

# IBM LTO-6 Firmware Versions J450 (FH) and J451 (HH) Release Announcement

May 2018

## Preface

This Product Information Bulletin announces the release of IBM LTO-6 firmware updates J450 for full-height (FH) drives and J451 for half-height (HH) drives. These updates are intended, among other things, to increase overall reliability, improve tape handling, further reduce any possibility of error, and provide continued enhancements to diagnostic capabilities.

## Models Affected

This firmware affects all IBM LTO-6 drives, both FH and HH.

## Upgrade Considerations

All systems running code IBM LTO-6 H4T2/H4T3 or H991 can be upgraded to LTO-6 J450/J451.



**CAUTION:** To prevent data corruption, verify that all active backup and recovery jobs to the NEO tape library are completed prior to performing the upgrade.

## Downgrades are Not Supported

Downgrades are not supported.

## Functional Improvements

Firmware fixes included with the J450 FH and J451 HH updates:

- **Improve host interface communications.**
- **Improve ADI (library interface) communications.**
- **LUN1: do not set VS bits in inquiry data.**
- **Servo control improvements.**
- **Fixes for log sense and tape alert data.**
- **Request clean for errors that require re-chuck ERP.**

## Previous Functional Improvements

Firmware fixes since G350 FH and G351 HH, including G9P0 FH, G9P1 HH, and H991 updates:

- **Update command timeout values.**
- **Support DRA using standards based op-codes.**
- **Support encrypt only (and related) modes.**
- **Improve drive tape servo handling.**
- **SCSI command handling and error reporting corrections.**
- **Log pages 00h and 14h and mode page 10h corrections.**
- **Improvements in ADT communication.**
- **Panic due to abandoned seg status begin cleared on load** – Fixes another case for error handling which involves a FM and EOD at end of wrap. In this scenario, the tape was unloaded right after a recovered error, and the panic occurred on the next load.
- **Correct data for drive ID in MAM parm** – Fixes a bug caused by a previous fix, where a cleaning cartridge could appear as a data cartridge in MAM data.
- **Add drive behaviors to report a drive panic** – To better identify when a drive panic occurs the follow behaviors were added to the drive for a library to monitor. Set TA=3Ah and assert new recovery procedure 10h – “Device initiated reboot. Retrieve device error log.”
- **Drive returned incorrect MAM parms 224h, 225h for unit WORM** – The attributes 224h and 225h should return FF FF FF FF FF FF FF FF (8 bytes) for no encrypted logical block. Instead the drive returned 00 00 FF FF FF FF FF FF which was incorrect.
- **MTR eject doesn't return callback when cartridge in sensor is off** – The drive would get stuck in a MTR when there was no cartridge in the drive. Additional case was found.
- **Fix error reporting on erase** – When a FID write error occurs during an erase sequence, correctly report a media error rather than a code internal error (FSC 6000).
- **Drive panic due to side effect of CMVC 35664** – Fix panic caused by previous code change for FSC 78B5 errors.
- **Increase size of max MAM attributes** – Fixes a code panic which occurred during an attempt to write/read all 1024 VU host attributes.
- **Fix FSC 6000 on WORM tape** – Fixes an FSC 6000 caused by a race condition with BOP caching and a host Locate command. Problem only occurred on WORM tapes.
- **Drive panic during POST when disabling crypto via the library.**
- **Change ASC/ASCQ for Out of Space for MAM (Vendor Unique Host Attributes 1400h to 17FFh)** – Send the correct return response of 05/55/06 Out of Space, when a Write Attrib command exceeds the allowable size limit.
- **Drive failed write with a FSC 7265** – Due to a code issue, a good write operation incorrectly triggered FSC 7265 and posted a failure.
- **Add cleaner cartridge support for log page 17h** – The drive code was not correctly handling information for log page 17h for cleaning cartridges.
- **FSC 7076 during extended recovery** – Fix for incorrect handling of an off-track read during extended recovery, which resulted in an FSC 7076.
- **Fix incorrect reporting for FSC 7342 (Wrt Unexp Wrap)** – Prevents a case of false reporting of an FSC 7342 error (Wrt on wrong wrap), when it should have been reported as an FSC 7855/7836 PES range error.
- **Fix Drive Panic FSC 7076** – When a FM is at EOD near EOW the drive panicked due to an incorrect handling of an abandoned ERP.

- **Fix Drive Panic** – Fixed a drive panic due to MAC queue sequencing issues. Caused by a command being aborted while a WRITE is paused.
- **Fix Drive Panic** – Fixed a drive panic caused by the drive not getting get LPOS, followed by C2 uncorrectable.
- **Fix queue hang after abort** – A Write Filemarks was aborted and the code did not clean up the queue correctly. This hung the queue, and the drive.
- **Drive failed on Write** – In skip sync mode the 4m rule was exceeded due to a WP value not being incremented.
- **Drive Panic during read/write test** – Drive was not correctly handling duplicate Datasets at a wrap turn during an ERP. This caused the drive to panic. You may see FSC 1055 or 7490 (drive fence because of unexpected reboot) indication in the engineering log if this happens.
- **CHN calibration hang** – Fix hang during calibration sequence which resulted in FSC 6017.
- **FSC 78B0 improvement (over rotation at stoplock)** – Two changes to fix some causes of FSC 78B0: 1) do not modify DAC offset values set by Mfg, and 2) filter out sudden invalid calculated radius values.
- **Log page 17h & rd attr parm match for uninit WORM** – On a new WORM cartridge, a read of the MAM data to check the FELO and FULO values, to see if the tape had any encrypted data, would return unexpected data. The drive did not populate these values until after a valid command was issued. This behavior was changed.
- **FSC 78B5 improvement (BOT\_EOT shutdown)** – Prevent some cases of FSC 78B5 with improved handling of a “stuck LPOS” condition near wrap turns.
- **Media motion hours of log page 16h is wrongly zero** – MMH in bytes 8-11 (Lifetime Media Motion Hours) in Log Page 16h was not getting reported correctly.
- **Drive panic on SCSI invoked Diagnostic** – Fix a panic caused by a SCSI invoked diagnostic, when another diagnostic was running.
- **Drive returning previous cleaning cartridge data** – Drive was returning previous cleaning cartridge data when reading log page 0x30 for thread count when an expired cleaning cartridge is loaded.
- **Fix thread count in LP 17h and 30h for WP carts** – Sets the thread counts to 0 when an uninitialized write protected cartridge is loaded.
- **Write Attribute command allows <= size of attribute** – A change was made allow MAM attributes in ASCII format to be used in Write Attribute command with less than number of bytes as specified by the SCSI format specifications.
- **FSC 605E on a Write command** – Drive did not have the proper media position after format command fail.
- **Drive failed unload with FSC 2E0C** – Allow unthreading tape even when bottom sensor is off. Previously drive was fenced by 2E0C.
- **Modified the allowed BOT unencrypted label on fully encrypted media** – On some ISVs, the label structure did not match what was expected and turned off the encryption LED, even though the entire tape was encrypted.
- **Drive Panic when out of range segment was about to clear** – Drive code did not set read mode buffer size when reposition to write was executed.
- **BOP cache copy should be aborted before flush operation** – Fixes a drive hang on a Set Capacity command.
- **Load fail due to tension shutdown** – Fixes an FSC 2E12 caused by a tension shutdown during Servo Init step in the load sequence.
- **Rewind failure from corrupted servo variable** – Fixes a code problem where an unbounded log trace overwrote a servo control variable trace, resulting in a Rewind failure.

## Encryption

- **Next block encryption status behavior was not per the standard** – Fix to correctly update the Encryption Status in the Next Block Encryption Status page to 6 (drive does not have the correct key to decrypt the encrypted block).
- **CRP: Improve CKORx handling** – Some changes were made to better comply with T10 standards.

## SAS Drives

- **SAS: Internal CRC failures send wrong data to host** – With some HBA suppliers, the drive would send bad data on a CRC error while performing TLR. Also changed the code to not attempt TLR - instead, a check condition with sense key B (aborted command) and ASC/Q of 110A (Mis-corrected Data) is sent which should inform the host that the data that was sent was bad.

## FC Drives

- **Drive panics due to unique Read abort behavior** – When not doing Class 3 error recovery, the HBA sends READ commands and Abort READ commands causing the drive to panic and reboot. Class 3 error recovery should be used.
- **Incorrectly removed turbo exchange** – Fixes a code panic for a scenario where the drive incorrectly detached an exchange during SRR on a Read command. An Abort on a subsequent command resulted in the panic.
- **FC: Update expected CRN in more cases** – Drive was not properly incrementing the CRN (Command Reference Number) when using an invalid task attribute.

## Library Drives

- **LUN1: Decrease the timeout for LUN1 inquiry caching commands.**
- **Clear timeout sense data after sent** – Fixes a code bug where sense data from a failed INQ command, was also later incorrectly reported to an IES command. This fix clears the sense data after it is sent.
- **Panic due to malformed packet tracing** – Fixes a code panic caused by a bug in the tracing of malformed data packets on the library/drive interface. After detecting the STX (start character), there was an error in the tracing logic if another STX was detected before the normal ETX (end character) was detected.

## Previous Fixes That Affect Only Certain Drives

### SAS Drives

- **SAS: FSC 6000 on SAS Hard Reset** – Fix write state cleanup when a SAS hard reset occurs.

### FC Drives

- **Panic on Aborted Write** – Fixes a panic due to incorrect handling of an Aborted Write command during a link reset sequence.

### FH Drives

- **MTR eject doesn't return callback when cartridge in sensor is off** – The drive would get stuck in a MTR when there was no cartridge in the drive.

## Library Drives

- **ADI: Optimize update frequency of VHF device activity changes.**
- **LN1: Fixed RES data for short alloc length** – Drive was not handling RES for lengths of  $\leq 16$  bytes correctly.
- **Task Management on ADT port not causing UA and aborting LUN** – A LUN RESET task management function to the ADC LUN via the sADT port, did not report a UA to be posted as described in SAM4. Updated code to reset the LUN.
- **Lun1 TUR command returning incorrect sense data** – Drive was giving “Invalid Field in CDB” check condition on a TUR to LUN1. This was due to an earlier CBD failing and reporting the same sense data for all subsequent TUR requests after this.
- **ADI: Incorrect INXTN/RAA bits in VHF Data** – Even if the clutched cartridge is ejected by midtape recovery, INXTN (in transition) bit keeps 1 (should be 0), and RAA (Robotic Access Allow) bit keeps 0 (should be 1).
- **ADI: Check frame size compare to login max size** – Drive was not checking the received frame payload size against the login negotiated maximum payload size.
- **ADI: Sending wrong data after 100 msec login delay** – Send IR (Initiate Recovery), and expected an IR ACK but received a normal ACK instead.

## Previous Functional Improvements

Previous firmware fixes for G350 FH and G351 HH updates:

- **Fix MLOI checking on Writes** – Correctly set Early Warning based on maximum block number checks.
- **Fix PEWZ break from MLOI changes** – The Maximum Logical Object Identifier (MLOI) changes broke the Programmable Early Warning Zone (PEWZ) check - the PEWZ would only occur if it was due to block number (not position on media).
- **Cartridge appeared to be stuck** – A verify command via the Ethernet interface was started and then the Ethernet connection was dropped. The drive did correctly abort the command which caused the command queue to get hung.
- **Request Sense did not return in progress sense** – The drive was returning incorrect sense data for a VERIFY command in progress.
- **Allow non-zero offsets for VPD read buffer.**
- **Panic due during a Write command** – Drive reset due to a race condition in which the previous command was aborted but did not complete before the next command started to execute.
- **Do not fence for open readers** – Do not fence write/read operations due to detection of an open reader condition.
- **Multi-initiator sense data collision** – Fixed an issue where the sense data in a multi initiator environment can be overwritten and incorrectly reported.
- **Recovery on CM write pass page - fix values and update corrected count** – Fixed an issue with correcting values in the CM write pass page, and then updating the corrected count in the CSTA page.
- **Timeout space command** – Fixed a problem which resulted in a drive hang and host timeout on a Space command.
- **Remove unsupported PRO/PRI capabilities** – Code cleanup to remove unsupported functions.
- **Fix Unload hangs** – Additional fixes for a race condition in the code where an Unload was started but the servo state got out of sequence and hung the command.

- **Improve echo buffer standards compliance** – The echo buffer was improved to better comply with the standards.
- **Add VOLSER Label to Event Log** – Add the VOLSER of the cartridge being loaded into the Event log.
- **LP 17h is not fully updated for expired cleaner** – With an expired cleaning cartridge and the drive set to disable eject on unload, LP 17h did not update correctly.
- **FSC 2E01 in Standalone applications** – A change was made to the cartridge in sensor to stop the load if the cartridge is removed from the drive. Previously the drive would continue loading and fail with a 2E01.
- **Fix Ldr Blk park position after Idle Mode Unload** – Fix the leader block park position after an Unload is issued while the drive is in Idle Mode and the tape is in the unthreaded state. This may help to prevent some cases of FSC 2E0C.
- **Change TapeAlerts for FSC 53A0 and 1058** – Previously, both these FSCs incorrectly reported TA2, TA31 and TA49. This was fixed by only setting TA2 (Warning) for a FSC 53A0 and TA31 (Informational) for FSC 1058.
- **Improve Flash dump collection** – Changed the flash dump process to reduce the collection of redundant information and reduce the chance of overwriting the information that is desired.
- **Add length checking on MAM attributes, read/write.**
- **Drive failed READ with FSC 7060** – Failure to find BOP on rewind was mishandled and always reported, when it should have been conditional based on command sequence. The result was FSC 7060 incorrectly getting reported to the host.
- **Fix panic during space/locate sequence** – Fix panic involved in handling buffer data flush in conjunction with degraded read performance during space/locate.
- **UNLOAD should return GOOD status when cartridge already ejected.**
- **Fix panic during ERP at wrap turn** – Fix panic caused by duplicate dataset numbers on a wrap turn, due to incorrect internal error handling.
- **Fix drive panic (reset) due to overlapping flush requests.**
- **LP34h parm 19h not reported correctly** – Fix problem counting Overruns in LP 34h parm 19h.
- **Drive failed read with FSC 7133** – Fix problem where, after many retries trying to read a dataset, the drive failed with a FSC 7133 even though the DS was read correctly.
- **Fix drive panic during aborted Write commands.**

## Previous Functional Change Requests

Previous functional change request for G350 FH and G351 HH updates:

- **FSC 1081 should not cause force dump or log entry.**

## Previous Fixes That Affect Only Certain Drives

Previous fixes affecting certain drives for G350 FH and G351 HH updates:

### Encryption Drives

- **Drive not reporting correct encryption status in MP25** – Report legacy encryption as LME (rather than AME) when T10-OOB. This was found in a TSM environment.



## Library Drives

- **Fix wrong handling of echo buffer** – The drive did not correctly handle the write to the library echo buffer.
- **LDI Fix inquiry forwarding for LDI** – Drive will send the inquiry command to the library if the inquiry data for the requested LUN1 inquiry command is not cached and the library is in a ready state.
- **LDI: fix problem parsing some data out parm lengths** – Fixed a problem where some parameter lengths were not getting parsed out correctly via LUN1.
- **Avoid sending data in data-in command payloads** – LUN1 ADI drives would sometimes send data in command payloads incorrectly. This could cause more than one command frame and cause other issues.
- **OEM: ACK dropped between LDI SCSI commands** – LDI drives only.
- **Drive responded incorrectly to a library unload request with PMR** – Drive was changed to better align with the ADC spec. LUN2 should not check PMR status on unload, but will leave the check in place for LUN0.

## SAS Drives

- **Update supported TM for SAS to match actual support** – Report Supported Task Management Functions had incorrect bit set for SAS drives.

## FC Drives

- **Improve direct forced L-port negotiation** – Improvement to drive connection in a switchless environment. This change extends the L-port negotiation time to attempt to improve the likelihood of bringing the link up fully to the host.
- **FC Drive Panic on port enablement** – An unhandled FC interrupt caused a panic during the transition from FC port disabled to enabled. The enablement was initiated via the ADT mode page.
- **Fix init case where rx frames are not processed** – Fix initialization problem where the FC chip got stuck and no frames were processed by the link layer.
- **Improve L-port negotiation** – On the QLogic adapter if the drive is set to N->L negotiation and the HBA is set to L-port only, the link does not come up (due to heavy loss of sync).
- **Improve N-port attachment** – Improved the drives ability to attach directly to an HBA.
- **FC L-Port speed did not change until power cycled** – Even though the port speed was changed, the actual drive port speed did not change until the drive was power cycled.
- **Fix drive panic due to LIP during Task Management.**
- **Re-attach session to Persistent Reservation** – If a session with a persistent reservation is logged out, the session should be re-attached to the persistent reservation when it logs back in.

## Downloads

Firmware update code IBM LTO-6 J450 (FH) and J451 (HH) are available for download for supported NEO users with active software entitlement agreements. Go to the Overland Storage Customer Support Portal by navigating to the Manage Products page: <http://docs.overlandstorage.com/neo>