Service Plan for:
Automatic
Cartridge Loader
1. Product Description

The Automatic Cartridge Loader (ACL) is a tape stacker/loader mechanism that attaches to the CONVEX 3480-Compatible Cartridge Tape System. It provides storage for ten cartridge tapes that can be read from or written to, either sequentially, or in a random order. This new product, and related software, will now allow for unattended tape dumps and restores of system files, as well as provide a means to allow jobs that require large volumes of tape data to be better scheduled and not require constant attention by the user.

2. Program Overview

2.1 Scope

CONVEX will offer this new product in two forms. An upgrade will be available for systems that currently have the 3480-Compatible Cartridge drives attached, and new 3480 purchases will be shipped with the ACL mechanism attached, if ordered by the customer.

Because of the vertical travel path of the ACL magazine, some system reconfiguration may be required on systems being upgraded. The reconfiguration is required to reposition the 3480-ACL drive units in the cabinet to allow a newly designed door to be fitted. The new door will allow the ACL mechanisms to protrude out of the expansion cabinet. This provides the user with easy access for the loading and unloading of cartridge magazines. The new door will allow two 3480 drives with ACL mechanisms attached, to be mounted side-by-side in a cabinet. Systems shipped from manufacturing with a 3480-ACL tape system installed will require no changes.

Once the ACL mechanism is in operation, access to equipment behind this cabinet’s door is restricted.

2.2 System Requirements

To utilize these new 3480-ACL subsystem, the system must have the following software/hardware installed:

- ConvexOS: v 9.1 or later
- ACL software: v 1.2 or later
- SCSI Controller Firmware: v 22
- 3480 Formatter Firmware: v 10
- 3480 Drive Firmware: v H or later
3. Equipment Specifications

3.1 Physical Dimensions of the Automatic Cartridge Loader

The physical specifications of the ACL mechanism is provided below:

ACL mechanism

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>5.00in</td>
<td>127mm</td>
</tr>
<tr>
<td>Width</td>
<td>8.50in</td>
<td>217mm</td>
</tr>
<tr>
<td>Depth</td>
<td>8.90in</td>
<td>226mm</td>
</tr>
<tr>
<td>Weight</td>
<td>17.6lb</td>
<td>8.0kg</td>
</tr>
</tbody>
</table>

3.2 Power Requirements of the Automatic Cartridge Loader

The ACL mechanism obtains its power from a power take-off connector, located on the 3480 tape drive. No additional power is required by the ACL mechanism.

4. Integration Philosophy

4.1 Overview

The ConvexOS and System Diagnostics software will require modification in order to integrate the ACL. New build systems will be shipped from the factory with the necessary software installed. When an existing system is upgraded with an ACL mechanism in the field, the necessary software will be structured to ship concurrently with the equipment. It is strongly suggested that each Field Office and Remote F.E. have a backup copy of this software upgrade in anticipation of a replacement situation.

4.2 Physical Integration into Existing Cabinetry

Due to mechanical considerations when using the ACL mechanism, existing configurations may require a rearrangement of the peripherals within a cabinet.

Peripheral system upgrades will be shipped with a new cabinet door. This will allow two ACL configured 3480 Tape Drives to operate side-by-side in a cabinet, with the ACL mechanism protruding out of the front of the door. This new door produces a clean look to the cabinet while allowing the user access to the ACL, for the loading and unloading of cartridge magazines.
5. Service Philosophy

5.1 Overview

Because the ACL mechanism attaches to the 3480 Cartridge Drive, which is already covered by a service plan, the service philosophy for the ACL will be to replace this unit, once it has been determined to be the failing unit. If the 3480 Cartridge Drive is deemed to be the failing unit, the ACL mechanism should be removed from this unit, and then installed on the 3480 replacement.

The following FRU has been designated:

1. Automatic Cartridge Loader. 550-000344-224

5.2 Level of Repair

The Field Level of Repair will be to the defined FRU. The FRU referenced in paragraph 5.1 above can be readily identified by the Field Engineer, and system downtime can be reduced by replacing the faulty FRU.

5.3 Repair Techniques

The techniques used by CONVEX Field Engineers will conform to accepted guidelines for field repairs. The unit replacement technique will be to utilise the personal grounding system and the removal of ALL AC power prior to working on the equipment.

5.4 Preventive Maintenance

The procedures described in the 3480 Service Plan for preventive maintenance of that unit fulfill the needs of the ACL mechanism.
6. Diagnostics

6.1 Internal Self-Tests

Additional internal self-tests are provided to allow an ACL mechanism to be tested to a basic operational level.

6.2 Standard CONVEX Diagnostics

CONVEX Diagnostic dev_vscait will be changed to provide support for the ACL mechanism. This will be accomplished by adding a new subtest class. Existing subtests will be modified to permit loading test tapes with a stacker when one is present.

6.3 Diagnostic Approach

The Diagnostic Approach for the ACL mechanism will be to:

a. Use Operating System Error messages first, if they occur.

b. Observe any self-test errors that may be displayed on the ACL's Operator Panel.

c. Use dev_vscait to determine the source of the error.

d. Exchange the FRU, or the Tape Drive to resolve the problem.

7. Support Philosophy

7.1 Support Levels

First level of support is to be provided by the Field Engineer assigned to each site. Second level technical support will be provided by individuals so designated by area support management within each geographical territory. Third level Product Support will be provided by the Hardware Product Support Specialists in the Technical Assistance Center.

7.2 Response Time

For purposes of planning, the maximum response time is defined to be four (4) hours. Response time is defined as the time elapsed between problem report to CONVEX and the start of problem determination by a CONVEX representative.
8. Installation Philosophy

The philosophy for installation will be for the local field organization to coordinate the required activities to install the ACL mechanism as either an add-on to an existing 3480 Tape System, or as a new installation of the 3480/ACL combination.

8.1 Installation Responsibility

The prime responsibility will be with the Field Engineering organization. CONVEX Field Engineers will install add-on 3480/ACL units or replacement units at the customer site. They will also be responsible for accurately recording the activity via the Service Tracking And Reporting System (STARS).

8.2 Installation Time Requirements

The estimated time to add an ACL mechanism to an existing 3480 drive unit is approximately one (1) hour. The estimation of time required for more complex installations or upgrades will be the responsibility of the local field office.

9. Modification Philosophy

9.1 Overview

The modification philosophy will be to exchange the individual FRU item with an upgraded version when deemed necessary to respond to functional discrepancies, design errors or performance improvements.

9.2 Modification Control Procedure

Any FMI activity should be reported to the STARS system for tracking and revision control.

10. Available Documentation

10.1 Types of Documentation

The Fujitsu M2481A/B Cartridge Tape Drives CE Manual contains a chapter devoted to the ACL mechanism.

11. Training

11.1 Overview

No specific training is planned for this product due to the ease of installation and usefulness of documentation.
12. Spare Parts

12.1 Overview

The field level of repair is defined to be to replace the FRU (Field Replaceable Unit). A FRU has been defined for this product and is provided for reference in paragraph 12.2 below.

12.2 FRU List

<table>
<thead>
<tr>
<th>Description</th>
<th>CONVEX P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Cartridge Loader</td>
<td>550-000344-224</td>
</tr>
</tbody>
</table>

13. Tools and Test Equipment

13.1 Standard Tools

The standard CONVEX F.E. Tool Kit will be utilized.

<table>
<thead>
<tr>
<th>Description</th>
<th>CONVEX P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zipper Bag</td>
<td>902-000001-001</td>
</tr>
<tr>
<td>Fluke Meter</td>
<td>902-000002-001</td>
</tr>
</tbody>
</table>

13.2 Standard Test Equipment

There is no standard CONVEX test equipment required to maintain the Stacker/Automatic Cartridge Loader beyond the tool kit and digital volt meter.

14. Service Planning Considerations

14.1 Mean Time Between Failure

For Service Pricing planning purposes only, CONVEX has determined a Mean Time Between Failure (MTBF) value of 25,000 hours. This value is an estimate only and is not meant to set a performance standard for the product.

14.2 Mean Time To Repair

The Field Engineering average Mean Time To Repair (MTTR) an ACL mechanism failure should be no more than 2.00 hours. This figure represents the total amount of time a fully-trained CONVEX Field Engineer would spend diagnosing and replacing this unit.
CHAPTER 10 AUTOMATIC CARTRIDGE LOADER (ACL)

This option realizes that the cartridge set in the magazine (for five or ten cartridges) is loaded or ejected into/from the drive automatically.

This option consists of the magazine that stores cartridges, elevator section that asends or descends the magazine, magazine guide section, feeder section that loads or unloads the cartridge into/from the tape drive, mechanism control section, and operator panel.

10.1 Specifications

10.1.1 Automatic cartridge loader performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outer dimensions (W × H × D)</td>
</tr>
<tr>
<td>2</td>
<td>Weight</td>
</tr>
<tr>
<td>3</td>
<td>Processing time</td>
</tr>
<tr>
<td></td>
<td>Initial loading time</td>
</tr>
<tr>
<td></td>
<td>Cartridge position change time</td>
</tr>
<tr>
<td></td>
<td>Loading time</td>
</tr>
<tr>
<td></td>
<td>Unloading time</td>
</tr>
<tr>
<td></td>
<td>Ejecting time</td>
</tr>
</tbody>
</table>

Note:
Each of processing time is a time from following A to B.
Initial loading time
The START switch is pressed.

Cartridge position change time
Ready state

Loading time
The cartridge is started to load from the magazine

Unloading time
Ready state

Ejecting time
Ready state

The cartridge is loaded and the head is positioned on the BOT (ready state).

The cartridge is ejected, next cartridge is loaded, and the head is positioned on the BOT.

Ready state

The cartridge is unloaded into the magazine.

The cartridge is unloaded and the magazine can be removed.

10.1.2 Magazine specification

<table>
<thead>
<tr>
<th>Item</th>
<th>10-cartridge type</th>
<th>5-cartridge type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Outer dimensions (W × H × D)</td>
<td>128 × 388 × 139 mm [5.0 × 15.3 × 5.5 in.]</td>
<td>128 × 231 × 139 mm [5.0 × 9.1 × 5.5 in.]</td>
</tr>
<tr>
<td>2 Weight Without cartridge</td>
<td>1.5 kg (3.3 lbs)</td>
<td>1.0 kg (2.2 lbs)</td>
</tr>
<tr>
<td>With cartridge</td>
<td>4.0 kg (8.8 lbs)</td>
<td>2.3 kg (5.1 lbs)</td>
</tr>
</tbody>
</table>
Figure 10.1  Automatic cartridge loader outer view
10.2 Operation

10.2.1 Automatic cartridge loader operator panel

![Operator Panel Diagram]

Figure 10.3 Automatic cartridge loader operator panel

Functions equipped on the operator panel of the automatic cartridge loader (ACL) is the same as the tape drive without the ACL except some functions (refer to Section 4.4).

(1) Switch

There are seven switches on the operator panel. Following explains the function of each switch. When the switch is pressed except the case that the maintenance function is activated, a message indicating the operation of that switch is displayed. This means that the operator can confirm the switch operation.

a. COMP switch

This switch function is the same as the switch of the drive without ACL (refer to Subsection 4.4.2).

b. TEST switch

This switch function is the same as the switch of the drive without ACL (refer to Subsection 4.4.2).

c. START switch

When the cartridge is set in the magazine and the cartridge is not loaded yet during the AUTO MODE LED lights, the cartridge is loaded by pressing this switch.

Under the condition that the cartridge is already loaded and the tape drive is in not ready state, when the head is positioned at the BOT, the tape drive enters the ready state by pressing this switch, and when the head is positioned at other
than the BOT, the tape drive enters the ready state after rewinding the tape by pressing this switch.

When the ACL is in the stop state (MAGAZINE START LED is off), the ACL enters the start state by pressing this switch.

d. UNLOAD switch

The cartridge is unloaded and ejected into the magazine manually by pressing this switch. When this switch is pressed under the condition that the tape drive is in the not ready state or an error occurs, the cartridge is unloaded and ejected or the error state is reset.

The magazine position can be changed by pressing this switch and the EJECT or MODE SEL switch.

When the magazine is not set;

- The position indication increases by pressing the EJECT switch while pressing the UNLOAD switch.

- The position indication decreases by pressing the MODE SEL switch while pressing the UNLOAD switch.

- When the magazine is set after selecting the position by the above, the magazine is positioned to first cartridge and then to the selected cartridge by pressing the START switch.

- When the 5-cartridge magazine is set and the selected position exceeds 5, the magazine is not loaded even if the START switch is pressed.

- When the RESET switch is pressed before the START switch is pressed, the position selection is canceled and the normal operation is performed.

When the magazine is set, the cartridge is not loaded, and the MAGAZINE START LED is off:

- The magazine position goes up one step by pressing the EJECT switch while pressing the UNLOAD switch.

- The magazine position goes down one step by pressing the MODE SEL switch while pressing the UNLOAD switch.

e. RESET switch

By pressing this switch, the tape drive enters the not ready state and the ACL enters the stop state. At this time, the MAGAZINE START LED goes off and the TEST, START, UNLOAD, and EJECT switch becomes enable. In the case that an error occurs, the error state is reset and the cartridge is unloaded or the magazine is ejected by pressing this switch.
f. **EJECT switch**

By pressing this switch, the cartridge is ejected into the magazine and the magazine is ejected. In the case that an error occurs, the error state is reset and the magazine is ejected by pressing this switch. This switch is effective only when the MAGAZINE START LED is off.

The magazine position can be changed by pressing the UNLOAD switch and this switch. For details, see the explanation of the UNLOAD switch.

g. **MODE SEL switch**

This switch is used to change the ACL mode; system or auto mode. This switch is effective when the MAGAZINE START LED is off.

The magazine position can be changed by pressing the UNLOAD switch and this switch. For details, see the explanation of the UNLOAD switch.

h. **Maintenance function**

This function is the same as the drive without ACL (refer to Subsection 4.4.2).

(2) **Indicator**

a. **ATTN LED**

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

b. **SEL LED**

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

c. **COMP LED**

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

d. **Remaining tape length LEDs**

These LEDs have the same function as ones on the drive without ACL (refer to Subsection 4.4.3).
e. Message display

This display has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

f. MAGAZINE START LED

This LED goes on when the magazine is set and the ACL enters the start state by pressing the START switch.

This LED goes off when the ACL enters the stop state, when an error regarding the magazine occurs, or when the magazine is ejected by the EJECT command.

g. SYSTEM LED

This LED goes on when the ACL is in the system mode.

h. AUTO LED

This LED goes on when the ACL is in the auto mode.

i. Position indicator

This indicator indicates the state of the ACL.

(3) Meaning of messages or indication

a. Messages on message display

These are the same as ones of the drive without ACL (refer to Subsection 4.4.4).
b. Position indicator

<table>
<thead>
<tr>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;off&quot;</td>
<td>No magazine is set.</td>
</tr>
<tr>
<td>1,2,3,4,5, 6,7,8,9,0</td>
<td>Magazine position &quot;0&quot; indicates 10th cartridge.</td>
</tr>
<tr>
<td>-</td>
<td>The magazine is set and the START switch is not pressed yet.</td>
</tr>
<tr>
<td>F</td>
<td>The magazine is ejected and the magazine is changeable. When the magazine is removed, this LED goes off.</td>
</tr>
<tr>
<td>E</td>
<td>An error occurs at the ACL.</td>
</tr>
<tr>
<td>H</td>
<td>The cartridge is being inserted or loaded manually without using the magazine.</td>
</tr>
<tr>
<td>A</td>
<td>The ACL takes same operations when the power is re-turned on with the magazine is set, when the magazine is loaded or ejected, or when the stopper operation of the magazine is performed.</td>
</tr>
</tbody>
</table>

(4) Mode

There are three ACL modes; auto, system and manual mode. The auto mode and system mode are selected by the MODE switch.

When the cartridge is processed one by one without using the magazine, the ACL enters the manual mode automatically regardless of the MODE switch setting.

a. Auto mode

When the UNLOAD command is received, the cartridge is unloaded and ejected into the magazine, then the next cartridge is loaded automatically.

b. System mode

When the UNLOAD command is received, the cartridge is unloaded.
To load the next cartridge, the LOAD DISPLAY command issue is needed.

10.2.2 Magazine operation

There are two type of magazine; 5-cartridge type and 10-cartridge type.

(1) Handle

This handle is used for carrying the magazine or for setting the magazine into the ACL.
(2) **Cartridge locking bar**

This locking bar is used for locking the cartridge so that the cartridge does not fall out of the magazine. When the cartridge is set into the magazine, the cartridge is automatically locked by the cartridge locking bar.

(3) **Locking release**

There are two way to release the lock of the cartridge. When removing the cartridge one by one, pull out the cartridge with pushing the cartridge locking bar. When removing several cartridges at a time, press the lock release button (all cartridge locking bars are pushed). The cartridges can be removed.

**Figure 10.4 Magazine (5-cartridge type)**
(4) Magazine file protect switch

All cartridges in the magazine are write-inhibited by this switch regardless of each cartridge condition.

![Magazine file protect switch diagram]

**Figure 10.5 Magazine file protect**

10.2.3 Notes on use

1. If a magazine has been placed for a certain period outside the computer room, it must be left in the computer room for the same period (not exceeding 24 hours) before using it.

2. Do not subject the magazine to dust or high temperatures.

3. Do not drop the magazine.

4. Protect the magazine from shock.
10.2.4 Notes on storage

Store cartridges under the following environmental conditions.

Temperature: 0 to 50°C (22 to 24°C)
Humidity: 8 to 95%RH (50 to 55%)
Maximum wet bulb temperature: 27°C

Notes:

1. Do not store the magazine for more than three months under maximum temperature and humidity.
2. The recommended temperature and humidity are enclosed in parentheses.

10.2.5 Notes on transportation

Transportation environmental conditions are given below. The magazine must be transported within 10 days. The magazine exposed to extremely high temperature (e.g., left in a car) may deform.

<table>
<thead>
<tr>
<th>Packaged condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
</tr>
<tr>
<td>-40 to 60°C</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
<tr>
<td>5 to 95%RH</td>
</tr>
<tr>
<td>Maximum wet bulb temperature</td>
</tr>
<tr>
<td>27°C</td>
</tr>
</tbody>
</table>
10.2.6 Labels on magazine

Figure 10.6 Labels position on magazine
10.3 Installation Procedure

(1) Turn off the main switch of the drive and remove the MTU (and connected cables) from the drive.

(2) Remove the front panel for the MTU with the following procedure (refer to Figure 10.7).
   1. Remove four screws "a" for the front panel.
   2. Disconnect one connector of the front panel.
   3. Remove two screws "b" and remove the top cover "A".
   4. Remove the shaft "C".
   5. Remove screws "c" and remove the panel bracket "B".
   6. Mount the FG cable to the original position.

(3) Mount the ACL with the following procedure.
   1. Take out the ACL from the packaging box.
   2. Remove two screws "e" for the ACL top cover. (Refer to Figure 10.8)
   3. Pull the ACL top cover this side with pushing the flag "D" with your finger, when the hook is disconnected, lift up the ACL top cover and remove it.
Remove four screws "F" for the ACL base "E" and remove the ACL mechanism of the ACL from the ACL base "E" (refer to Figure 10.8).

Note:

When removing the ACL mechanism from the ACL base, take care not to damage the PCA.

Insert the grounding plate "F" (accessory) inside the outer frame of the portion of the front panel of the MTU is removed (meet three holes of the grounding hole to the screw hole of the MTU). (refer to Figure 10.9).

Note:

Pass the connector of the operator panel through the cable hole.

Mount the ACL base "E" to the MTU. At that time, put the bolt "g" in the most bottom side (left side) hole of the ACL base at first and tighten the wrench temporarily. Then tighten remaining two screws "g" temporarily. (refer to Figures 10.8 and 10.9).

Run "X" side of the ACL base "E" against "T" side of the MTU side (loader) and run "Y" side of the ACL base "E" against "S" side of the MTU and then tighten three bolts "g" certain. (refer to Figure 10.9).

Connect the operator panel cable "H" (accessory: approximately 30 cm) to the cable "G" from the cable hole of the ACL base "E" (refer to Figure 10.9).

Peel off protect sheet of the adhesive tape inside the ACL base "E" and paste the operator panel cable. (see below).

Note:

Mount the operator panel cable "H" inside the ACL base under the condition that the connector of the operator panel cable "H" that is connected to the cable "G" is pushed into the cable hole of the ACL base "E".
• Connect the interface cable "I" (accessory: approximately 10 cm) to the connector "J" of the ACL. (refer to Figure 10.10).

• Mount the ACL mechanism to the ACL base “E” (when mounting take care not to damage the PCA).

• Connect the interface cable “I” to the connector “K” of the MTU (refer to Figure 10.11).

• Connect the connector of the operator panel cable “H” to the connector of the ACL. Put the excessive cable in the ACL.

• Mount the ACL top cover (refer to Figure 10.11).

  (1) When mounting the ACL top cover take care not to pinch cables.

  (2) Refer to step (3) for the hinge of the ACL top cover. Place the ACL top cover on the ACL base with shifting to the front slightly. Push in the ACL top cover with pushing the flag “D” and hang the edge of the ACL base to the hook of the ACL top cover.

  (3) Tighten two screws “a” for the ACL top cover.

• Mount the top cover “A” and tighten two screws.

(4) When the ACL is installed, the EC level setting of the MTU is needed. This setting is made at “71 : S. ECL” of display. For setting method, see Section 5.2.

  Setting:  “EC LV:01”  (default:  “EC LV:00”)
Figure 10.7 ACL installation (2)
Figure 10.8  ACL installation (3)
Figure 10.9 ACL installation (4)
Interface cable "I" (Accessory)

Connector "J"

Operator panel cable "H" (Accessory)

Screw "I"

Figure 10.10  ACL installation (5)
Figure 10.11  ACL installation (6)
This page is intentionally left blank.
APPENDIX B MANUAL HEAD CLEANING

B.1 Purpose

The head of this drive must be cleaned with the exclusive cleaning cartridge. In generally, other cleaning is not necessary if the periodical cleaning by the cleaning cartridge is performed. However, the dust that cannot be removed by the cleaning cartridge may be attached to the head with an illegal use of the cleaning cartridge. In this case, it is recommended to clean the head and guide manually with the following procedure.

B.2 Cleaning Procedure

1. Remove the top cover (see Subsection 9.3.13).

2. Open the PCA-CR (see Subsection 9.3.14).

3. Clean the tape path (head, tape guide, and cleaner) from the slit of the upper plate of the threader assembly with a cleaning solvent (isopropyl alcohol) by a cotton swab.

4. Close the PCA-CR.

5. Mount the top cover.

6. Confirm the drive operation according to the procedure explained in Section 9.4.
Appendix B
Automatic Cartridge Loader (ACL)

B.1 Overview

The CONVEX 3480-compatible cartridge tape subsystem has an optional Automatic Cartridge Loader (ACL) that mounts to the front of the tape drive and accommodates a 10-cartridge magazine.

This appendix contains the Fujitsu Cartridge Tape Drives CE Manual, chapter 10, "Automatic Cartridge Loader (ACL)," sections 10.1 and 10.2, which describe the operation and installation of the ACL mechanism.
CHAPTER 10 AUTOMATIC CARTRIDGE LOADER (ACL)

10.1 Specifications

10.2 Operation

10.3 Installation Procedure

This option realizes that the cartridge set in the magazine (for five or ten cartridges) is loaded or ejected into/from the drive automatically.

This option consists of the magazine that stores cartridges, elevator section that asends or descends the magazine, magazine guide section, feeder section that loads or unloads the cartridge into/from the tape drive, mechanism control section, and operator panel.

10.1 Specifications

10.1.1 Automatic cartridge loader performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer dimensions (W × H × D)</td>
<td>217 × 127 × 226 mm</td>
</tr>
<tr>
<td></td>
<td>[8.5 × 5.0 × 8.9 in.]</td>
</tr>
<tr>
<td>Weight</td>
<td>8 kg (17.6 lbs) or less</td>
</tr>
<tr>
<td>Processing time</td>
<td>10-cartridge magazine</td>
</tr>
<tr>
<td>Initial loading time</td>
<td>45 sec. max.</td>
</tr>
<tr>
<td>Cartridge position change time</td>
<td>41 sec. max.</td>
</tr>
<tr>
<td>Loading time</td>
<td>26 sec. max.</td>
</tr>
<tr>
<td>Unloading time</td>
<td>12 sec. max.</td>
</tr>
<tr>
<td>Ejecting time</td>
<td>32 sec. max.</td>
</tr>
</tbody>
</table>

Note:
Each of processing time is a time from following A to B.
Initial loading time: The START switch is pressed.

Cartridge position change time: Ready state

Loading time: The cartridge is started to load from the magazine

Unloading time: Ready state

Ejecting time: Ready state

10.1.2 Magazine specification

<table>
<thead>
<tr>
<th>Item</th>
<th>10-cartridge type</th>
<th>5-cartridge type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Outer dimensions</td>
<td>128 X 388 X 139 mm [5.0 X 15.3 X 5.5 in.]</td>
<td>128 X 231 X 139 mm [5.0 X 9.1 X 5.5 in.]</td>
</tr>
<tr>
<td>2 Weight Without cartridge</td>
<td>1.5 kg (3.3 lbs)</td>
<td>1.0 kg (2.2 lbs)</td>
</tr>
<tr>
<td>With cartridge</td>
<td>4.0 kg (8.8 lbs)</td>
<td>2.3 kg (5.1 lbs)</td>
</tr>
</tbody>
</table>
Figure 10.1 Automatic cartridge loader outer view
10.2 Operation

10.2.1 Automatic cartridge loader operator panel

Figure 10.3 Automatic cartridge loader operator panel

Functions equipped on the operator panel of the automatic cartridge loader (ACL) is the same as the tape drive without the ACL except some functions (refer to Section 4.4).

(1) Switch

There are seven switches on the operator panel. Following explains the function of each switch. When the switch is pressed except the case that the maintenance function is activated, a message indicating the operation of that switch is displayed. This means that the operator can confirm the switch operation.

a. COMP switch

This switch function is the same as the switch of the drive without ACL (refer to Subsection 4.4.2).

b. TEST switch

This switch function is the same as the switch of the drive without ACL (refer to Subsection 4.4.2).

c. START switch

When the cartridge is set in the magazine and the cartridge is not loaded yet during the AUTO MODE LED lights, the cartridge is loaded by pressing this switch.

Under the condition that the cartridge is already loaded and the tape drive is in not ready state, when the head is positioned at the BOT, the tape drive enters the ready state by pressing this switch, and when the head is positioned at other
than the BOT, the tape drive enters the ready state after rewinding the tape by pressing this switch.

When the ACL is in the stop state (MAGAZINE START LED is off), the ACL enters the start state by pressing this switch.

d. UNLOAD switch

The cartridge is unloaded and ejected into the magazine manually by pressing this switch. When this switch is pressed under the condition that the tape drive is in the not ready state or an error occurs, the cartridge is unloaded and ejected or the error state is reset.

The magazine position can be changed by pressing this switch and the EJECT or MODE SEL switch.

When the magazine is not set:

- The position indication increases by pressing the EJECT switch while pressing the UNLOAD switch.
- The position indication decreases by pressing the MODE SEL switch while pressing the UNLOAD switch.
- When the magazine is set after selecting the position by the above, the magazine is positioned to first cartridge and then to the selected cartridge by pressing the START switch.
- When the 5-cartridge magazine is set and the selected position exceeds 5, the magazine is not loaded even if the START switch is pressed.
- When the RESET switch is pressed before the START switch is pressed, the position selection is canceled and the normal operation is performed.

When the magazine is set, the cartridge is not loaded, and the MAGAZINE START LED is off:

- The magazine position goes up one step by pressing the EJECT switch while pressing the UNLOAD switch.
- The magazine position goes down one step by pressing the MODE SEL switch while pressing the UNLOAD switch.

e. RESET switch

By pressing this switch, the tape drive enters the not ready state and the ACL enters the stop state. At this time, the MAGAZINE START LED goes off and the TEST, START, UNLOAD, and EJECT switch becomes enable. In the case that an error occurs, the error state is reset and the cartridge is unloaded or the magazine is ejected by pressing this switch.
f. EJECT switch

By pressing this switch, the cartridge is ejected into the magazine and the magazine is ejected. In the case that an error occurs, the error state is reset and the magazine is ejected by pressing this switch. This switch is effective only when the MAGAZINE START LED is off.

The magazine position can be changed by pressing the UNLOAD switch and this switch. For details, see the explanation of the UNLOAD switch.

g. MODE SEL switch

This switch is used to change the ACL mode; system or auto mode. This switch is effective when the MAGAZINE START LED is off.

The magazine position can be changed by pressing the UNLOAD switch and this switch. For details, see the explanation of the UNLOAD switch.

h. Maintenance function

This function is the same as the drive without ACL (refer to Subsection 4.4.2).

(2) Indicator

a. ATTN LED

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

b. SEL LED

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

c. COMP LED

This LED has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

d. Remaining tape length LEDs

These LEDs have the same function as ones on the drive without ACL (refer to Subsection 4.4.3).
e. Message display

This display has the same function as one on the drive without ACL (refer to Subsection 4.4.3).

f. MAGAZINE START LED

This LED goes on when the magazine is set and the ACL enters the start state by pressing the START switch.

This LED goes off when the ACL enters the stop state, when an error regarding the magazine occurs, or when the magazine is ejected by the EJECT command.

g. SYSTEM LED

This LED goes on when the ACL is in the system mode.

h. AUTO LED

This LED goes on when the ACL is in the auto mode.

i. Position indicator

This indicator indicates the state of the ACL.

(3) Meaning of messages or indication

a. Messages on message display

These are the same as ones of the drive without ACL (refer to Subsection 4.4.4).
b. Position indicator

<table>
<thead>
<tr>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;off&quot;</td>
<td>No magazine is set.</td>
</tr>
<tr>
<td>1,2,3,4,5,</td>
<td>Magazine position</td>
</tr>
<tr>
<td>6,7,8,9,0</td>
<td>&quot;0&quot; indicates 10th cartridge.</td>
</tr>
<tr>
<td>-</td>
<td>The magazine is set and the START switch is not pressed yet.</td>
</tr>
<tr>
<td>F</td>
<td>The magazine is ejected and the magazine is changeable. When the magazine is removed, this LED goes off.</td>
</tr>
<tr>
<td>E</td>
<td>An error occurs at the ACL.</td>
</tr>
<tr>
<td>H</td>
<td>The cartridge is being inserted or loaded manually without using the magazine.</td>
</tr>
<tr>
<td>A</td>
<td>The ACL takes same operations when the power is re-turned on with the magazine is set, when the magazine is loaded or ejected, or when the stopper operation of the magazine is performed.</td>
</tr>
</tbody>
</table>

(4) Mode

There are three ACL modes; auto, system and manual mode. The auto mode and system mode are selected by the MODE switch.

When the cartridge is processed one by one without using the magazine, the ACL enters the manual mode automatically regardless of the MODE switch setting.

a. Auto mode

When the UNLOAD command is received, the cartridge is unloaded and ejected into the magazine, then the next cartridge is loaded automatically.

b. System mode

When the UNLOAD command is received, the cartridge is unloaded.
To load the next cartridge, the LOAD DISPLAY command issue is needed.

10.2.2 Magazine operation

There are two type of magazine; 5-cartridge type and 10-cartridge type.

(1) Handle

This handle is used for carrying the magazine or for setting the magazine into the ACL.
(2) Cartridge locking bar

This locking bar is used for locking the cartridge so that the cartridge does not fall out of the magazine. When the cartridge is set into the magazine, the cartridge is automatically locked by the cartridge locking bar.

(3) Locking release

There are two way to release the lock of the cartridge. When removing the cartridge one by one, pull out the cartridge with pushing the cartridge locking bar. When removing several cartridges at a time, press the lock release button (all cartridge locking bars are pushed). The cartridges can be removed.

Figure 10.4 Magazine (5-cartridge type)
(4) Magazine file protect switch

All cartridges in the magazine are write-inhibited by this switch regardless of each cartridge condition.

Figure 10.5 Magazine file protect

10.2.3 Notes on use

① If a magazine has been placed for a certain period outside the computer room, it must be left in the computer room for the same period (not exceeding 24 hours) before using it.

② Do not subject the magazine to dust or high temperatures.

③ Do not drop the magazine.

④ Protect the magazine from shock.
10.2.4 Notes on storage

Store cartridges under the following environmental conditions.

Temperature: 0 to 50°C (22 to 24°C)
Humidity: 8 to 95%RH (50 to 55%)
Maximum wet bulb temperature: 27°C

Notes:
1. Do not store the magazine for more than three months under maximum temperature and humidity.
2. The recommended temperature and humidity are enclosed in parentheses.

10.2.5 Notes on transportation

Transportation environmental conditions are given below. The magazine must be transported within 10 days. The magazine exposed to extremely high temperature (e.g., left in a car) may deform.

Packaged condition

<table>
<thead>
<tr>
<th>Temperature</th>
<th>-40 to 60°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>5 to 95%RH</td>
</tr>
<tr>
<td>Maximum wet bulb temperature</td>
<td>27°C</td>
</tr>
</tbody>
</table>
10.2.6 Labels on magazine

Figure 10.6 Labels position on magazine
10.3 Installation Procedure

(1) Turn off the main switch of the drive and remove the MTU (and connected cables) from the drive.

(2) Remove the front panel for the MTU with the following procedure (refer to Figure 10.7).

1. Remove four screws "a" for the front panel.
2. Disconnect one connector of the front panel.
3. Remove two screws "b" and remove the top cover "A".
4. Remove the shaft "C".
5. Remove screws "c" and remove the panel bracket "B".
6. Mount the FG cable to the original position.

(3) Mount the ACL with the following procedure.

1. Take out the ACL from the packaging box.
2. Remove two screws "e" for the ACL top cover. (Refer to Figure 10.8)
3. Pull the ACL top cover this side with pushing the flag "D" with your finger, when the hook is disconnected, lift up the ACL top cover and remove it.
5. Remove four screws "F" for the ACL base "E" and remove the ACL mechanism of the ACL from the ACL base "E" (refer to Figure 10.8).

Note:

When removing the ACL mechanism from the ACL base, take care not to damage the PCA.

6. Insert the grounding plate "F" (accessory) inside the outer frame of the portion of the front panel of the MTU is removed (meet three holes of the grounding hole to the screw hole of the MTU). (refer to Figure 10.9).

Note:

Pass the connector of the operator panel through the cable hole.

7. Mount the ACL base "E" to the MTU. At that time, put the bolt "g" in the most bottom side (left side) hole of the ACL base at first and tighten the wrench temporarily. Then tighten remaining two screws "g" temporarily. (refer to Figures 10.8 and 10.9).

8. Run "X" side of the ACL base "E" against "T" side of the MTU side (loader) and run "Y" side of the ACL base "E" against "S" side of the MTU and then tighten three bolts "g" certain. (refer to Figure 10.9).

9. Connect the operator panel cable "H" (accessory: approximately 30 cm) to the cable "G" from the cable hole of the ACL base "E" (refer to Figure 10.9).

10. Peel off protect sheet of the adhesive tape inside the ACL base "E" and paste the operator panel cable. (see below).

Note:

Mount the operator panel cable "H" inside the ACL base under the condition that the connector of the operator panel cable "H" that is connected to the cable "G" is pushed into the cable hole of the ACL base "E".
1. Connect the interface cable "I" (accessory: approximately 10 cm) to the connector "J" of the ACL. (refer to Figure 10.10).

2. Mount the ACL mechanism to the ACL base "E" (when mounting take care not to damage the PCA).

3. Connect the interface cable "I" to the connector "K" of the MTU (refer to Figure 10.11).

4. Connect the connector of the operator panel cable "H" to the connector of the ACL. Put the excessive cable in the ACL.

5. Mount the ACL top cover (refer to Figure 10.11).
   (1) When mounting the ACL top cover take care not to pinch cables.
   (2) Refer to step (3) for the hinge of the ACL top cover. Place the ACL top cover on the ACL base with shifting to the front slightly. Push in the ACL top cover with pushing the flag "D" and hang the edge of the ACL base to the hook of the ACL top cover.
   (3) Tighten two screws "e" for the ACL top cover.

6. Mount the top cover "A" and tighten two screws.

(4) When the ACL is installed, the EC level setting of the MTU is needed. This setting is made at "71: S. ECL" of display. For setting method, see Section 5.2.

Setting: "EC LV:01" (default: "EC LV:00")
Figure 10.7 ACL installation (2)
ACL top cover

Connector

Flag "D"

ACL Mechanism

Operator panel cable

Screw "e"

ACL base "E"

Figure 10.8  ACL installation (3)
Figure 10.9 ACL installation (4)
Figure 10.10  ACL installation (5)
Figure 10.11 ACL Installation (6)
This page is intentionally left blank.
Appendix C
ACL Upgrade Procedures

This appendix describes how to add an ACL to an existing peripheral cabinet.

C.1 Installation onto Existing Cartridge Tape Drive

This section gives the procedure for installing an ACL onto an existing cartridge tape drive.

NOTE

The following items must be taken into consideration before installing an ACL onto an existing cartridge tape drive:

- There can be a maximum of two cartridge tape drives with ACL's in one expansion cabinet.
- Once the ACL is installed, the cabinet door cannot be opened as long as there is a magazine in the ACL. So you need to make sure devices in the cabinet do not need regular access while the ACL is loaded.
- You must have the devices in the peripheral cabinet arranged in a specified order for the formatter, drive, and ACL to fit properly when door is closed. You may have to rearrange and/or remove devices within the cabinet prior to installing the ACL. Refer to the appropriate service guide for instructions on moving devices other than the 3480 tape subsystem. The procedure for removing and rearranging the 3480 formatter and tape drive is given below. This procedure must be executed in the order listed for optimal accessibility and ease of replacement. Figure C-1 shows the required arrangement.
Figure C-1, Required Cabinet Arrangement for ACL Use

The recommended procedure is:

1. Remove tape drive and formatter.
2. Attach ACL to tape drive.
3. Reinstall devices into cabinet.
4. Remove existing front door.
5. Install new front door.

The following sections explain these procedures in detail. If your devices are already in this arrangement, refer to Appendix B for instructions on installing the ACL unit.
C.1.1 Preinstallation

This section gives steps to be done before installing the ACL onto an existing 3480 tape drive.

**CAUTION**

Shut down system before removing power to the existing expansion cabinet. Failure to do so will cause a system crash and possible loss of data. Refer to the *CONVEX Processor Operation Guide (C100 Series, C200 Series)* for power-down procedures on a CONVEX supercomputer.

1. Turn the processor's front panel key switch to the OFF position. Figure C-2 shows a typical front panel control switch:

**Figure C-2, Front Panel Power Control Switch**

![Front Panel Power Control Switch Diagram](image-url)
2. Remove power to the expansion cabinet.

- To remove power from a CONVEX EXP-101 or EXP-102 expansion cabinet, disconnect the cabinet's AC power cord.
- To remove power from a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the OFF position. Figure C-3 shows the EXP-105 expansion cabinet's power controller front panel and main power control switch:

Figure C-3, EXP-105 Expansion Cabinet Power Controller Front Panel
(WARNING) Expansion cabinet stabilizer bars must be extended before extending the cartridge tape drive assembly from its expansion cabinet for service. Failure to do so will make the expansion cabinet unstable, increase the possibility of it falling forward, can cause injury to personnel, and will cause damage to equipment.

3. Extend the expansion cabinet stabilizer bars and adjust the feet until they are in firm contact with the floor. Figure C-4 shows the expansion cabinet stabilizer bars and adjustable feet:

Figure C-4, Expansion Cabinet Stabilizer Bars
C.1.2 Removal of Existing Devices

This section gives procedures for removing existing devices in an existing CONVEX expansion cabinet before installing the ACL onto an existing 3480 tape drive.

1. Remove the formatter.
   1. Mark all cables connected to the rear of the formatter for easy reconnection.
   2. Disconnect the AC power cable, the PCI cable, the MTU DIGITAL cable, the MTU ANALOG cable, the SCSI IN, and the SCSI OUT cable from the rear of the formatter.
   3. Slide the formatter out of the cabinet.

2. Remove tape drive.

   - **NOTE**
   
   To avoid injury, remove the tape drives from the tray while the tray is in the forward, locked position.
   
   To avoid injury and to make the ACL attachment easier, place the tape drive onto a workbench.

   1. Disconnect the target tape drive's power supply's AC power cord from the expansion cabinet's power strip.
   2. Remove the 2 screws holding the cartridge tape drive tray and slide the tray partially out of the cabinet.
   3. Remove the 2 screws securing the shielding bracket covering the cables and remove the shielding bracket.
   4. Mark each cable attached to the tape drive for easy replacement.
   5. Remove each cable attached to the tape drive. Remove the terminator from the tape drive (if present).
   6. Remove the 2 screws that secure the cable shielding clamp to the tape drive.
   7. Remove the 4 screws from the bottom of the tray holding the target tape drive.
   8. Remove the tape drive.

C.1.3 ACL Installation

Install the ACL unit. Refer to Appendix B of this guide for installation procedures.
C.1.4 Replacement of Existing Devices

This section gives procedures for replacing devices into an existing CONVEX expansion cabinet after installing the ACL onto an existing 3480 tape drive.

1. If you are leaving another device in the top of the cabinet, ensure that it is exactly 7" from the top. Otherwise, install a filler panel (CONVEX part number 320-000239-503) as a spacer.

2. Install formatter chassis with the top exactly 7" below the top of the cabinet, underneath the previous device/panel. Different formatters have different hole placements, so make sure the top of the chassis is placed exactly 7" below the top of the cabinet.

3. Install the tape cartridge rackmount slides directly below and flush against the bottom of the formatter chassis (no empty holes between them), exactly 3 1/2" below filler panel/device.

4. Install tape drive tray, with power supply.

5. Install tape drive onto tray.
   1. Place the tape drive in the tray.
   2. Install the 4 screws into the bottom of the tray that holds the tape drive.

   **NOTE**
   Refer to chapter 2, "Unpacking and Installation," section 2.3.4.1, "Installation of the Cartridge Tape Drive and Power Supply," for more detailed cabling instructions.

   3. Install the 2 screws that secure the cable clamp bracket to the tape drive.
   4. Attach the cables and terminator (if necessary) to the tape drive.
   5. Install the shielding bracket over the cable clamp bracket and secure with 2 screws.
   6. Slide the tape drive tray back into the expansion cabinet.
   7. Install the 2 screws that hold the tray in the expansion cabinet.

6. Install formatter into chassis.

7. Connect the AC power cable, the PCI cable, the MTU DIGITAL cable, the MTU ANALOG cable, the SCSI IN, and the SCSI OUT cable to the rear of the formatter.

Figure C-5 illustrates the new cabinet arrangement with the ACL attached.
C.1.5 Postinstallation

This section give steps to be done after replacing devices into the expansion cabinet.

1. Remove the existing front door to the expansion cabinet.
2. Install the new front door onto the expansion cabinet.
3. Return the expansion cabinet stabilizer bars to their retracted position. See Figure C-4.
4. Return power to the expansion cabinet.
   - To return power to a CONVEX EXP-101 or EXP-102 expansion cabinet, connect the cabinet's AC power cord to the site source.
   - To return power to a CONVEX EXP-105 high-performance expansion cabinet, set the main power control switch to the ON position. Figure C-6 shows the EXP-105 expansion cabinet's power controller front panel and main power control switch:
   - Turn the processor's front panel key switch to the ON position. See Figure C-2.

C.2 Part Number List

Table C-1 lists the CONVEX part numbers and descriptions for the FRUs of the ACL:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>207-000015-032</td>
<td>Cartridge loader, auto 3480</td>
</tr>
<tr>
<td>207-000015-036</td>
<td>Magazine, black, 10 cartridge ACL</td>
</tr>
</tbody>
</table>

Table C-2 lists the CONVEX part numbers and descriptions for the expansion cabinet door assembly:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-001030-200</td>
<td>PUR ASSY, PERIPH DOOR 3480 ACL, LEFT-HAND</td>
</tr>
<tr>
<td>500-001030-201</td>
<td>PUR ASSY, PERIPH DOOR 3480 ACL, RIGHT-HAND</td>
</tr>
<tr>
<td>330-000207-500</td>
<td>PFAB, PANEL INSERT DOOR, ACL</td>
</tr>
</tbody>
</table>