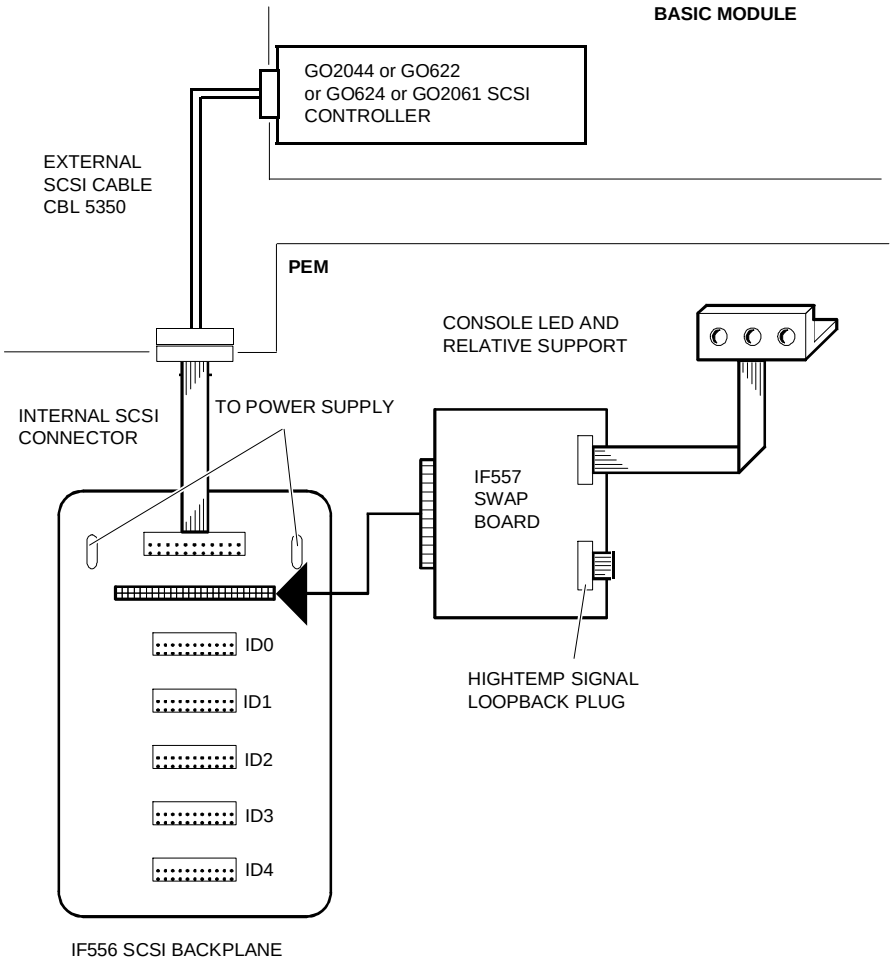
PEM COMPOSITION

The PEM 100/R has the following differences with respect to the basic module of the SNX 140/R and SNX160/R Systema:

- **Board Area** - On the basic module, the board area contains the motherboard and expansion boards, while on the PEM this area is empty; there are not boards present so there are no connections with the motherboard.
- **Console** - As far are the console is concerned, on the PEM only the power on button and system power on LED are active and are both connected directly to the power supply. On the basic module, the system power LED is connected to the motherboard. The reset button and the HDU activity LED are not active on the PEM; HDU activity is only indicated by the SCSI BUSY LED on the console of the resilience system.
- **Resilience System** - The motherboard and swap board are not connected together; a loop-back plug, inserted in the connector on the swap board, connects to ground the overtemperature detection signal for the motherboard area otherwise the SYS FAULT LED on the system console will always remain on. The connection between the SCSI back plane and the SCSI controller is an external connection made using the CBL 5350 SCSI cable. A SCSI cable inside the PEM connects the SCSI back plane using an external high density SCSI connector.
- **Power Supply** - The SP300T-3 power supply used by the PEM is identical to the one used in the basic module. Since this is a switching power supply, and power absorption at power on is too low because it has to power only the HDUs that start with a SCSI command, to maintain the tolerances a load resistor on the +5 V, located underneath the power supply, is connected between the +5 V and the ground of connector P8. Besides connector P8, among the power supply's internal connectors only P3 and P6 are used by the SCSI IF556 back plane, while among the external connectors only the display connector is not used.
- **Fans** - On the PEM there is no fan in the board area and there is no CPU fan. The PEM only has a power supply fan.
- **Front Bays** - The only peripherals that can be installed in PEMs are hard disks compatible with resilience systems. Therefore since no other peripherals will be installed on the PEM, the front bays of this module are empty, whereas the font bays on the basic module contain removable magnetic peripherals.



RESILIENCE PEM CONNECTIONS



CONFIGURATION

The following table briefly describes the possible configurations between the PEM and the systems.

SYSTEM BASIC MODULE	EXPANSION CABINET	SCSI CONTROLLER	DESCRIPTION
SNX 140/R Systema SNX 160/R Systema	Resilience PEM	GO2044	This is the standard resilience version obtained by connecting a resilience PEM to the GO2044 SCSI controller board already installed in the system, or to an optional GO2044 controller (HDCR 1E015).
SNX 140 Systema 66 MHz SNX 160 Systema	Resilience PEM	GO2044	This is the case when the user of a basic SNX configuration needs a resilience configuration, obtained by connecting a resilience PEM to an optional GO2044 controller board (HDCR 1E015).
SNX 160E Systema SNX 140 Systema 75 MHz	Resilience PEM	GO2044 GO2061	This is the case when the user of a basic SNX 160E/140 75 MHz configuration needs a resilience configuration, obtained by connecting a resilience PEM to an optional GO2044 controller (HDCR 1E015) or to an optional GO2061 controller (DCR PCI1/3).
SNX 140 Systema 66 MHz SNX 160 Systema	Resilience PEM	GO622, GO624	This is when the user of a basic SNX configuration needs to expand the number of hard disks currently in use while maintaining a non-resilience configuration. It is obtained by connecting a non-resilience PEM to a GO622 or GO624 controller board already installed in the system, or to an optional GO624 controller (SCC PCI 101).
SNX 160E Systema SNX 140 Systema 75 MHz	Resilience PEM	GO624 GO2096	This is when the user of a basic SNX 160E/140 75 MHz configuration needs to expand the number of hard disks currently in use while maintaining a non-resilience configuration. It is obtained by connecting a non-resilience PEM to the Dagger controller already installed in the system, or to an optional Dagger controller (SCC PCI 101).

Note: *The connection of a PEM to a resilience system through an optional GO624 SCSI controller (SCC PCI 101) is not available since it represents a degraded configuration.*

Avoid connecting more than three PEMs to the basic module. Each PEM has a dedicated SCSI controller and external SCSI cable CBL 5350 is used to connect the extenal SCSI connectors of the PEM and basic module.

The PEM cabinets are not mechanically connected to the basic module, but given the length of the external SCSI cable the PEMs are placed alongside the basic module. In the maximum configuration of three PEMs, the basic module is at the center with the PEMs on its two sides.

SCSI cable CBL 5350 is available in two versions: CAV 231 and CAV 232. CAV 231 is 75 centimeters long and is used to connect the PEMs that are closest to the basic module. CAV 232 is 1.1 meters long and is used to connect the PEM farthest away from the basic module.

As far as array configurations are concerned, turn to Appendix F which talks about the Storage Manager Utility.

■