OPERATOR GUIDE

AML/2

ABBA

MEDIA

LIBRARY

DOC B00 001

1 About Your AML/2 System

2 Before You Begin Working with AML/2

3 For Your Safety

4 About The AML/2 System

5 Operating The AML/2 System

1 About Your AML/2 System

1.1 Technical Data

1.1.1 Electrical Data

Equipment	European Values	North America Values
Power entire system	400 V + 6 %, -10% 3, N, PE	208 V ± 10% 3, N, PE
Fusing (customer´s site installation)	20 A wire fuse slow blow	20 A wire fuse slow blow
Voltage, power section	300 V =	
Frequency	50 Hz	60 Hz
Control voltage	24 V =	
Enclosure type	IP 50	

1.2 Components

The main components are:

- AML/2 management unit and operating panel
- robot system
- archive
- I/O unit

1.3 Emission

- heat
  - single-ABBA: max. 2.5 kW
  - twin-ABBA: max. 5.0 kW
- noise 80 dB(A)

1.4 Layout of Your AML/2 System

Symbol explanation:

AMU	ABBA management unit and operating cabinet
EA	I/O unit
HT	Hexa tower
LK	Drive controller
LW	Drive for cassette tapes
OD	Drive for optical disk
QT	Quadro tower
RS	Robot system
SK	control cabinets with control and supply components
WR	Maintenance room

1.4.1 Single-AML

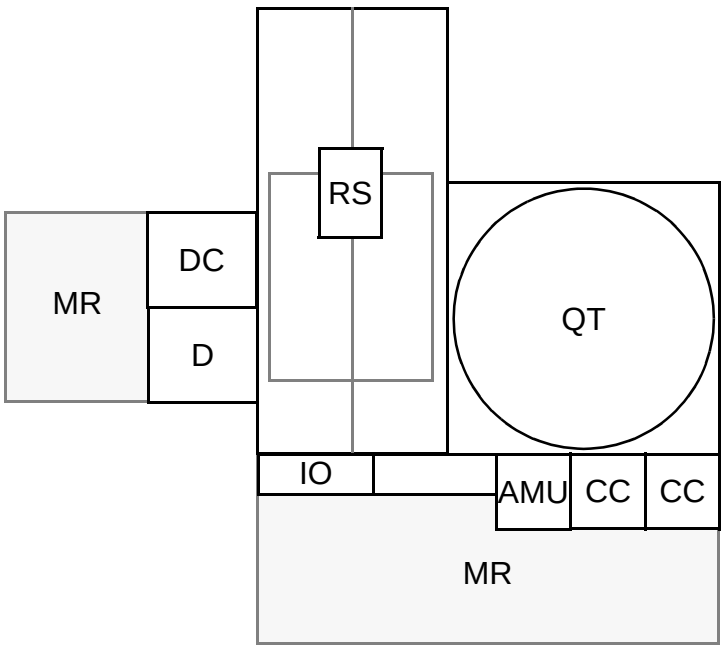

Fig. 1-1: Layout Example Single-AML

1.4.2 Twin-AML

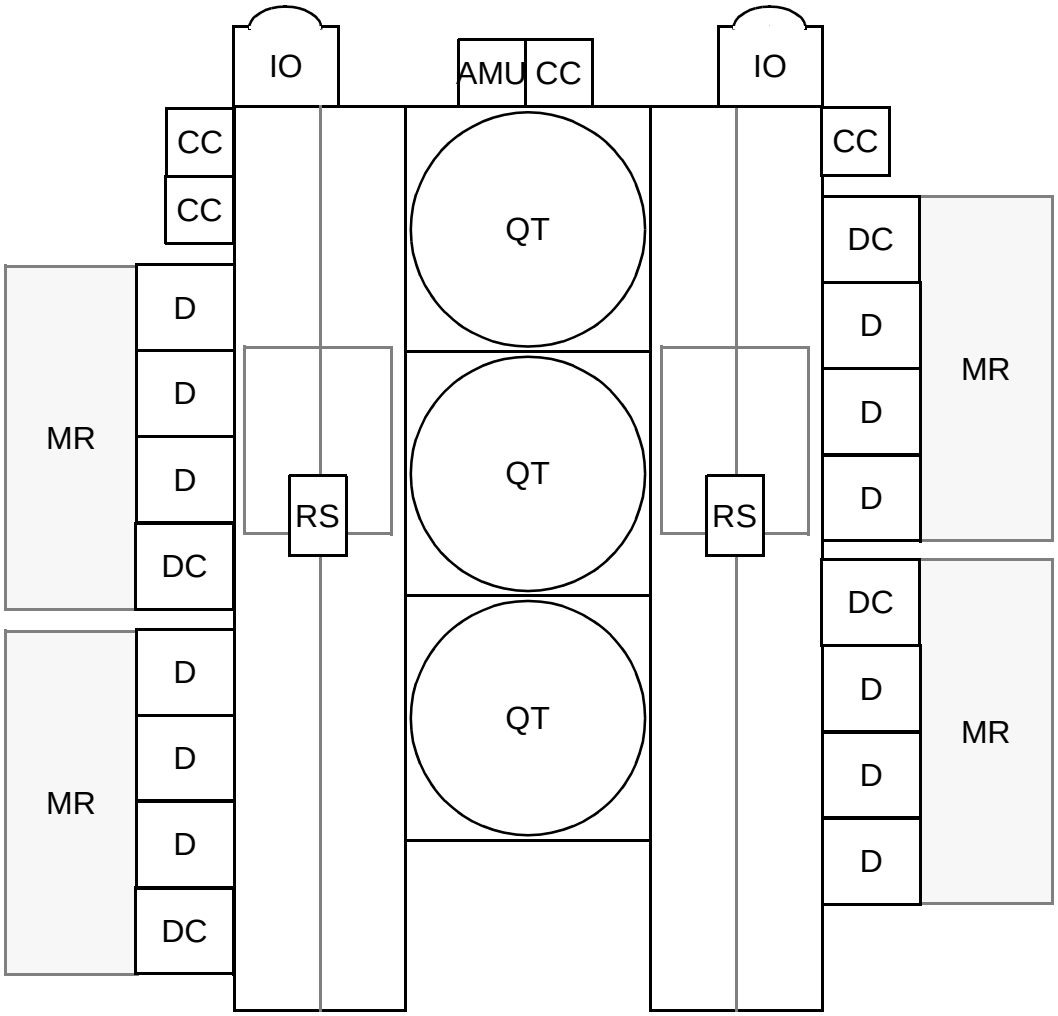

Fig. 1-2: Layout Example Twin-AML

2 Before You Begin Working with AML/2

2.1 Explanation of Symbols and Notes

The following symbols and highlighted passages draw attention to important information.



Explanations of these symbols (☞ “Hazard Alert Messages” page 3-2)

Information

Information important for understanding this introduction.

<KEY> Operating element/key on the operating panel or the keyboard of the AMU processor

<1> + <2> Press these keys simultaneously.

“ABCD” Switch position

ABCD Terms appearing on the AMU operating console

(☞ page 3-2) Reference to a description on another page

Address:

If you cannot solve problems with the aid of this document, please refer your enquiries to your trading partner:

GRAU Storage Systems GmbH & Co.

Eschenstraße 3
89556 Böhmenkirch

Germany

Telephone: +49 / 73 32 / 83-0
Telefax: +49 / 73 32 / 83-1 48

We will be pleased to give you every assistance.

2.2 About This Manual

This manual contains all information and instructions you need to operate the equipment safely.

You have received comprehensive training from GRAU Storage Systems and can operate the AML/2 system without endangering yourself or others.

WARNING!

Operation of the AML/2 system by untrained persons can lead to dangerous situations.

The consequence could be severe or fatal injury caused by moving parts or contact with live connections.

Introductroy training at GRAU Storage Systems therefore is an indispensible precondition for all who work with the AML/2 system!

As an operator, you also are responsible for ensuring that only qualified personnel authorized by GRAU Storage Systems carries out the following on the equipment:

- prepare for operation
- set-up
- start
- operate
- shut down
- maintain
- restart

Refer to this manual when you have an operating problem.
If you cannot solve a problem call the authorized service-partner or ask GRAU Storage Systems for assistance.

Please note however:

WARNING!

Som e work and adaptations you may carry out only if you have the appropriate qualifications and training!

And most importantly:

Be sure to read Chapter 3 "For Your Safety" from page 3/1, before you begin working with the equipment!

2.3 Product Observation

We are obliged by law to monitor our products even **after** delivery to the customer.

Therefore please communicate every point of interest.

- modified set-up data
- experiences with the product
- repetitive faults
- difficulties with this manual

For Europe and Africa:

EMASS/GRAU Storage Systems GmbH.
Eschenstrasse 3
89556 Boehmenkirch
Germany

Telephone: + 49 / 73 32 / 83-360
Telefax: + 49 / 73 32 / 83-367

For all other countries:

EMASS Inc.
10949 East Peakview avenue
Englewood, CO 80112
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001 / 303 / 792 / 9700
001 / 303 / 792 / 2465

2.4

3 For Your Safety

Information

In addition to the safety instructions in this manual, local and professional safety rules apply.

Avoid hazards when operating the equipment

- by safety-conscious behavior
- by careful action

Read and carefully observe the hazard alert information in this manual.

ATTENTION!

Knowing and observing the instruction are indispensible for operating the AML/2 system.

3.1 Intended Use

The offer and the order confirmation as well as the purposes for use defined in this document are part of the AML/2 documentation. Any use other than the specified is not considered intended use.

This equipment is designed for processing of

- magnetic tape casettes
- optical disks
- VHS-casettes

Any other application is not considered intended use.

GRAU Storage Systems shall not be held liable for damage arising from unauthorized use of the system. The user assumes all risks in this aspect.

Intended use also includes

- observing the instructions supplied with the equipment (Operator and Maintenance Guides)
- observing inspection and maintenance instructions

3.2 Hazard Alert Messages

We classify the hazards in several categories. The following table shows the relation of symbols, signal words, the actual hazard, and its possible consequences.

Symbol	Damage to...	Signal Word	Definition	Consequences
	**Peopel**	**DANGER!**	imminently hazardous situation	death or serious injury (maiming)
		WARNING!	potentially hazardous situation	possibly death or serious injury
		CAUTION!	less hazardous situation	possibly minor or moderate injury
	**Property**	**ATTENTION!**	potentially damaging situation	possibly damaging to: • the product • its environment
		Information	tips for users and other important/useful information and notes	no hazardous or damaging consequences for people or property

3.3 Further Symbols

The table below lists all symbols used in this manual and explains their meaning.

Symbol	Damage to ...	Signal Word	Definition	Consequences
	**People**	**WARNING! Hazardous Voltage!**	potentially hazardous situation replaces the pictorial  hazard of electric shock	possibly death or serious injury After an EMERGENCY STOP and also after switching off the main switch, voltage can still be present at the places marked with this symbol. Hazard of fatal electric shock.
	**People**	**CAUTION! Laser Radiation! Do not stare into beam!**	less hazardous situation Laser radiation	possibly minor or moderate injury Laser radiation when opened and interlock defeated
		CAUTION! Hazardous Radiation!	less hazardous situation Laser radiation	possibly minor or moderate injury Use of controls/ adjustments/performance of procedures other than those specified here within may result in hazardous radiation exposure.
		-	identifies the address of your contact person	no hazardous or damaging consequences for people or property

3.4 Area of Application

This information applies to the entire AML/2 system.

Further safety instructions for components used in the equipment are not invalidated by these instructions.

Information

Other manufacturers' documentation forms an integral part of the AML/2 documentation.

3.5 Intended Audience/Authorized Persons

3.5.1 Intended Audience

This manual is only intended for operators of the AML/2 system. Consequently, the hazard alert messages apply only to the operation of the equipment.

ATTENTION!

Additional rules and conditions apply to service and maintenance work.

The trained specialists of the customer and the maintenance personnel of the service partner are authorized to carry out service and maintenance work.

3.5.2 Authorized Personnel

Only trained personnel of the customer (operator training) are allowed to operate the AML/2 system.

The names of trained personnel of the customer and trained specialists of the service partner (maintenance technician training) are entered into the system logbook.

The system logbook can be found in a compartment on the inside of the control cabinet door.

GRAU STORAGE SYSTEMS

System Logbook

Order-No.:
Customer:
Address:
Contact Person: **Tel.:** **Fax:**

Trained staff of customer (VBG 4 / VDE 0105 / VDI 2853) :

Name:	Signature:	Name:	Signature:
	_____ _____ _____ _____		_____ _____ _____ _____

Service-Partner: **Tel.:** **Fax:**

Trained specialists of the service partner (VBG 4 / VDE 0105 / VDI 2853):

Name:	Signature:	Name:	Signature:
	_____ _____		_____ _____

Fig. 3-1: System Logbook

3.6 Guards

The system is equipped with the following guards:

- monitored access to the archive
- <EMERGENCY STOP> button
- monitored guard door to the Quadro tower
- operating mode selector switch

3.6.1 Access to the Archive

The archive is completely enclosed in a housing. The only access to it is a monitored guard door. The interlock is active when the main switch has been switched on.

The guard door cannot be opened in operating mode “AUTO”.

The housing around the archive serves as a **separating guard**. It separates the danger area of the AML/2 system from the normal working area.

The danger area (archive) of the AML/2-Systems is the area in which persons could be injured due to hazardous movements of the robot the handling unit or the storage towers.

Hazardous movements can be:

- expected movements
- unexpected movements

The guard door can be opened from the outside only with a key. The authorized person is responsible for this key.

WARNING!

In the archive movements of components can cause serious injury.

Access to this area is therefore restricted to authorized persons. Persons who have not been trained in the use of the system may only enter the archive under supervision.

Access to the library is permitted only

- **System is provided with a plug on the power supply cord (type „B“), disconnect system with the supply plug**
- **in the operating mode “EMERGENCY” after the key has been removed from the operating mode selector switch**
- **after switching off the reset switch and**
- **securing it against being switched on again**

Unauthorized persons are especially at risk in the danger area since they

- are not trained in operating the system
- are not aware of the hazards
- cannot correctly appraise the reactions of the system

3.6.2 <EMERGENCY STOP> Buttons

All <EMERGENCY STOP> buttons (operating panel, I/O unit …) have the same function: EMERGENCY STOP switches off the output electronics. All movements of the robot and the storage towers stop immediately.

When persons or property are at risk immediately press the nearest <EMERGENCY STOP> button.

Moving parts stop at once.

WARNING!
Hazardous Voltage!

Pressing an <EMERGENCY STOP> button will not render the entire AML/2 system voltageless. Only the drive amplifiers are switched off.

Emergency stop does not switch off:

- the control units of the robot(s) and the storage towers
- the AMU processor
- the drives
- the compressed air supply

Cut the power supply to these components at a suitable point (e. g. connecting plug or switch)!

ATTENTION!

If the <EMERGENCY STOP> buttons are frequently used contrary to their purpose, just to stop the system, this may lead to:

- **increased wear of mechanical parts**
- **damage to electronic and electric components of the AML/2 system**

Do not use the <EMERGENCY STOP> buttons to stop the normal operation of the AML/2 system.

Stop the system only with the appropriate AMU or host computer commands (☞ HACC/ROBAR)!

GRAU Storage Systems will not be responsible for damages caused by improper use of the <EMERGENCY STOP> buttons. The risk lies entirely with the user.

WARNING!

Movement of components inside the archive can cause serious injury.

Before releasing the <EMERGENCY STOP> buttons and before starting the AML/2 system, ensure that the start will not endanger persons or property!

3.6.3 Operating Modes of the AML/2 System

Operating mode "AUTO"

In the "AUTO" mode the host computer controls the AML/2 system.

WARNING!

Movements of components in the archive can cause serious injury.

In "AUTO" mode nobody must be inside the archive.

Before starting "AUTO" operation ensure nobody is in the archive.

a) Lock the operating mode selector switch in position “AUTO”
b) Carefully guard the key and keep it with you always

The archive access interlock is active when the main switch is on. The guards are activated when the luminous push-button <CONTROL ON> is pressed.

Information

This operating mode must be selected to start the ABBA/E system.

Operating mode "MANUAL"

"MANUAL" operation is intended for

- manual input and output of media
- manual operation of drives
- automatic movement of storage towers

ATTENTION!

Manual output alters the archive catalog!

In this operating mode only personnel entered in the system logbook (trained personnel and specialists) may work inside the archive.

WARNING!

In this operating mode the door lock of the archive is not active.

a) Lock the operating mode selector switch in position “MANUAL”

b) Carefully guard the key or keep it with you always.

The robot system is shut down.

The Quadro tower interlocks are active during movements.

Operating mode “EMERGENCY”

“EMERGENCY” operation is intended for

- manual input and output of media
- manual operation of drives
- manual movement of storage towers

In this operating mode only personnel entered in the system logbook (trained personnel and specialists) may work inside the archive.

WARNING!

In this operating mode the door lock of the archive is not active.

a) Lock the main switch in position “OFF”

b) Carefully guard the key or keep it with you always.

The robot system is shut down.

The Quadro tower interlocks are inactive.

3.6.4 Guard Door of Quadro Tower

In the “AUTO” operating mode the guard door of the Quadro tower

- must be open (ABBA/2-System).
- must be closed (ABBA/E-System).

The guard door is locked when the Quadro tower moves.

In the ABBA/E system it can be opened only in “EMERGENCY” operating mode.

Information for ABBA/2 twin systems

If both robots are to run in the “AUTO” operating mode the guard doors on both sides must be open.

If one robot is to run in “AUTO” and the other in “MANUAL” the guard doors on the side with the robot running in “MANUAL” must be closed.

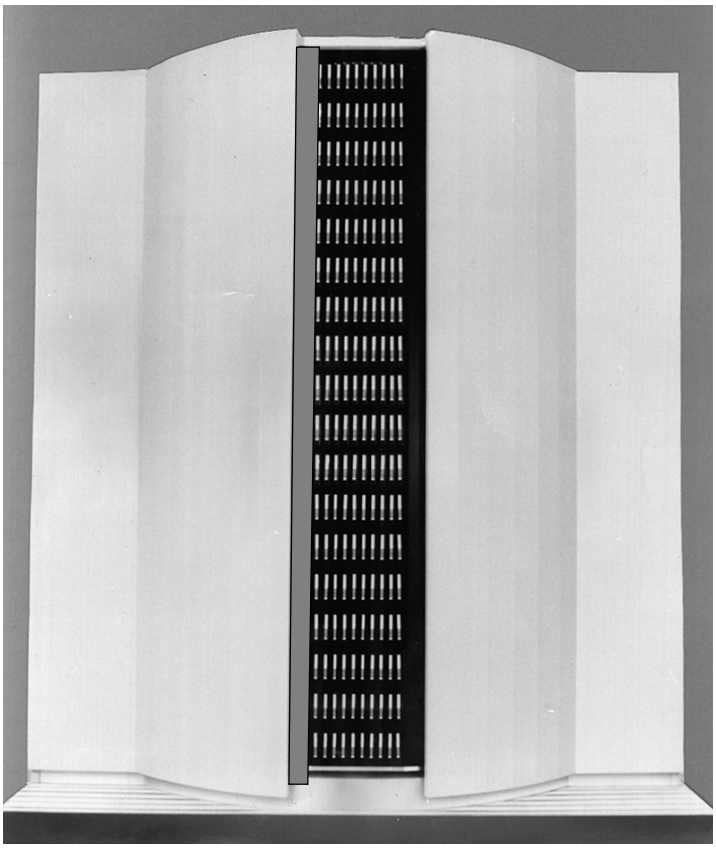


Fig. 3-2: Quadro Tower Guard Door

3.7 High Leakage Current

WARNING

High Leakage Current

Earth connection essential before connecting supply.

4 About The AML/2 System

4.1 General

The name **AML/2** is an acronym of the first letters of the German words

- **A**utomatisches (automatic)
- **B**andkassetten (tape cassette)
- **B**edienungs (operating)
- **A**rchiv (archive)
- **/2** means version 2 or the system

The host computer is connected to the AML/2 system via the AMU (ABBA Management Unit).

4.2 Components

The main components of the AML/2 system are:

- ABBA Management Unit (AMU) and operating panel
- robot system
- archive
- I/O unit
- control cabinets with control and power supply components

System layout (☞ page 1-2)

4.2.1 AML/2 Management Unit (AMU)

The AMU is the central interface of the autmatic AML/2 system. In normal operation ("AUTO") the host computer controls the system.

The AMU consists of hard- and software.

Hardware

IBM PS/2

- operating system OS/2 with Extended Services
- interfaces to
  - host computer
  - robot control
  - storage tower control
  - I/O unit

Software

The software consists of seven individual processes running in parallel (multi-tasking). Each process accomplishes a specific task.

- **HOC** (**HO**st **C**ommunication)
  Communication wiht
  - host computers
  - control ofand the storage towers
- **ARC** (**ARC**hive) management of the archive catalogue; SQL data base
- **KRN** (**K**e**RN**el) central logic, converts host commands into control commands
- **CON** (ABBA Operator **CON**sole) operator console
- **ART** (**A**le**RT**er) writes logs und traces
- **RFM** (**R**ho **F**ile **M**anager) transfers files (control software) between the AMU and the rho control
- **ARCBACK** (**ARC**hiv-**BACK**up) saves, protocols (journaling) and restores the archive catalogue (database)

Tasks of the AMU

- Host communication
  - interprets commands from the host
  - checks these commands for executability
- Archive catalog management
  - stores the logic coordinates of the compartments
  - assigns media to the compartments
  - keeps track of the status of compartments and drives
  - stores values for statistic evaluation
- Converts the logic coordinates into physical coordinates
- Communicates with the control units of the robot and the storage towers
- Operator interface
  - for initial operation
  - for service
  - for the operator
- Configuration (describes the specific structure of the archive)

Information

The AMU does not register the data content of media.

4.2.2 Robot System

The robot system acoomplishes the mechanical access to the physical archive and the drives.
It executes the commands of the AMU and sends a feedback signal to it.

Functions

- identifies media by reading the barcode
- carries out the handling commands (e.g. Mount, Keep …)

Components of the robot system

- swivelling arm robot (Bosch turboscara SR 80 G)
- gripper with camera (barcode scanner)
- lifting platform
- lifting column
- carriage
- track

4.2.3 Archive

The archive stores the media

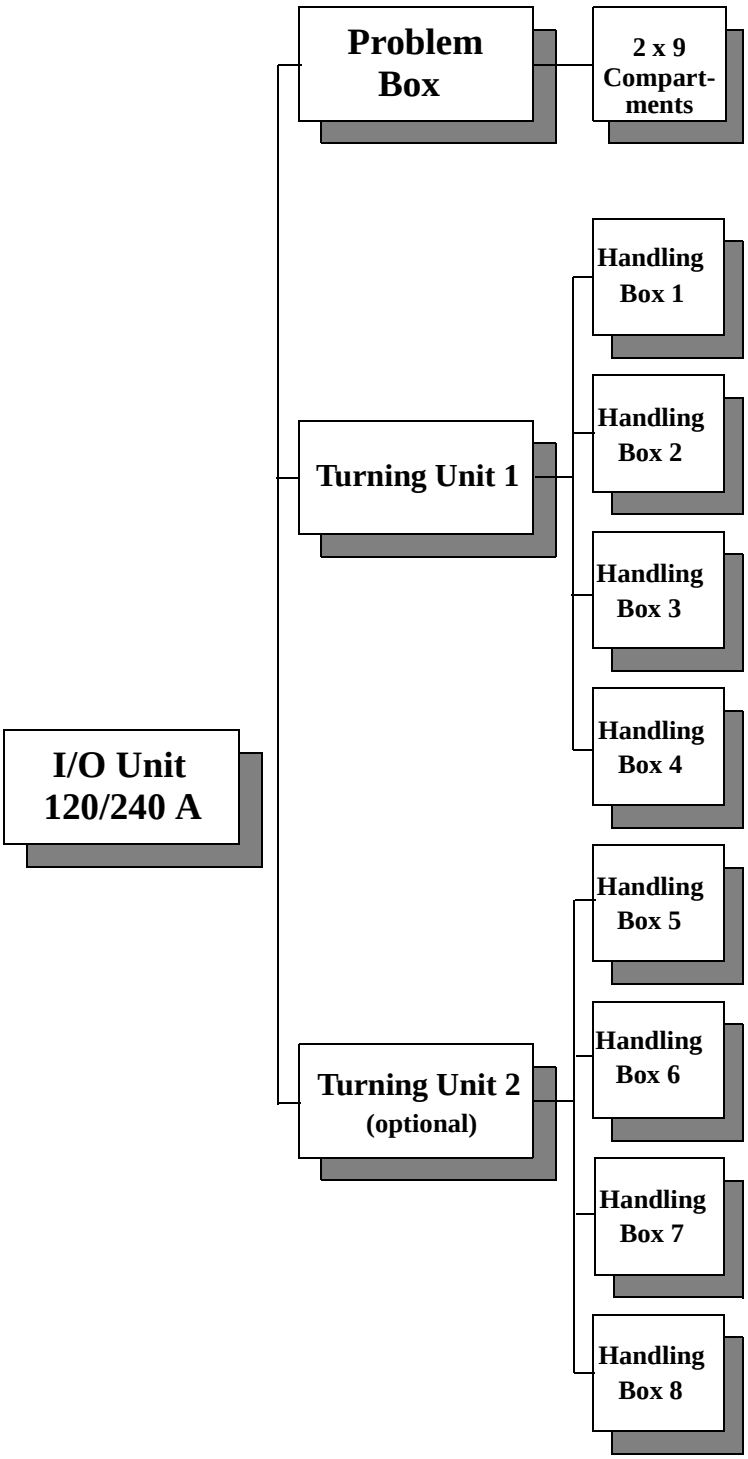
The archive is divided into compartments.

Logical coordinates define the position of each compartment in the archive.
Each medium in the system is identified by a barcode label with volser. The assignment of this number to its logical coordinates is stored in the archive catalog.

4.2.4 I/O Unit

The I/O unit inputs and outputs the media.

Diagram of the components:


I/O Unit
120/240 A
Problem Box
2 x 9 Compart-ments
Turning Unit 1
Handling Box 1
Handling Box 2
Handling Box 3
Handling Box 4
Turning Unit 2
(optional)
Handling Box 5
Handling Box 6
Handling Box 7
Handling Box 8

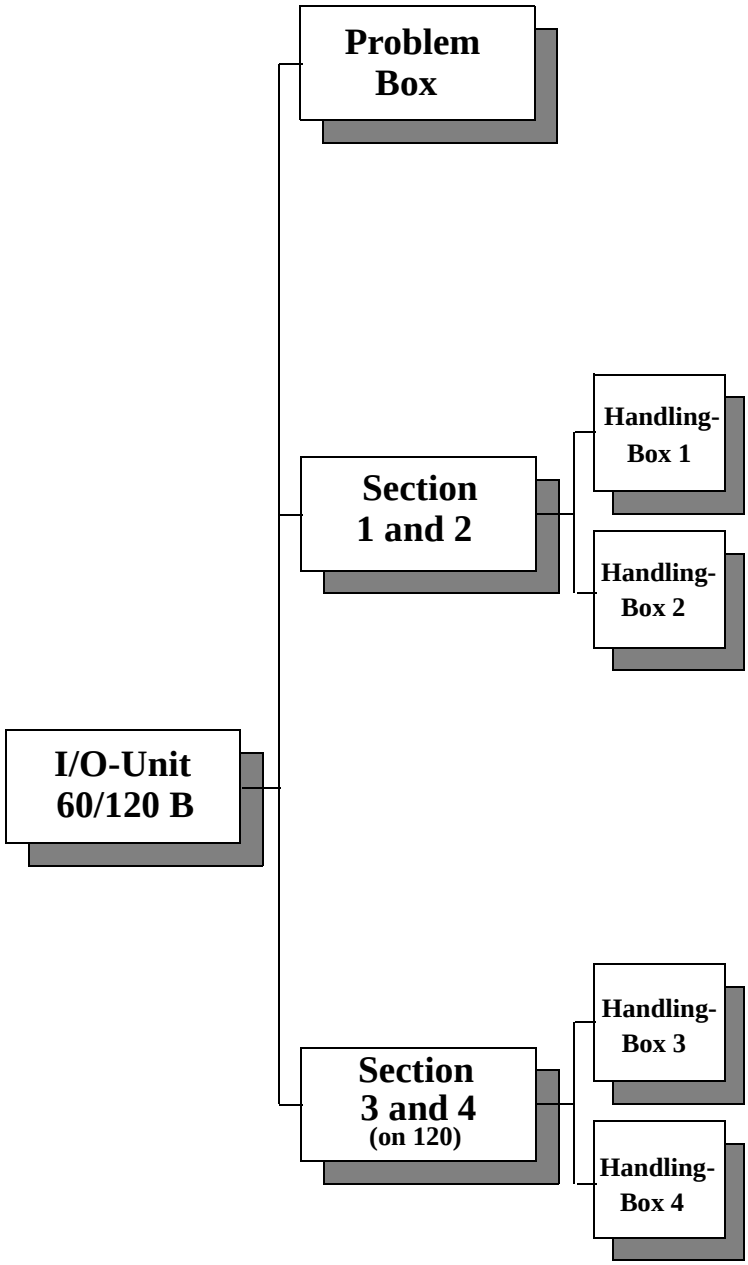
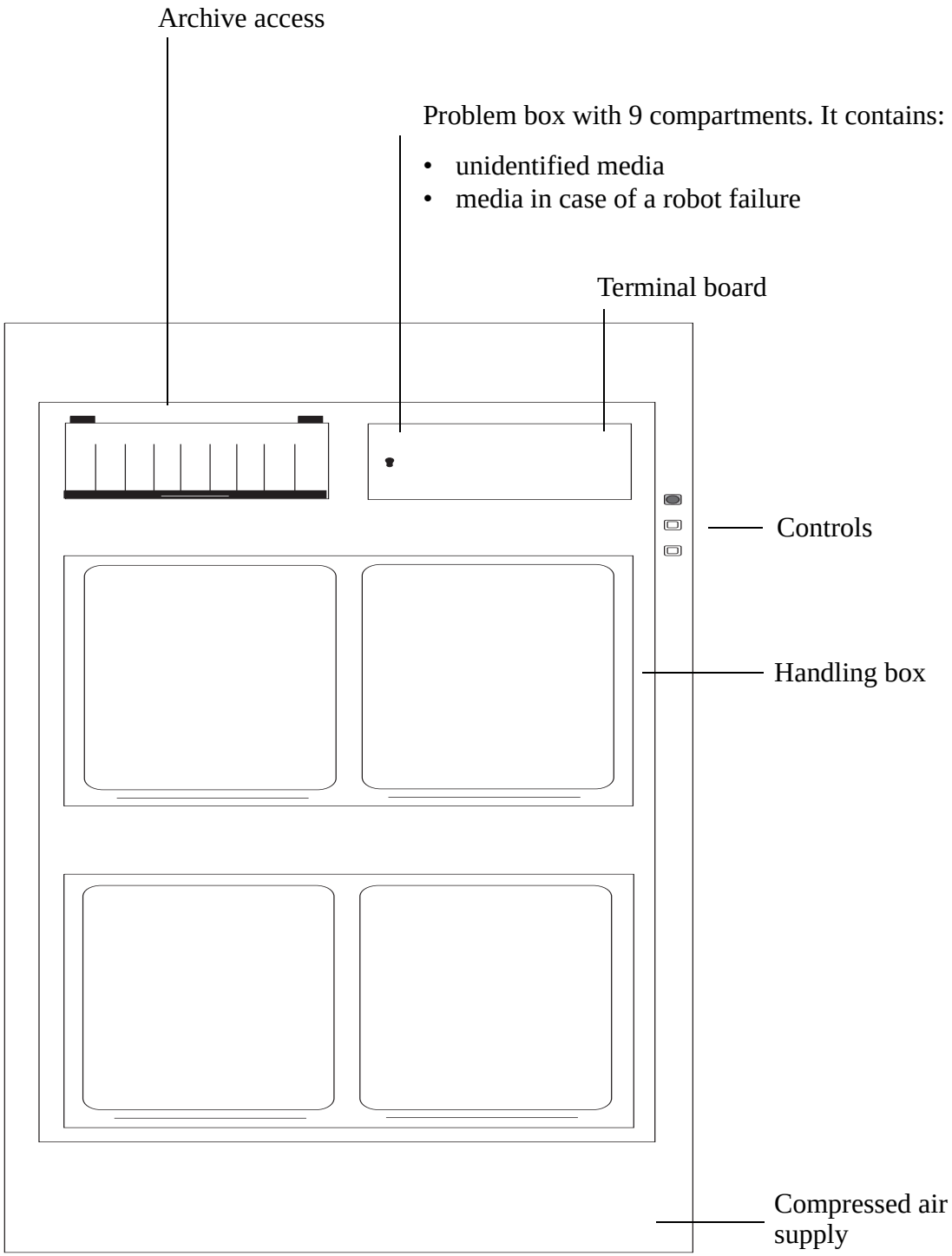
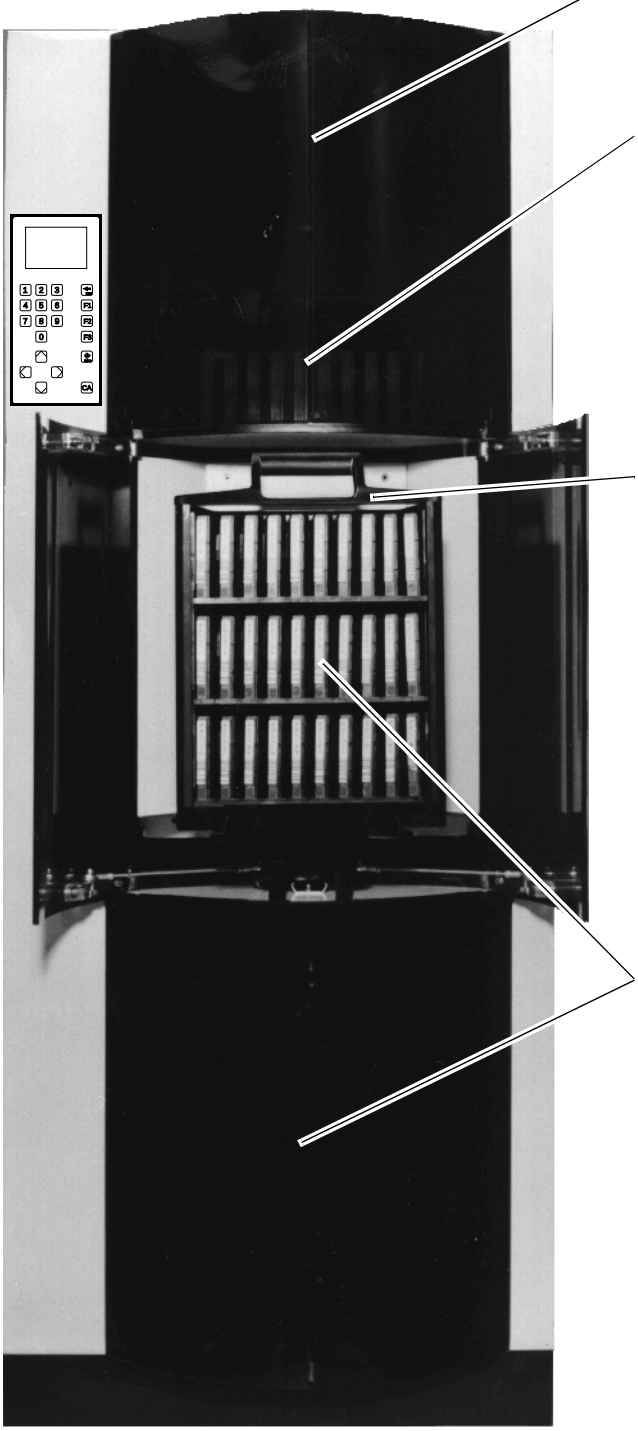


Fig. 4-1: Diagram of the I/O Unit

Overview of the I/O unit BA:





Compressed air supply of the ABBA/2 system

Problem box

The problem box has 2 x 10 compartments. It is turned manually.
It houses media which cannot be identified by the robot as well as used cleaning cassettes.

Handling box

Each handling box has space for

- 30 cassette tapes (type 3480) or
- 24 optical disks or
- 8 VHS cassettes

All handling boxes can be extracted. The robot takes the media from the handling boxes and files them in the archive or mounts them on drives.

Turning units

The two turning units work independently of one another. Select them via the operating panel of the I/O unit.
Each turning unit ist divided in four sections. These house the handling boxes.
The turning units move the handling boxes from the operator side to the side accessed by the robot system.

Fig. 4-2: View of the I/O Unit

4.2.5 Control Cabinet

Components

- drive amplifier and power supply unit 160
- rho control unit (Bosch IQ 140 M)
- supply voltage module
- Barcode scanner or image recognition system (BOSCH Vision System IRIS)
- Interface modem (only in conjunction with barcode scanner)
- visual recognition system (BOSCH Vision System IRIS)
- frequency converter for Hexa tower
- connector panel

4.2.6 Control Cabinet for 3 Quadro Towers and I/O Unit

Components

- drive amplifier and power supply 160
- rho control unit (Bosch IQ 140 M)
- supply voltage module
- plug connecting panel

5 Operating The AML/2 System

In "AUTO" operation the host computer controls the AML/2 system.

The operator only

- adds or
- removes

media from the archive and

- mounts
- removes

non-system media (☞ “I/O Unit (Handling)” page 5/38).

Commands are entered via the host computer console.

All AMU commands of the service menu are to be used only by service personnel and are password protected.

When the system fails the operator can process media in the "EMERGENCY" operating mode.

Procedure for hand operation:

a) switch off the equipment and secure it against switch on

b) enter the archive

c) shift the robot and stretch the robot arm

d) remove the crank of the archive access door

e) using the crank, rotate the storage tower into position

f) remove the medium

g) mount the medium in the drive

5.1 Operating Elements

5.1.1 AML/2 Operating Panel

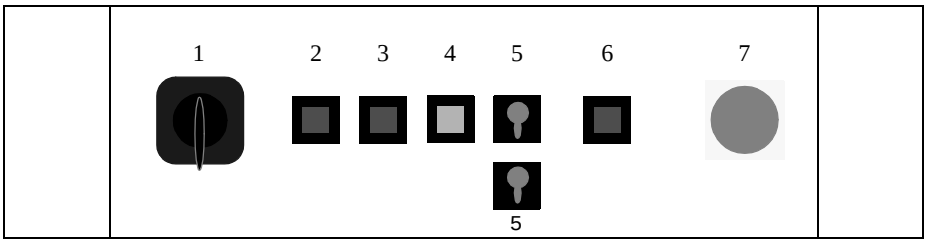


Fig. 5-1: AML/2 Operating Panel
(2 operating mode selector switches on twin systems only)

1	Main switch (lockable)	Switches the main power supply **WARNING!** **Hazardous Voltage** **The following are not controlled by the main switch:** • **drives** • **AMU processor** • **service power-socket** • **lighting** <CONTROL OFF> lights up when the controller is ready to operate but not active.

2	Luminous push-button (green) <SYSTEM ON>	The light inside the push-button lights up when pressed. It activates the EMERGENCY STOP control circuit. Preconditions • main switch is on • no <EMERGENCY STOP> button is pressed • guard door for archive access is closed
3	Luminous push-button (green) <CONTROL ON>	The light inside the push-button lights up when pressed. Activates the control unit of the robot and the storage towers. Preconditions: • main switch is on • <SYSTEM ON> lights up
4	Luminous push-button (yellow) <CONTROL OFF>	The lihgt inside the push-button lights up • when the luminous push-button has been pressed, • if one of the control units fails. Deactivates the controller of the • robot • storage towers
5	Operating mode selector switch (key switch)	Selects operating modes: • “AUTO” • “MANUAL” Each robot system has an operating mode selector switch.

6	Push-button <SYSTEM LIGHTING>	Switches the lighting of the danger area on and off.
7	<EMERGENCY STOP> button	Immediately stops all movements of the system. The drive amplifiers are switched voltageless. • <SYSTEM ON> switches off • <CONTROL ON> switches off • <CONTROL OFF> lights up  **DANGER!** **Correct the cause of the emergency situation before unlocking the <EMERGENCY STOP>!** Unlocking: • turn the push-button left.

5.1.2 Operating Panel I/O Unit

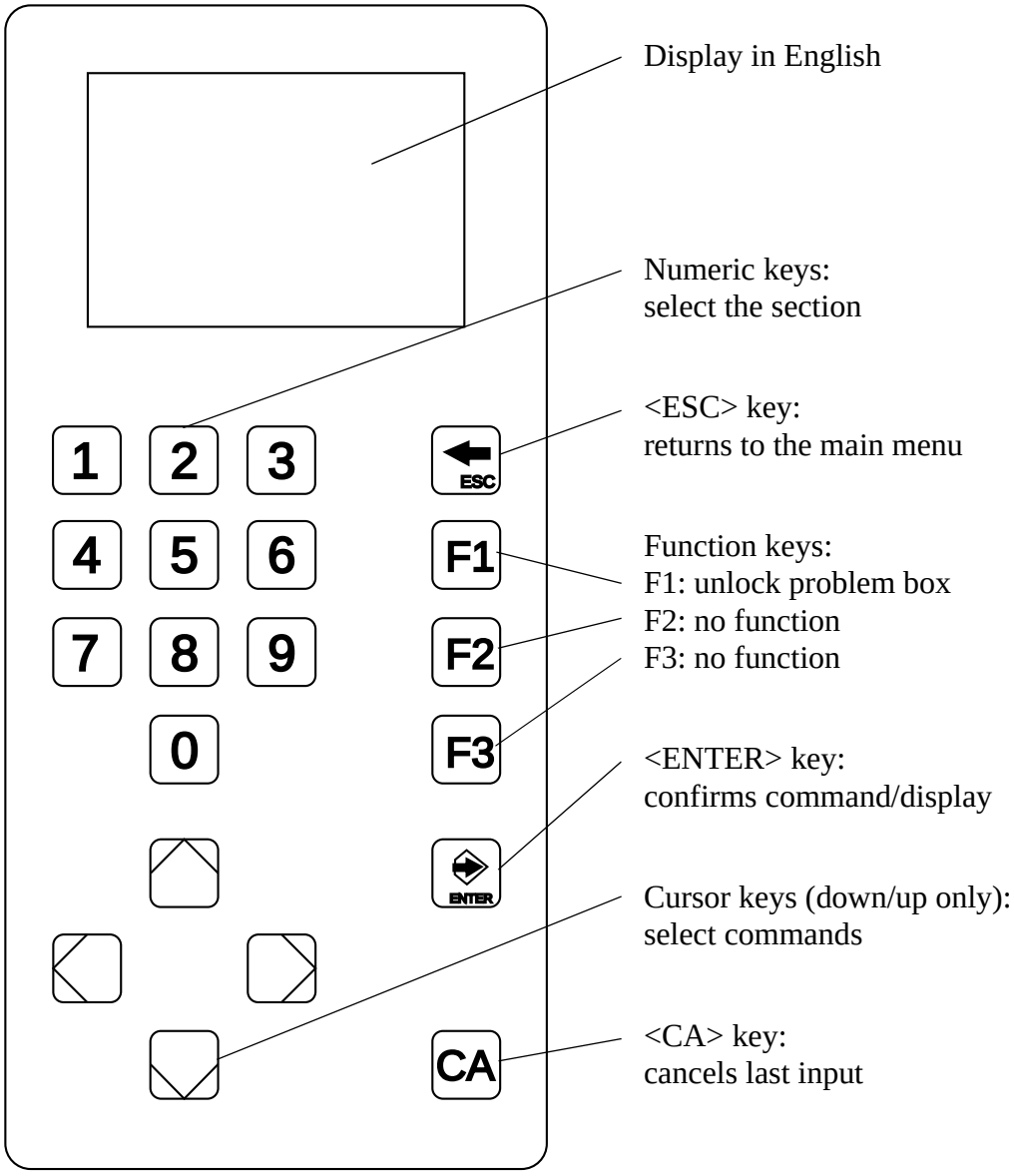


Fig. 5-2: Operating Panel of I/O Unit

5.2 Operating Panel of the AML/2 System

Instructions input via the operating panel of the AML/2 system (AMU operating panel) have the same priority as host instructions.

Input at the AMU must be restricted to the following situations:

- start and stop of the AMU
- in the „MANUAL“ operating mode

Information

All non-executable commands or options are displayed with a shadow.

5.2.1 Using the Operator Console

Layout and operation conform to SAA standards.

It is controlled by

- the keyboard
- the mouse

Further information is found in the OS/2 manuals.

5.2.2 Starting the Operating Console AMU

Information

Do this only when the operating console AMU is not shown on the monitor or has been quit unintentionally.

a) Press <CTRL> + <ESC> (process list).

b) Check whether AMU and KRN have already been started.

c) If both processes have been started change to the AMU (select the process and confirm by pressing <ENTER>).

d) If one of the two processes has not yet been started perform a system shut-down (☞ page 5/34) and then press <Ctrl> + <Alt> + <Del>.

5.2.3 Window Layout

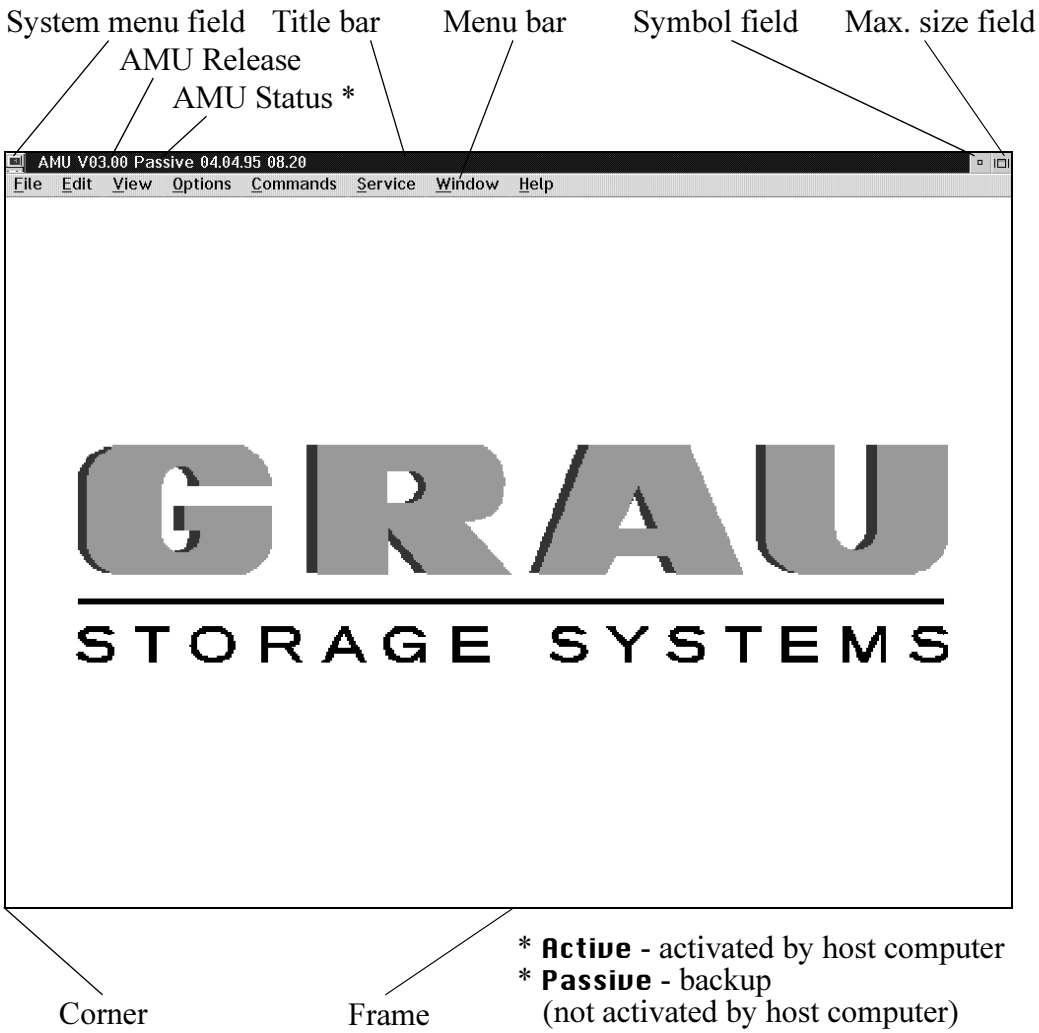


Fig. 5-3: Window Layout of Operating Console

Information

When the window is active the title bar has a green background. When the window is inactive the title bar has a gray background.

The following functions are the same in all windows:

Button	Function
	Cancels the current function and closes the window.
	Opens online help.

5.2.4 Selecting a Command

With the mouse

a) Move the mouse pointer to the desired menu in the menu bar.
b) Click on the menu; the menu opens.
c) Click on the command in the menu; the command window opens.

With the keyboard

a) Press the <ALT> key and the underlined letter in the menu bar. The menu opens.
b) Now press the underlined letter in the menu to select the command.

With a command code

If a key or a combination of keys is specified following the command you can directly select the command with it.

5.2.5 Altering a Window´s Size

Resizable windows have a frame all around (e. g. Trace window).

a) Move the mouse to any corner of the active window.
The mouse pointer changes into a double arrow.
b) Press the mouse button and pull the window to the desired size while keeping the mouse button pressed.

5.2.6 Moving a Window

a) Move the mouse pointer onto the title bar.
b) Move the window while keeping the mouse button pressed.

5.2.7 Closing a Window

Close the window by a double click on the system menu field.

5.3 Overview of Menus

All commands of the operating console are explained below.

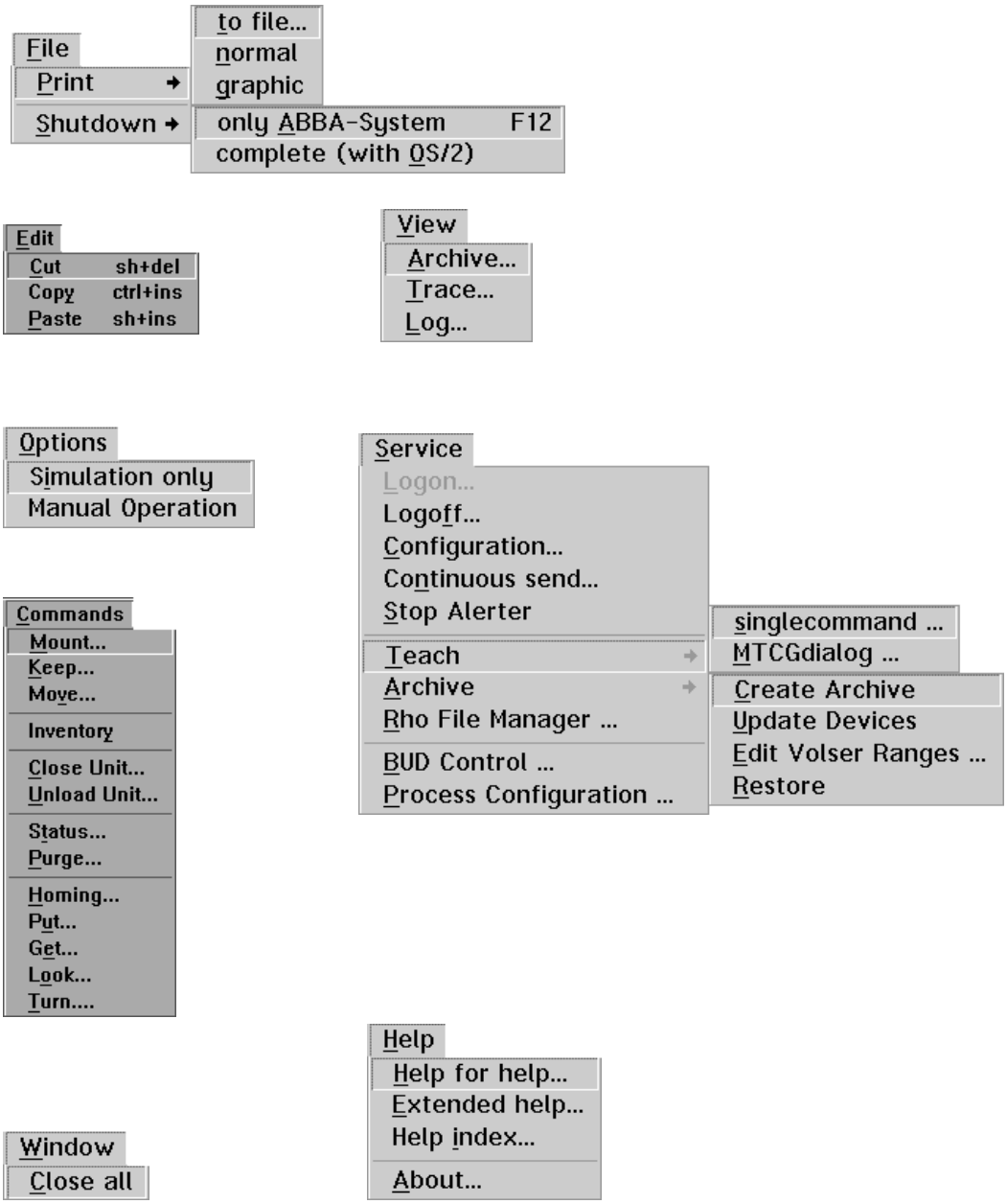


Fig. 5-4: Overview of AMU Menus

5.4 Menu File

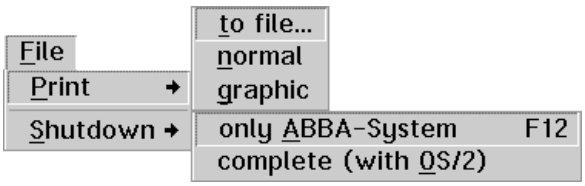
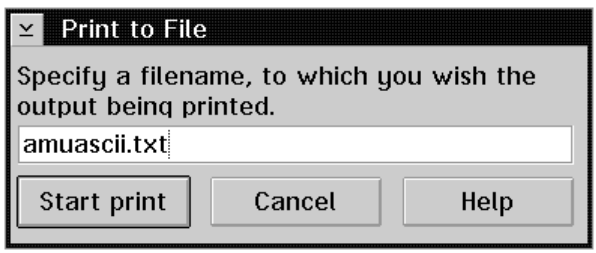


Fig. 5-5: Menu "File"

Command	Field	Explanation
Print		Print selected lines from the log data.
		Information **First select the lines to be printed in the LOG Control Center.**
	... to file	Store as a text file.
		
		Fig. 5-6: Window "Print to File"
		Enter the target file name with path (e.g. **a:\logascii.txt**).
		Start print starts the filing.
	... normal	Print with standard font.
	... grafic	Print with graphic font.

Command	Field	Explanation
Shutdown only ABBA system	Prepares shut-down of the ABBA system.	

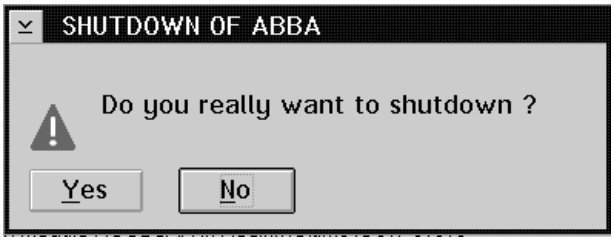


Fig. 5-7: Window "SHUTDOWN OF ABBA""

ATTENTION!

Before shutting down interrupt the communication with the host computer (e.g. with HOLD 1,1).

Yes — The current command will still be processed. After that, all modules of the AMU will be terminated and the database will be closed.

Information

Shutting down of the system ☞ Operator Guide.

No — Return to the program, no shut-down.

Command	Field	Explanation
Shutdown complete (with OS/2)		Prepare shut-down of the ABBA system (like Shutdown only ABBA system) and then terminate all processes running under OS/2 and terminate OS/2.

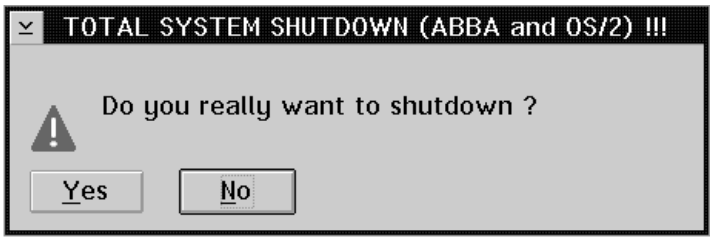


Fig. 5-8: Window "TOTAL SYSTEM SHUTDOWN"

ATTENTION!

Before shutting down interrupt the communication with the host computer (e.g. with HOLD 1,1).

5.5 Menu Edit

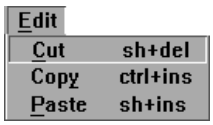


Fig. 5-9: Menu "Edit"

Command	Explanation
Cut	Cut the marked object and file it in the intermediate storage (computer main storage).
Copy	Copy the marked object to the intermediate storage.
Paste	Insert the object from the intermediate storage at the current cursor position.

5.6 Menu View

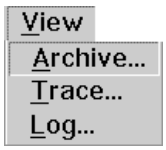


Fig. 5-10: Menu "View"

Calls up information in various windows.(continued)

Command	Field	Explanation
Archive...		Check and change entries for specific compartments in the archive catalog. After input of information (e.g. volser) the respective archive catalog entry is displayed.

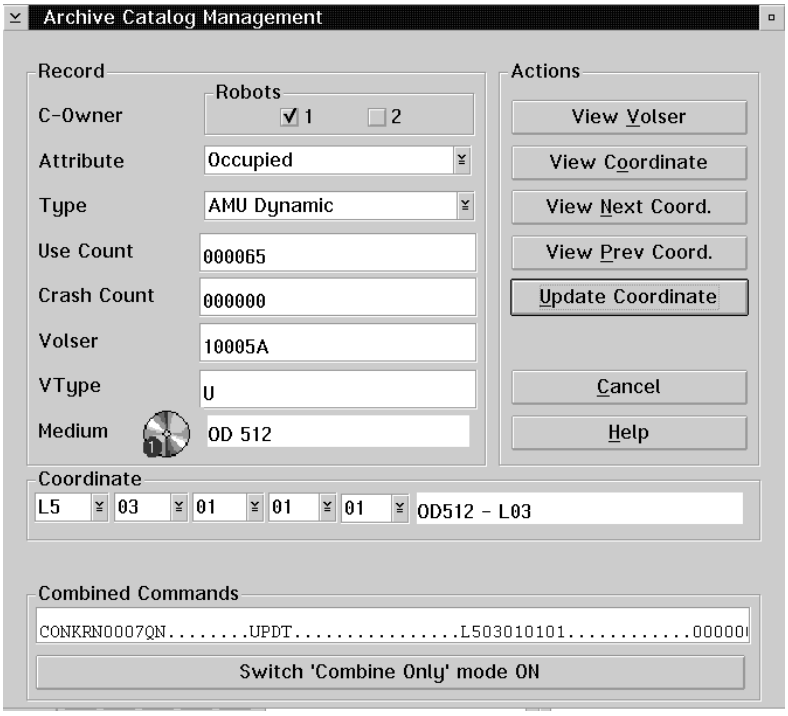
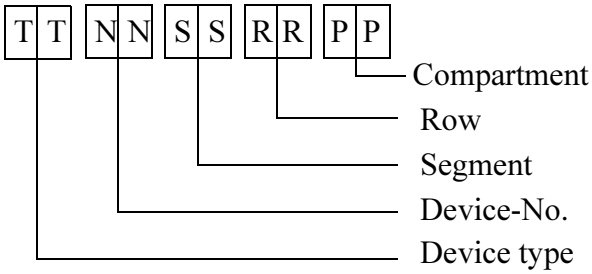


Fig. 5-11: Window "Archive Catalog Management"

Command	Field	Explanation
Archive...	**C-Owner**	Medium owner: indicates the robot or the robots which can access this medium.
	Attribute	Status of the medium • **Occupied:** compartment occupied • **Ejected:** medium has been ejected • **Mounted:** medium mounted on drive • **Initial:** initial attribute condition (initialized, available) • **In Jukebox**: medium in jukebox • **Reverse Side Mounted** (OD only): medium mounted in drive (reverse) • **Empty:** campartment empty • **Undefined:** not defined • **Temp Away**: attribute not occupied (no home position) • **Temp Here**: medium in the problem box
	Type	Type of compartment in the archive • **Storage**: archive compartment for - hierarchically defined Volser ranges - dynamically defined Volser ranges, on HACC/MVS only - no cleaning medium compartment • **Clean**: cleaning medium compartment • **AMU-Dynamic** (not on HACC/MVS): archive compartment for dynamic insert and transit Type of compartment in the I/O unit • **Foreign**: foreign media compartment • **Problem**: compartment in the problem box (I/O unit) • **Clean**: cleaning media compartment • **HACC-Dynamic** archive compartment for dynamic use of the I/O unit under HACC/MVS • **AMU-Dynamic** : archive compartment for dynamic use of the I/O unit under DAS, VolServ and OS400, eject range for ROBAR and optical disk compartment on HACC/MVS
	Use Count	Number of accesses to compartment.

Command	Field	Explanation
Archive... (continued)	**Crash Count** (in preparation)	Number of times compartment is accessed without success. When the crash sensor on the gripper is activated the counter increments by one.
	Volser	Media number
	VType	Volser type of storage media • **U:** undefined (no scratch medium) • **S:** scratch medium **Information** **The value of this file can be changed only with a host command.**
	Medium	Type of medium • **all media**: special type for problem box • **undefined**: reserved for special applications • **3480-1/2inch** C0: magnetic tape cartridges 3480 and 3480E • **TK85** C1: magnetic tape cartridge TK • **3590** C2: magnetic tape cartridge NTP • **OD Reflexion** O0: optical disk 9 mm • **OD 512** O1: optical disk 11 mm • **VHS** V0: VHS cassette • **Exabyte 8 mm** V1: magnetic tape cartridge • **Exabyte 4 mm** V2: magnetic tape cartridge • **D2 (25 Gbyte)** V3: magnetic tape cartridge • **D2 (75 Gbyte)** V4: magnetic tape cartridge • **TRAVAN** V5: 3MTR-*magnetic tape
	View Volser	Display the archive catalog entry for the volser entered.
	View Next Coord.	Display the archive catalog entry of the next coordinate of the component. When the last coordinate has been reached no scrolling occurs.

Command	Field	Explanation
Archive... (continued)	**View Prev. Coord.**	Display the archive catalog entry for the previous coordinate of the component. When the first coordinate has been reached no scrolling occurs.
	View Coordinate	Display the archive catalog entry for the logic archive coordinate entered.
	Update Coordinate	**Information** **This command requires login.** Update the archive catalog entry for the archive coordinate. **ATTENTION!** **The existing entry in the archive catalog will be overwritten. Wrong entries can lead to discrepancies between the archive and the HACC/ MVS archive catalog.**
	Coordinate	Logic coordinate of the medium in the archive. **Information** **One optical disk occupies 2 logic coordinates, one for each side.** The digits of the coordinates indicate the following:  List of all device types (☞ page 7/4)

Command	Field	Explanation
Archive... (continued)	**Combined Commands**	Generate a **Continuous Send** command.
	Switch 'Combine Only' mode ON/OFF	Display active mode. Switch over the mode by clicking. • **mode ON**: The command string is combined and executed. • **mode OFF**: The command string is combined but not executed.

Command	Field	Explanation
Trace...		Online or offline record of the internal operations of the AMU-Software. The records can be selected by levels (AMU processes). A list of the trace levels is found at theAMU Reference Guide. Trace levels can be selected with the <SPACE> bar or the mouse.

Information

The selection of trace can slow down the processing!

Change the selection only after consulting GRAU Storage Systems (Support).
Standard selection: no traces.

ATTENTION!

The memory for the current trace is limited. When failures occur file the trace as soon as possible.

Trace:
✔ Online
ON

Write the current traces to the main storage (1 MB reserved) and display them on the monitor. When the storage is full the oldest entry is overwritten.

.

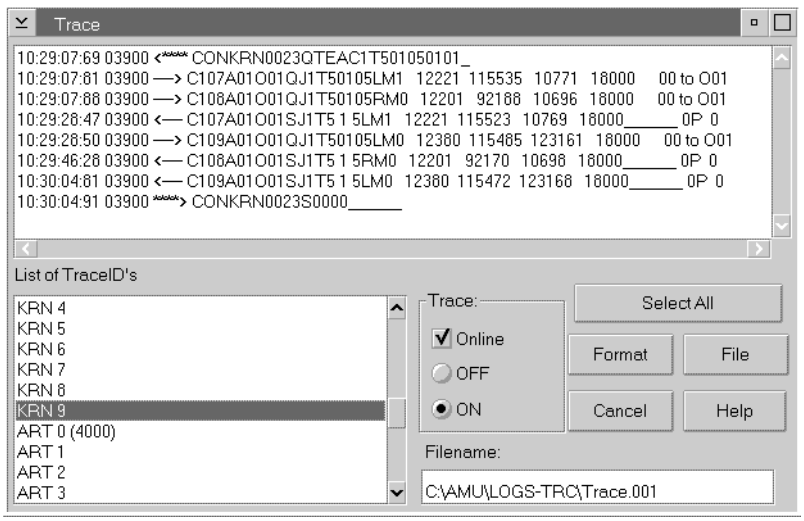


Fig. 5-12: Window “Trace” Online

Command	Field	Explanation
Trace... (continued)	**Trace: ON**	Save the current trace in a file in the main storage (Offline Trace).

.

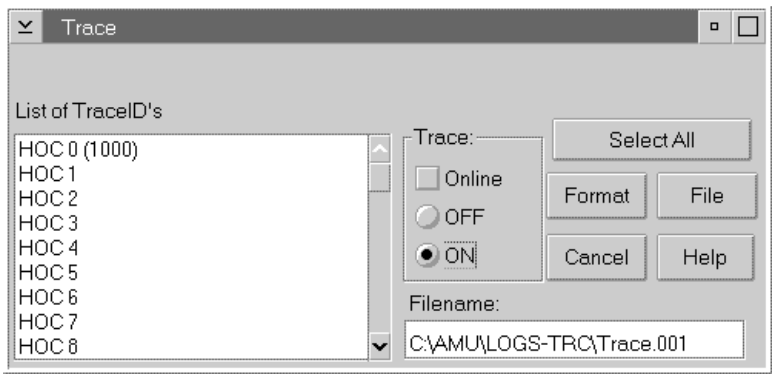


Fig. 5-13: Window "Trace" Offline

File — File the recorded trace.

After formatting, this file can be printed (☞ **Format**) with the OS/2 `Print` command.

Format — Format a file saved with the **File** command for printing.

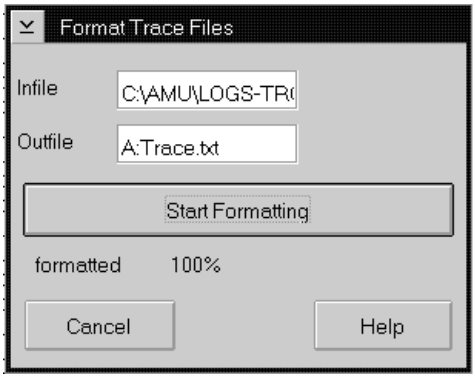


Fig. 5-14: Window "Format Trace Files"

Infile: source file name with path

Outfile: target file name with path
(e. g. **a:\name**
or **c:\amu\logs-trc\name**)

Start Formatting starts the formatting. The execution will be confirmed by display of the message "**formatted 100%**".

Command	Field	Explanation
Log...		The LOG control center records all messages, e.g. (even when the LOG Control Center is not open).

Examples:

- host computer commands
- execution of host commmands
- messages to the host computer
- operator interventions
- error messages

Log files begin daily at 0.00 hours. If disk space available drops below 30 MB, the oldest log file will be deleted.

Information

Log files cannot cover several days!
There is only one log file for each day.

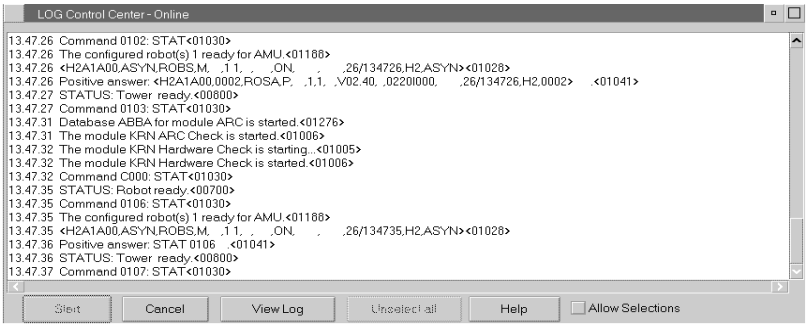


Fig. 5-15: Window "LOG Control Center - Online"

Information to to single LOG messages (☞ Page 6-5)

Start reserved for futher use.

Unselect all Delete all marks in the list box.

Command	Field	Explanation
Log... (continued)	**✔ Allow selections**	Swtich enabling selection of log strings for printing or filing. Select the desired range (only one range possible).
	ViewLog	**ViewLog** (scroll and search in current and stored logs)
		 *Fig. 5-16: Window „LogView.exe“*
LogView	**View**	Open the OS/2 standard Editor with the selected log-file
	Exit	**Closed the window LogView.exe**

5.7 Menu Options

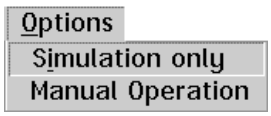


Fig. 5-17: Menu "Options"

Command	Field	Explanation
Simulation only ✔		**ATTENTION!** **Command execution alters the archive catalog although no medium is actually moved.** Switch for simulation mode: No processing of commands outside AMU. AMU processes the commands as far as possible and confirms their execution to the host (positive acknowledgement).

ABBA/2 only

Command	Field	Explanation
Manual Operation		Precondition: ”MANUAL” operating mode Manual execution of the host commands **Mount** (montieren) and **Eject** (output) by the operator.

Information

ABBA/2 twin systems cannot run automatically and manually at the same time.

a) Close all guard doors of the quadro towers. The quadro tower rotates, the robot does not move.

b) Open the guard door and remove the medium.

c) If a **Mount** command has been received mount the medium on the drive indicated.

d) Confirm the execution of the command displayed with **OK**.

e) The host computer acknowledges the execution and displays the next command.

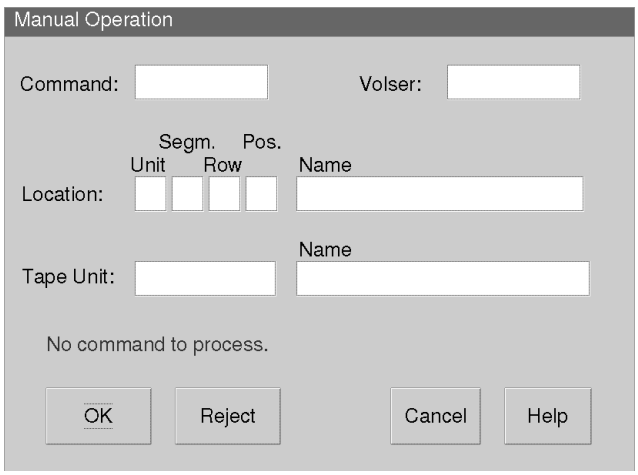


Fig. 5-18: Window “Manual Operation”

OK	Select it when the command has been executed by the operator.
Reject	Select it when the command will not be executed by the operator.

5.7.1 Commands Menu

Fig. 5-19: Commands Menu

Information

All commands in this menu

- **are provided exclusively for service personnel and are protected by a password.**
- **open the command window**

5.7.2 Service Menu

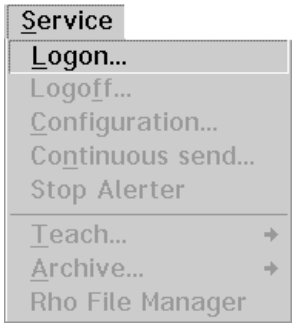


Fig. 5-20: Service Menu

Information

All commands in this menu (except Logon ...) are provided exclusively for service personnel and are protected by a password

Command	Explanation
Logon...	Logging in of service personnel with password.

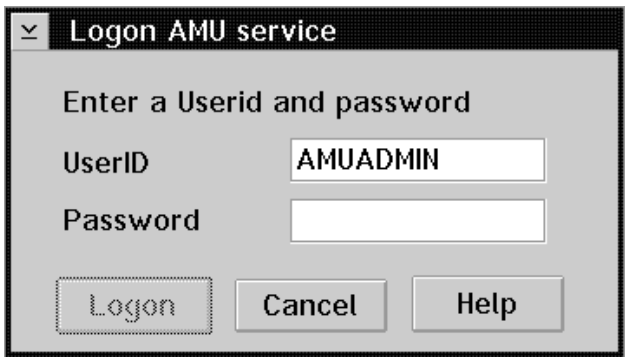


Fig. 5-21: Window: Logon AMU Service

5.7.3 Window Menu

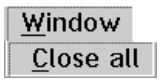


Fig. 5-22: Window Menu

Command	Explanation
Close all	Closes all open windows.
Windows (List of all open windows)	Calls up the respective window.

5.7.4 Help Menu

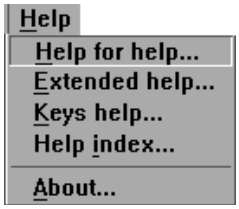


Fig. 5-23: Help Menu

Command	Explanation
Help for help...	Information about the help function.
Extended help...	Extended help

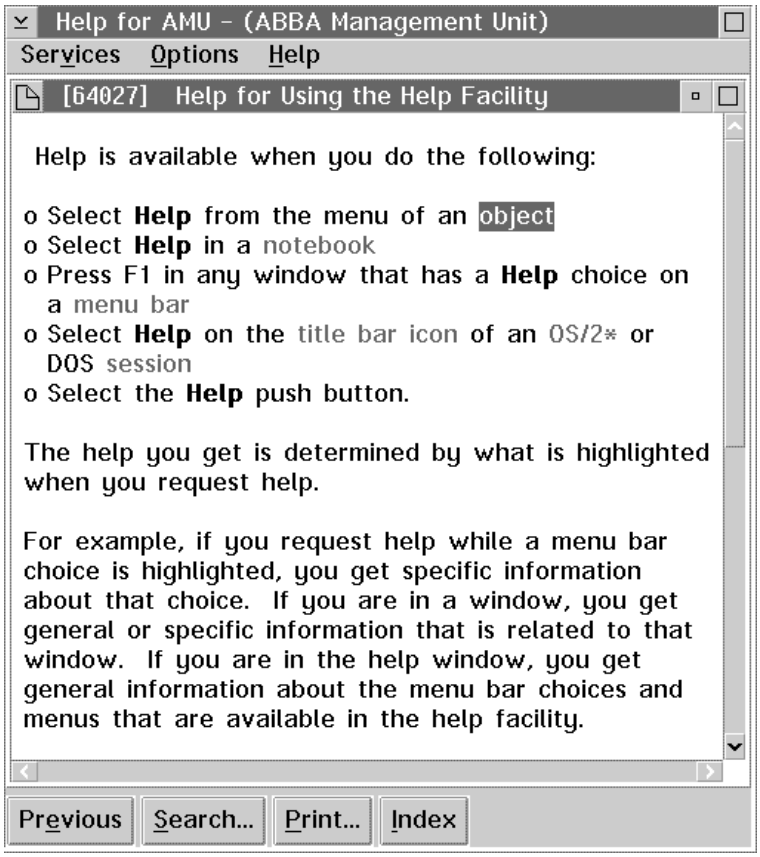


Fig. 5-24: Window: Help for AMU

Keys help...	Key assignment
Help index...	Help index
About...	Displays copyright information and AMU version number.

5.8 Starting The AML/2 System (Starting "AUTO")

In the "AUTO" mode the host computer controls the system.

WARNING!

Movements of the system components inside the archive can cause severe injuries.

Before closing the access door and before starting the AML/2 system ensure that nobody is inside the archive.

The AML/2 system starts only when

- the operating mode selector switch is set to “AUTO”
- the access to the archive is closed
- the guard doors of the Quadro towers ar open
- the robot arm is stretched out

Information

If the AML/2 system has been shut-down properly the robot arm is stretched out.

ATTENTION!

The robot needs sufficient vacant space for its reference movement.

During the reference movement all axes of the robot and the Quadro towers move. Objects and system components within the reach of the robot unit can be damaged.

a) Check
   - <EMERGENCY STOP> buttons released
   - all handling boxes inserted into the I/O unit
   - I/O door closed and locked
   - archive access door closed and locked

b) Set operating mode selector switch to “AUTO”, remove the key and keep it in a place unaccessible for unauthorized persons.

c) Switch on the main switch.
   <CONTROL OFF> lights up yellow.

d) Press <SYSTEM ON>
   <SYSTEM ON> lights up green: EMERGENCY STOP circuit is activated.

e) Press <CONTROL ON>
<CONTROL OFF> switches off, <CONTROL ON> lights up green.
All control units of the AML/2 system are ready to operate.

f) Wait for the following messages in the LOG Control Center window
- STATUS: robot ready 700
- STATUS: tower “x” ready 800 (“x” = Number of the storage tower)
- STATUS: E/I/F ready 900

Information

The message “E/I/F closed” may mean

- **the I/O unit door is not closed and locked**
- **not all handling boxes have been inserted**

The starting of the AML/2 system from the host computer is described in a separate start/stop procedure tailored to the particular AML/2 system (Operating Manual AML/2 ROBAR/BS2000 HACC/MVS).

5.9 Start “MANUAL”

In this operating mode the drive amplifiers of the robots are voltageless.

This operating mode is intended exclusively for:

- input and output of media
- manual operation of drives
- automatic movement of Quadro towers.

WARNING!

Movements of system components inside the archive can cause severe injury.

Before starting the system ensure that nobody is inside the archive.

The AML/2 system must be operated exclusively by trained personnel that is registered in the system logbook.

a) Set the operating mode selector switch to “MANUAL”, remove the key and keep it in a place unaccessible for unauthorized persons.

b) Switch the main switch on.
<CONTROL OFF> lights up yellow.

c) Press <SYSTEM ON>.
<SYSTEM ON> lights up green: EMERGENCY STOP circuit is activated.

d) Press <CONTROL ON>.
<CONTROL OFF> remains on, <CONTROL ON> lights up green.
The drive amplifiers for the Quadro towers are switched on.
The Quadro towers can be addressed via the AMU (**Manual Operation**) operating panel.

5.10 Changing the Operating Mode

a) Select **Shutdown ABBA...**

b) Press <CONTROL OFF>.
<CONTROL ON> switches off, <CONTROL OFF> lights up yellow.

c) Change the operating mode.

d) Press <CONTROL ON>.

e) Restart AMU: enter „startup“ in an OS/2 window.

5.11 Shutting Down the AML/2 System

ATTENTION!

This section describes the normal shutdown procedure and deviations are allowed only in case of emergency. An emergency shutdown can alter or destroy files that are required to restart the system.

Stopping the AML/2 system from the host computer is described in a separate start/stop procedure tailored to the particular AML/2 system (☞ Operating Manual AML/2 ROBAR/BS2000 HACC/MVS).

5.11.1 Normal Shut-Down

Shut the system down only from the operator console.

- Stopping of individual units is not possible.
- A partial stop is only a logical condition for the AMU

a) End AMU operation with the command "S**hutdown ABBA**…".

b) Press <CONTROL OFF>.
<CONTROL ON> switches off; <CONTROL OFF> lights up yellow.

ATTENTION!

Never switch off the main switch before you have pressed <CONTROL OFF>

Parts of the control unit could be damaged!

c) Switch off the main switch.

5.11.2 Shutting Down the AMU Processor

Information

The processor runs continuously and is therefore not in the main switch circuit.

ATTENTION!

Possible data loss or very long start-up procedure.
Switch the AMU processor of only in the manner described below.

Before switching off the AMU processor:

- shut down the AMU operator console (**Shutdown ABBA...**)
- shut down the system

Shutting down the system OS/2 Version 2.1

a) change to the OS/2 desktop
   - open the task list with <CTRL> + <ESC>
   - select “Desktop Icon - View”

b) call up the system menu
   - if an icon is selected press <SPACE>
   - Press <SHIFT> + <F10> or the right mouse button

Fig. 5-25: System Menu OS/2

c) select **Shut down...** (system shut-down)

d) confirm the subsequent querries

e) wait for the message “Shutdown has completed. It is now safe to turn off your computer, or restart the system by pressing Ctrl+Alt+Del”

f) do not switch off the processor before the above message appears

5.12 EMERGENCY STOP

5.12.1 Interrupting the Operation by EMERGENCY STOP

All <EMERGENCY STOP> push-buttons (operating panel, I/O unit...) have the same function. An EMERGENCY STOP switches off the power electronics. All movements of the robot system and the storage towers are stopped immediately.

When persons or property are endangered immediately press the nearest <EMERGENCY STOP> push-button.

The moving parts will stop immediately.

- Power supply to the drive amplifiers is shut off.
- <SYSTEM ON> switches off
- <CONTROL ON> switches off
- <CONTROL OFF> lights up

WARNING!
Dangerous voltages!

Pressing an <EMERGENCY STOP> button will not render the entire AML/2 system voltageless. Only the drive amplifiers are switched off.

Emergency stop does not switch off:

- the control units of the robots and the storage towers
- the AMU processor
- the drives
- the compressed air supply

Cut the power supply to these components at a suitable point (e. g. connecting plug or switch)!

ATTENTION!

If the <EMERGENCY STOP> buttons are frequently used contrary to their purpose, just to stop the system, this may lead to:

- **increased wear of mechanical parts**
- **damage to electronic and electric components of the AML/2 system**

Do not use the <EMERGENCY STOP> buttons to stop the normal operation of the AML/2 system.

Stop the system only with the appropriate AMU or host computer commands (☞ HACC/ROBAR)!

5.12.2 Starting after an EMERGENCY STOP

WARNING!

Movements of system components in the archive can cause severy injury.

Before releasing an <EMERGENCY STOP> push-button and before re-starting the AML/2 system ensure that persons or property are not endangered!

a) Eliminate the cause of the EMERGENCY STOP.
b) Release the <EMERGENCY STOP> push-button (turn it left).
c) Stretch out the robot arm.

ATTENTION!

Upon the start of the system the robot automatically carries out a reference movement. It will start only when the robot arm is stretched out and aligned parallel to the the track. During the reference movement all axes of the robot and the storage towers move.

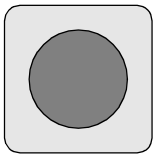
Objects and system components within the reach of the axes can be damaged.

Ensure the robot has enough vacant space for the reference movements.

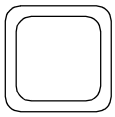
d) Push the carriage to its initial position.
e) Leave the archive and lock the access door to the archive.
f) Start the system
(☞ “Starting The AML/2 System (Starting "AUTO")” page 5/30).

5.13 I/O Unit (Handling)

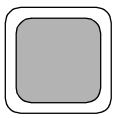
Operating elements of the I/O unit



<EMERGENCY STOP> button



Luminous push-button
<ON>



Lamp
<OPERATION>
Handling box

Operating panel of the I/O unit

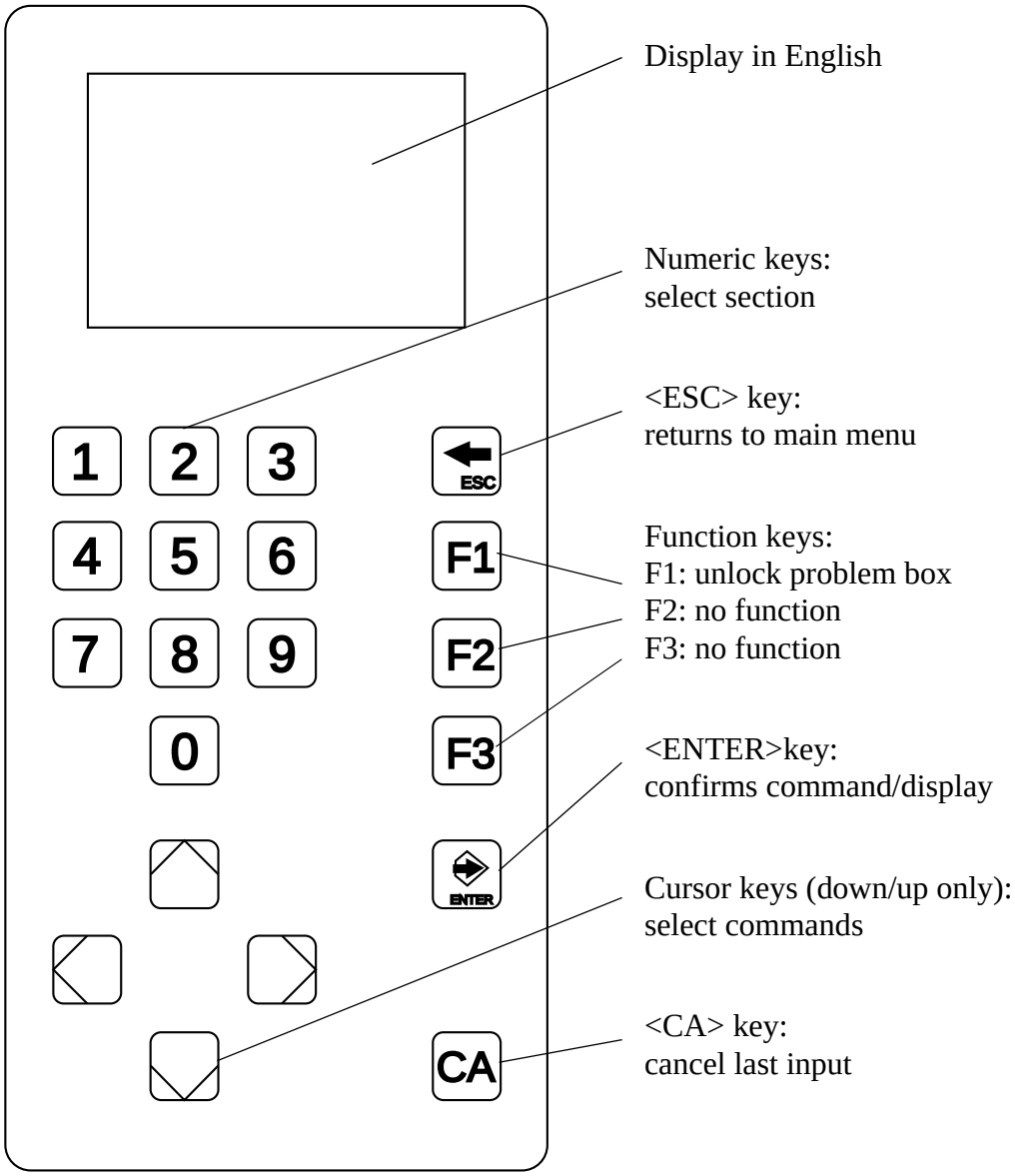
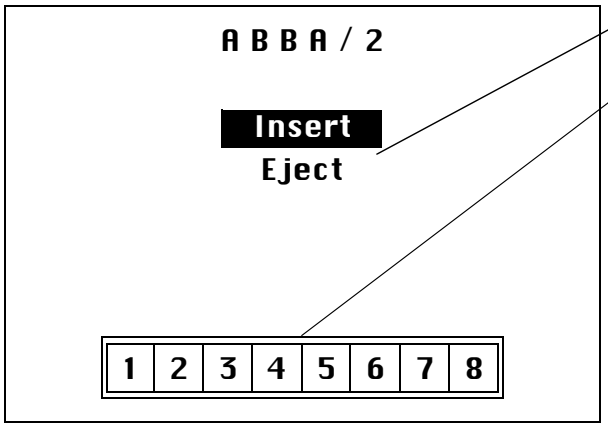


Fig. 5-26: Operating Panel I/O Unit

When the main switch has been switched on the main menu appaears.



Commands of the main menu

No. of the handling boxes (sections, here 2 turning units with 8 sections)

5.13.1 Input of Media

Information

As long as the operator intervenes (shutter in bottom end position) the handling unit cannot access.

Release of the I/O unit may be delayed.

a) Press the luminous push-button <ON> .
This generates a request to open the I/O door.
- The shutter closes.
  As long as it is moving, the luminous push-button <ON> is continuously lit.
- When the shutter has reached its bottom end position <OPERATION> will light up and the I/O door is unlocked.
- The luminous push-button <ON> switches off.
- The message **I/O closed** appears in the AMU log.

b) Open the I/O door as far as possible within 15 seconds.

Information

If the I/O door remains closed the shutter opens after 15 seconds.

c) Remove the handling boxes or empty the problem box.

d) Load the handling boxes removed or the problem box. Begin left in the bottom row (opening of the box facing you).

The I/O unit is divided in input, output and foreign areas:
- MVS, HACPARM1 in the LDEV commands,
- all other operating systems: archive catalogue (type of archive coordinate)

e) Put the loaded handling boxes back into the I/O unit.

f) Close the I/O door.
- The door retaining mechanism must audibly latch into place.
- The <OPERATOR> lamp will blink if not all boxes are inserted correctly.
- The shutter opens automatically.
- The <OPERATOR> lamp and the luminous push-button <ON> switch off.

Information

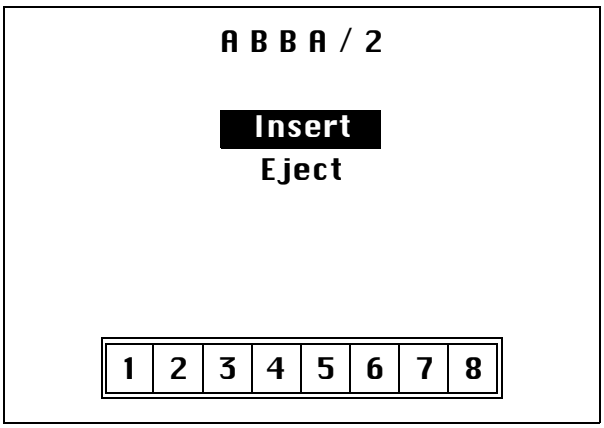
Therefore remove only handling boxes you want to load.

Information

If cartridge storage compartments are defined as Eject in the configuration the AMU, through ROBAR, carries out an automatic inventory of these compartments after manual access.

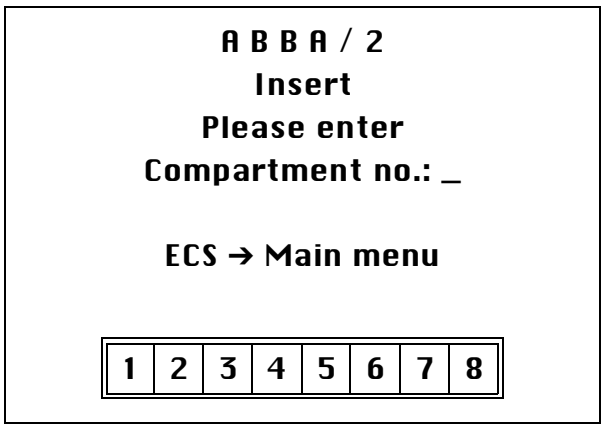
System media

System media have a Volser.
The robot identifies the medium by its barcode label and reports the volser to the AMU.



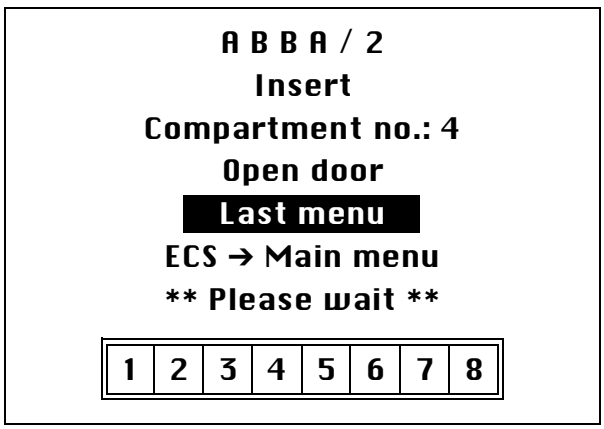
Select “Input” with the cursor keys.

Confirm by pressing <ENTER>.

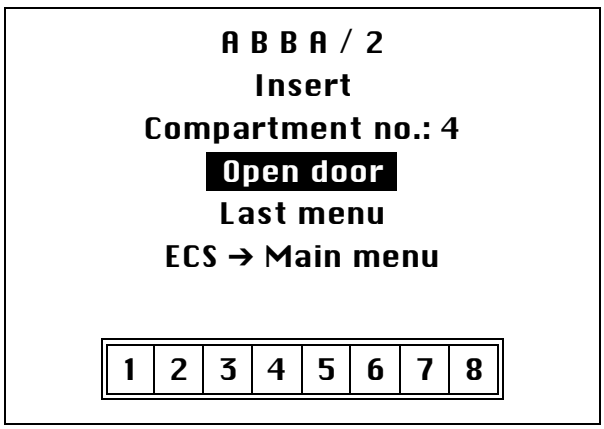


Enter number of the handling box

Confirm by pressing <ENTER>.



Wait until the turning unit has positioned the selected handling box.



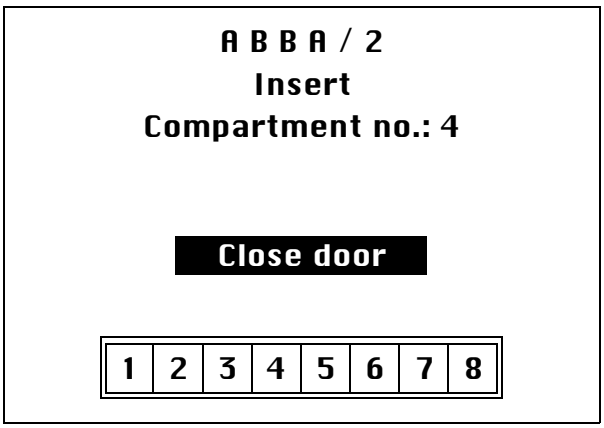
Select “Open doo“ with the cursor keys.

Caution!
When you press <ENTER> the respective door opens. Do not stand directly infront of the door!

Open door with <ENTER>.

Now put media into the handling box selected.
The I/O unit is divided in input, output and foreign areas:

- MVS, HACPARM1 in the LDEV commands,
- all other operating systems: archive catalogue (type of archive coordinate)



Select “Close door” with the cursor keys.

Caution!
When you press <ENTER> the respective door closes. Hazardous bruises!

Close door with <ENTER>

When the door is closed the robot checks the inventory under ROBAR. Controlled by host or AMU commands the media are stored in the archive.

Foreign (non-system) media

Non-system media do not have volsers readable for the AML/2 system.

- They are not identified by a barcode label.
- They are not accepted into the archive.

Non-system media are always located in compartments reserved for non-system media in the handling boxes. They are processed directly from these compartments.

ATTENTION!

The compartment number and the input at the AMU must be identical.

Be sure to place the media in the right compartments of the handling box.

Non-system media receive a symbolic volser. Symbolic volsers begin with an "*" and are registered in the AMU archive catalog. The symbolic volser for the first compartment thus is "*FR001".

Cleaning cassettes for BS2000/ROBAR

Cleaning cassettes do not need a barcode label. They are stored in defined compartments of the archive.

Cleaning cassettes must be stored in the archive for each drive. After a predefined number of cleaning cycles (e. g. 500) the host computer automatically sends a command to eject them (☞ documentation of interface software).

Cleaning cassettes receive a symbolic volser in the archive catalog.

The symbolic volser is “*CL....”. It can be attached to the cassette on a barcode label. This will simplify the replacement of cleaning cassettes. A cleaning cassette can then be stored with the ROBAR command “IN *CL…” .

Cleaning cassettes for MVS/VM/VSE users

The cleaning cassettes do not have a barcode label.

Cleaning cassettes must be stored in the archive for each drive. After a predefined number of cleaning cycles (e. g. 500) the host computer automatically sends a command to eject them (☞ documentation of interface software).

ATTENTION!

When you replace a cleaning cassette put the barcode label of the old cassette onto the new cassette!

Otherwise the system will not recognize the cassette as a cleaning cassette.

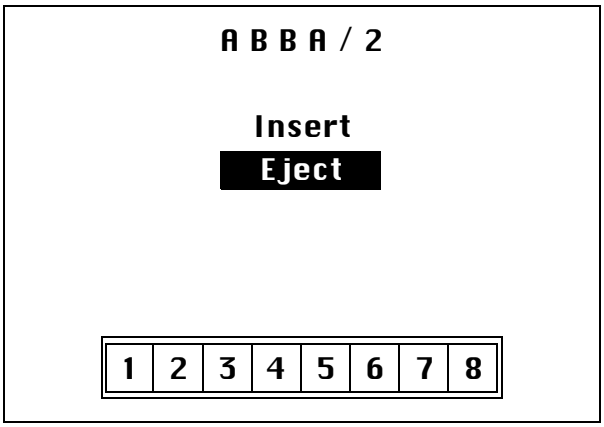
Fast input

In a first input cycle only the defined fast input compartments are querried.

5.13.2 Ejection of Media

The ejection command is send by the host computer. The robot places the media in the handling boxes in the I/O unit.

When the host controlled ejection is complete you can remove the media or the handling boxes.



Select “Eject” with the cursor keys.

Confirm by pressing <ENTER>.

The further operating procedure is identical with insertion (☞ page 5/40).

6 Error Messages and Resolving Errors

6.1 General Information

All messages including error messages are displayed in the Log window of the AMU operator console (☞ page 5/22). The error number is indicated in brackets at the end of the error message.

Additionally the host computer receives an error information.

With the error number additional information can be called up on the operating system level (e.g. in an OS/2 window).

Enter "help amu" followed by the error number to call up the information.

A list of error messages is contained in the Maintenance Guide.

If no action is recommended or if the error cannot be resolved call the maintenance technician of your service-partner or GRAU Storage Systems.

CAUTION!

If you must enter the danger area inside the archive housing to determined or resolve an error, be sure to observe the safety instructions (☞ "For Your Safety" page 3/1).

6.2 Trouble Shooting Hints

6.2.1 The Equipment Cannot Be Switched on

Check the following:

- Is voltage present? (fan noise in the control cabinet?)
- Are all EMERGENCY STOP components deactivated?
  - Are the <EMERGENCY STOP> push-buttons released?
  - Quadro tower door(s) open?
  - I/O door closed?
  - Access to the archive closed?
- Is the yellow <CONTROL OFF> push button lit?
  - If it is not switch the main switch off.
  - After approx. 2 minutes switch it on again (☞ page 5/30).
  - If the system still cannot be switched on call the maintanance technician of your service partner.

7 Appendix

7.1 Terms Used

AML/2	Automatic cassette tape operating archive; AML/2 software and physical archive. /2 means version 2
ABBA operating panel	Operating panel on the control cabinet for switch-on/off and monitoring of the AML/2 system.
AMU	**A**BBA **M**anagement **U**nit Central intelligence of the AML/2 system. Consists of hard and software.
AMU operator console	OS/2 programme for operation of the AML/2 system.
Archive	The archive consists of: • physical archive and • logical archive. The physical archive consists of storage towers for cassette tapes and optical disks (= media). The logical archive (archive catalog) is the list of volsers assigned to the compartments in the physical archive.
Archive catalog	An OS/2 database with the logical archive. Contains the assignment of volsers to to the compartments in the physical archive as well as further vital information about the media and the drives.
Archive coordinates	These define the compartment of a medium in the physical archive.
Barcode label	Label on the medium, contains the volser in a form readable for the robot (barcode).
Click	Short pressing and releasing of the mouse button.

Command, instruction — A command sent to the AML/2 system:

- from the host computer
- direct operator input at the AMU operator console

Configuration — Determins the structure of the AML/2 system. The configuration specifies the components and their connections.

Foreign medium — Cartridges not listed with a Volser in the archive catalog. They are processed by the AML/2 system via the I/O unit.

Handling box — Storage box for media in the I/O unit.

Hexa tower — Storage archive with 6 Segments for 720, 900 or 1080 media.

Host computer — Large computer system.
The data of the host computer is stored in the AML/2 system (archive) on media.

- host computer
- AMUs
- rhos
- storage towers
- linear shelves
- robot
- specials
- drives

I/O unit — Input/output area. Media are inserted and ejected via the I/O unit.
ent in the archive.

Linear shelf — Storage archive (only one storage level)

Medium — Storage medium in the archive, e. g. a magnetic tape cassette or optical disk

Operator — Trained operator of the AML/2 system.

Optical Disk (OD) — Optical storage medium (CD)

Quadro tower — Storage archive with 32 segments.

Section — Compartment of a handling box in the I/O unit.

Segment — A column of rows in a storage tower.

System media — System media have a volser, are stored and registered in the archive.

Turning unit — Part of the I/O unit. One turning unit houses four handling boxes in its sections.

Volser, VSN — english: **vol**ume **ser**ial number
An up to six digit alphanumeric designation. It identifies one medium (cassette, optical disk) in the archive.
The volser is attached to the rear of the medium on a barcode label and can be read by the robot.

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