Purpose
The purpose of this brochure is to introduce the IBM Customer Engineer to the Automatic Cartridge Loader feature of the 3480.

Description
The Automatic Cartridge Loader feature consists of:
An automatic loader mechanical assembly and the load assembly that is mounted on the front of a 3480 tape drive (replacing the front cover and manual latch assemblies). The Automatic Cartridge Loader feature allows for both automatic loading of premounted tape cartridges or loading of a single tape cartridge. The Automatic Cartridge Loader feature (#2511) includes two Loader Mechanical and two Load assemblies, one for each tape transport in the 3480 B22 or B11 tape units.

Installation
The field installation time for one Automatic Cartridge Loader is 1.0 hours (2.0 hours per feature).

Diagnostics
The 3480 product diskette includes the diagnostics necessary to service the loader feature.

Modes of Operation:
Auto:
Allows the operator to premount up to six cartridges that are automatically mounted and demounted on the drive.

System:
Supporting software is required. In response to volume requests (mount messages), allows the operator to premount up to five scratch cartridges that are mounted and demounted on the drive automatically.

Note: A cartridge should not be premounted in the feed position as this position may be needed for a specific volume request.

Manual:
Allows cartridge loading by depressing the start key on operators panel. This mode is effectively the same as a 3480 without the Automatic Cartridge Loader feature.
**Start Switch:**
Press the Start switch to cause an index and/or load procedure or, under error conditions, an unload. The Start switch is pressed after making any mode change (Auto, System, or Manual).

**Attention Indicator:**
The Attention indicator has two functions.

Flash:
Clear cartridge(s) from output stacker and cartridge from feed position. Press the Start switch on the loader to clear this condition.

On Continuous:
Clear cartridge(s) from output stacker and cartridge from feed position. Press the Unload switch on the drive to clear this condition.

**Power Indicator:**
On when the voltages required for the Automatic Cartridge Loader are present.

---

**Error Codes:**
A two position Error Display Indicator is located on the Loader Control Card.

Blank:
Indicates the microcode for the Automatic Cartridge Loader is not loaded.

00:
Indicates the microcode is loaded and the Automatic Cartridge Loader is functional.

XX:
Indicates the last error that occurred on the Automatic Cartridge Loader. The indicator having characters other than 00 is used by the Maintenance Device to isolate to the failing FRU.
**Diagnostics:**
The product diskette has been updated to incorporate the diagnostics necessary to service the Automatic Cartridge Loader.

<table>
<thead>
<tr>
<th>Description</th>
<th>FRU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loader Control Card</td>
<td>281</td>
</tr>
<tr>
<td>Load Assembly</td>
<td>282</td>
</tr>
<tr>
<td>Load Motor</td>
<td>283</td>
</tr>
<tr>
<td>Load Motor Complete Sensor</td>
<td>284</td>
</tr>
<tr>
<td>Cartridge Latched Sensor</td>
<td>011</td>
</tr>
<tr>
<td>Cartridge Present Sensor</td>
<td>010</td>
</tr>
<tr>
<td>File Protect Switch</td>
<td>009</td>
</tr>
<tr>
<td>Loader Mechanical Assembly</td>
<td>285</td>
</tr>
<tr>
<td>Fuse 24v</td>
<td>288</td>
</tr>
<tr>
<td>Fuse 5v</td>
<td>299</td>
</tr>
<tr>
<td>Stack Low Position Sensor</td>
<td>289</td>
</tr>
<tr>
<td>Cartridge in Stack Sensor</td>
<td>291</td>
</tr>
<tr>
<td>Cartridge Staged Sensor</td>
<td>292</td>
</tr>
<tr>
<td>Stacker Up Position Sensor</td>
<td>296</td>
</tr>
<tr>
<td>Input Stacker Assembly</td>
<td>290</td>
</tr>
<tr>
<td>Left Input Rail Assembly</td>
<td>293</td>
</tr>
<tr>
<td>Right Input Rail Assembly</td>
<td>294</td>
</tr>
<tr>
<td>Feed Assembly</td>
<td>295</td>
</tr>
<tr>
<td>Output Stacker Assembly</td>
<td>297</td>
</tr>
<tr>
<td>Loader Operator Panel</td>
<td>298</td>
</tr>
<tr>
<td>Loader Signal Cable</td>
<td>286</td>
</tr>
<tr>
<td>Loader Power Cable</td>
<td>287</td>
</tr>
</tbody>
</table>
### Sense Information

The following sense bytes contain information about the Automatic Cartridge Loader.

- Sense byte 7 must be 19 or 20
- Sense byte 25 bit 7 on = Automatic Cartridge Loader installed
- Sense byte 21 contains the drive check codes - EC, ED, EE or EF (all are Automatic Cartridge Loader errors). The check codes are converted to E7nn in the fault symptom index, where nn is equal to the contents of the loader control card display (sense byte 18). The drive check codes, and the contents of the loader control card, found in sense byte 18, are used to develop fault symptom codes.

**Example:**

DRIVE DISPLAY = EC, ED, EE, EF  
LOADER CONTROL CARD = A9  
SENSE BYTE 18 = A9  
FSC WOULD BE = E7A9

```
00 02 04 06 08 10 12 14 16 18 20 22 24 26 28 30
4240983300000000207308E060000000000A902FFEC000F6810E7157379900
XX XX XX
AUTOMATIC CARTRIDGE LOADER LEDs:<XXXX XX XX
DRIVE CHECK CODE:<XXXXXXXXXXXXXXXXXXXXXX XX
BIT 7 ON = AUTOMATIC CARTRIDGE LOADER INSTALLED=XX
```

### LOAD SEQUENCE

- **START**
- **CARTRIDGE IN STACK SENSOR**
- **CARTRIDGE STAGED AND INPUT COMPLETE SENSORS**
- **FEED SOLENOID**
- **TRACK FEED SENSOR TRACK CLOSED SENSOR**
- **FEED MOTORS START**

- The 'cartridge in stack' sensor is closed, when a cartridge is placed in any of the top five (5) positions of the input stack assembly. The micro code then recognizes a cartridge is ready for a load operation.
- The 'cartridge staged' sensor detects that a cartridge has been moved into the feed position. (bottom slot of the input assembly position '6'). The 'index complete' sensor also detects when an input cycle has completed.
- The 'feed solenoid' is energized after the cartridge staged sensor has sensed a cartridge in the feed position. The feed drive belts contact the sides of the cartridge.
- The 'track feed' sensor is activated during a cartridge feed cycle. If there is no cartridge in the 'track closed' sensor will also activate. (after the 'track feed sensor').
- The feed assembly motors drive the cartridge into the loader assembly.
LOAD SEQUENCE (CONTINUED)

A

FEED COMPLETE SWITCH

The 'feed complete' switch is activated when a cartridge is fully loaded into the load assembly.

FEED MOTORS STOP

The 'feed motors stop' after the feed complete switch is made.

FEED SOLENOID RELEASES

The 'feed solenoid' releases after the feed motor stops.

CARTRIDGE PRESENT AND / OR FILE PROTECT

The 'cartridge present' sensor is closed when a tape is loaded into the loader. It is NOT closed when a cleaner cartridge is loaded. The 'file protect' switch is ACTIVE with a non protected tape or a cleaner tape loaded.

LOADER MOTOR MOVES TRAY DOWN

The 'loader motor' is made active, driving the cartridge down onto the file reel motor hub.

CARTRIDGE LATCHED SENSOR

When the loader reaches its full downward travel, the 'cartridge latched' sensor is activated by the cartridge latched flag mounted on the loader tray.

LOAD MOTOR COMPLETE SENSOR

The 'load motor complete' sensor is activated when the window of the motor crank completes its full travel, turning the motor off.

START 3460 THREAD LOAD OPERATION

End Automatic Cartridge Loader function, resume 3460 thread load operation.

UNLOAD SEQUENCE

START

TAPE PATH SENSOR (A) CLOSED

When the threader puts the loader block back into the cartridge, 'tape path sensor A' is deactivated by a flag on the threader arm.

LOADER MOTOR MOVES TRAY UP

The 'loader motor' drives the cartridge up, putting the cartridge latched sensor in the active state.

LOADER MOTOR SENSOR COMPLETE

The 'loader motor complete' sensor is activated when the motor crank window completes its full travel, turning off the loader motor.

FEED SOLENOID PICKS

The 'feed solenoid' is energized after the load motor complete sensor is activated - bringing the feed drive belts into contact with the sides of the cartridge.

TRACK FEED SENSOR TRACK CLOSED SENSOR

The 'track feed' sensor is deactivated by a flag on the sensor rod with a cartridge ready to be unloaded. If the cartridge is not in the proper position, the 'track closed' sensor will be deactivated by a flag on the sensor rod. The sensor rod is attached to the feed assembly, and moved when the solenoid is energized.
The 'feed motors' are activated after the track feed sensor is deactivated and the track closed sensor is active, running cartridge out of the loader into the input assembly bottom position.

The 'extract complete' sensor is activated when the cartridge has gone past it in the feed assembly. This sensor turns off the feed motors.

The 'feed solenoid' is deactivated after the extract complete sensor has been activated.

The 'stack up' sensor repositions the output tray or top cartridge in the tray to the up most position of the output assembly.

After the output assembly repositions, the 'input assembly' runs the exited cartridge down to the output tray, and the input complete sensor senses a complete cycle.

When the cartridge was placed on the output tray, the 'stack up' sensor was closed by the cartridge. The output assembly then runs down and repositions to the stack up sensor.

This completes automatic cartridge loader operation.