

# Custom Sorting of Items in Aleph

How Triggers and the Z13 Enabled Us to Rule  
Our World

by

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THE CHURCH OF  
JESUS CHRIST  
OF LATTER-DAY SAINTS

# Agenda

## Background

- The Problem
- The Solution
- Gotchas
- Additional Material



# Background LDS Church

- 14+ million members globally
- 166 languages supported
- \$885 MM of humanitarian assistance given since 1985
- 4 Universities and Colleges
- Family History Library
- Church History Library
- Audio Visual Department / Motion Picture Studio

# Background Church History Dept

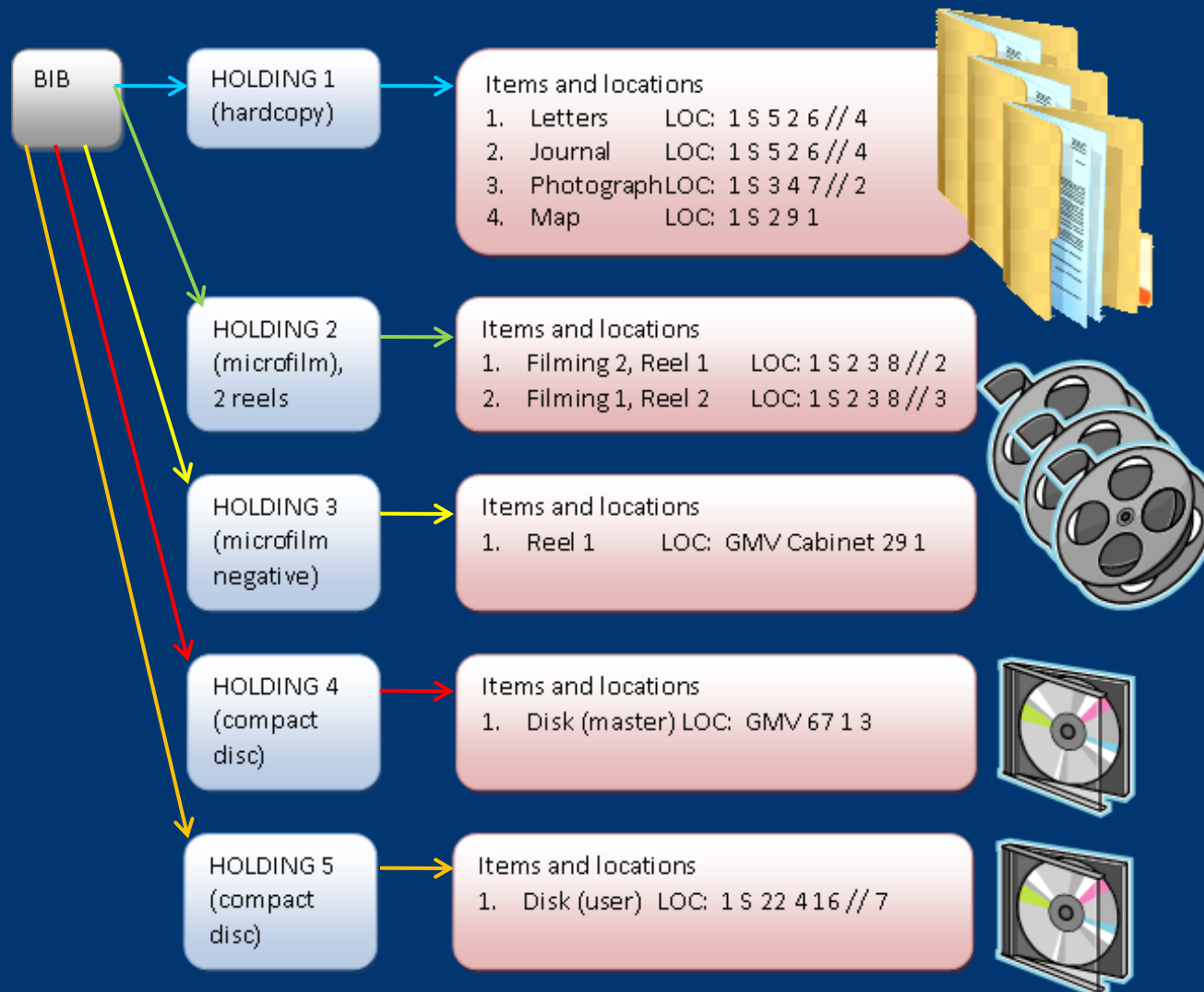
- Within The Church of Jesus Christ of Latter-day Saints there is a Church History Department.
- Inside this department there is a Church History Library, Museum, and Archives.
  - Aleph handles circulation for all 3 organizations (single shared ADM library).
- Primo is used for discovery.

# Background within the Archives

- In the Archives, a BIB record can have multiple associated HOL records.
  - The first HOL record is typically the hard copy original.
    - HOL1: manuscripts, diaries, photographs, maps, etc.
  - Each subsequent HOL record (and its associated items) is typically a duplicate of the first HOL record in a different material type.
    - HOL 2: microfilm positive 
    - HOL 3: microfilm negative
    - HOL 4: CD master copy 
    - HOL 5: CD patron copy
    - Other miscellaneous reasons
  - Certain HOL records have dozens or even hundreds of item records.
    - REEL 1, REEL 2, REEL n ...
    - FILMING 1, FILMING 2, FILMING n ...



# Typical Archives Record



# Hold Requests in the Archives

- Patrons search/discover in Primo and manually request by call number at the reference desk.
- Staff places the hold request for the patron using the Aleph client.
  - Many of the staffers are volunteers and are not professional librarians.
- When placing hold requests for patrons, staff must sift through and choose the preferred item in the Aleph client.
  - There are hundreds of items / many locations / multiple item statuses.
  - Circ policy prefers “Regular” items (don’t require approval).
  - Circ policy prefers a digital or microfilm copy (not the original).

# Agenda

- Background

- The Problem

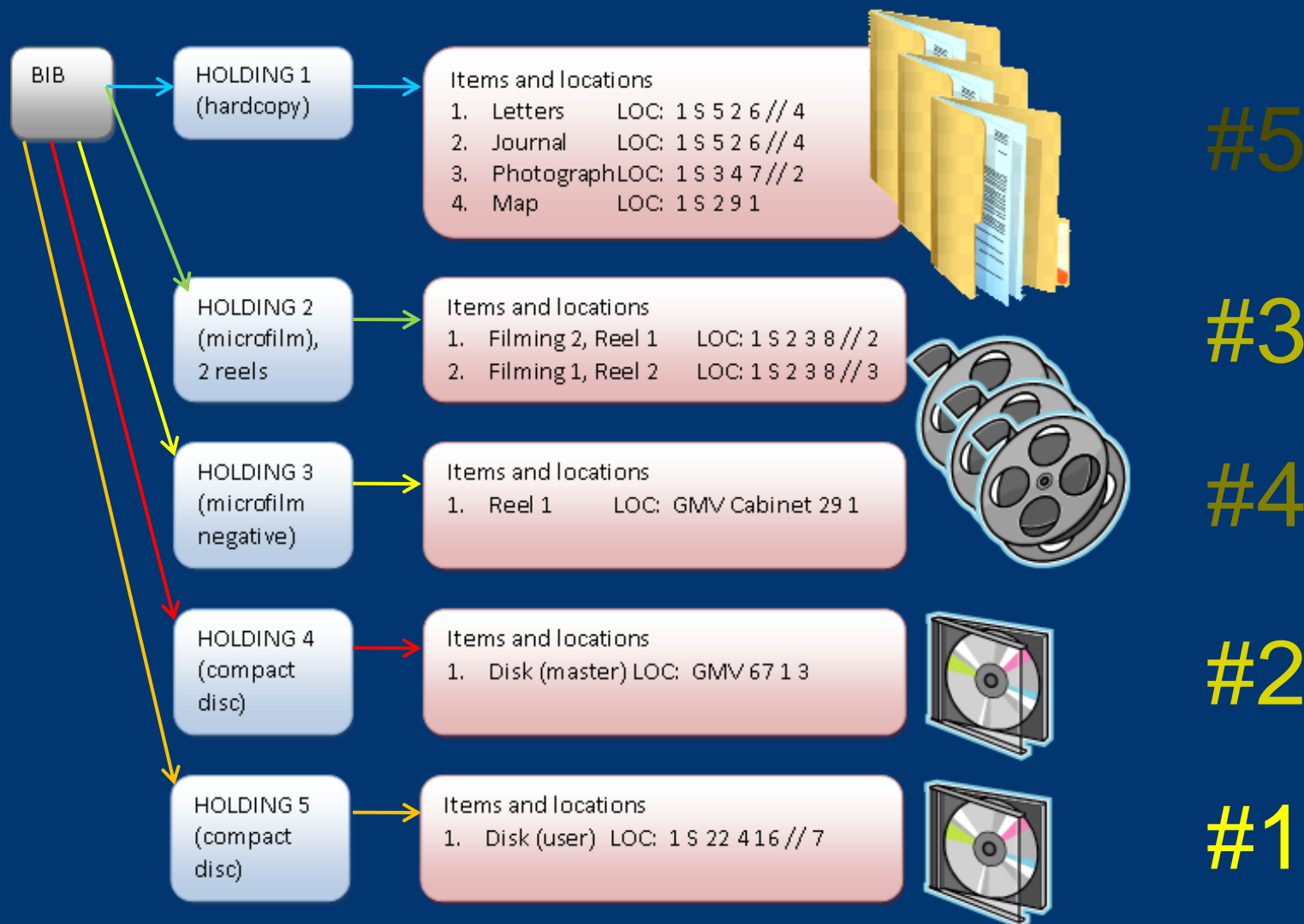
- The Solution

- Gotchas

- Additional Material



# Preferred Item Order for a Typical Archives Record



# The Problem

- How do we customize the sorting of items?
- In our case: sort items by sublibrary + material type + collection + item status + the sequence number in item description?
  - There isn't a pre-defined sort routine for this.
  - There is no way to create a new sort routine.
  - Material type doesn't appear on the item list.
  - There isn't an item level filter mechanism.
  - There is no way to expand and correctly sort the sequence number (a piece of the item description).

# Example of the Problem

- Hundreds of items, many locations, multiple item statuses.
- Vault items show up before Open Stacks.
- “Non-patron” items show up before “Regular”.
- Numbers in item description sort incorrectly (1, 10, 11).

[1] Functional [2] Overview

[M] List Of Items (0/224)

[I] Item (100000143604, CR

[H] Hold Requests (0, 0)

[P] Photocopy Requests (0, 0)

[L] Loan (0)

[O] History (Last updated 12/

[Z] Circulation Log (-----)

[S] Circulation Summary

[K] Booking (0, 0)

[R] Maintenance Record (0)

[B] Bibliographic Info.

[T] Trigger List

[N] Maintenance Profile

Items List

Loan Filter

Sublibrary	Item/Cont desc	Collection	Item Status	Call Number	Due Date	Item Barcode	Location
Granite Mountain Records Vault	[MNEG ] FILMING 1	Corporate Records	Non-Patron	CR 100 142		100000143604	GMV CABINET 5 11 // REEL (100000097716)
Granite Mountain Records Vault	[MNEG ] FILMING 10	Corporate Records	Non-Patron	CR 100 142		100000143613	GMV CABINET 5 11 // REEL (100000097725)
Granite Mountain Records Vault	[MNEG ] FILMING 11	Corporate Records	Non-Patron	CR 100 142		100000143614	GMV CABINET 5 11 // REEL (100000097726)
Granite Mountain Records Vault	[MNEG ] FILMING 12	Corporate Records	Non-Patron	CR 100 142		100000143615	GMV CABINET 5 11 // REEL (100000097727)
Granite Mountain Records Vault	[MNEG ] FILMING 13	Corporate Records	Non-Patron	CR 100 142		100000143616	GMV CABINET 5 11 // REEL (100000097728)
Granite Mountain Records Vault	[MNEG ] FILMING 14	Corporate Records	Non-Patron	CR 100 142		100000143617	GMV CABINET 5 11 // REEL (100000097729)
Granite Mountain Records Vault	[MNEG ] FILMING 15	Corporate Records	Non-Patron	CR 100 142		100000143619	GMV CABINET 5 11 // REEL (100000097731)

Sort Options Sublibrary/Collection/standard sort

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# The Solution

- Create custom sort keys and store them in unused item fields (using database triggers)
- and*
- Re-purpose a sort routine that will reference this field or fields.
- If needed, modify the z13 and z13u configuration to get additional data from the BIB and/or HOL records.  
(Covered in the additional material section.)

# The Solution (Example)

- Open Stacks show up first.
- “Regular” items show up first.
- Numbers in item description sort correctly.

The screenshot shows a library management system interface. On the left is a navigation menu with the following items: [M] List Of Items (0/224), [E] All Items History, [I] Item (100000618744, CR), [H] Hold Requests (0, 0), [P] Photocopy Requests (0, 0), [L] Loan (0), [O] History (Last updated 12/), [Z] Circulation Log (-----), [S] Circulation Summary, [K] Booking (0, 0), [R] Maintenance Record (0), [B] Bibliographic Info., [T] Trigger List, and [N] Maintenance Profile. The 'List Of Items (0/224)' item is circled in red. The main area displays an 'Items List' table with columns: Sublibrary, Item/Cont desc., Collection, Item Status, Call Number, Due Date, Item Barcode, Location, and Requested. The table contains 9 rows. The first four rows are 'Open Stacks' with 'Regular' status and item descriptions 'REEL 61', 'REEL 62', 'REEL 63', and 'REEL 64'. The last five rows are 'Secure Stacks' with 'Regular' status and item descriptions 'ITEM 1', 'ITEM 2', and 'ITEM 3'. Red boxes highlight the 'List Of Items (0/224)' menu item, the 'Regular' status column, the item description numbers, and the 'Sort Options' dropdown at the bottom right, which is set to 'Standard sort (key)'.

Sublibrary	Item/Cont desc.	Collection	Item Status	Call Number	Due Date	Item Barcode	Location	Request
Open Stacks	[FILM ] REEL 61	Corporate Records	Regular	CR 100 142		100001134577	CHL-OS MICROFILM	
Open Stacks	[FILM ] REEL 62	Corporate Records	Regular	CR 100 142		100001134578	CHL-OS MICROFILM	
Open Stacks	[FILM ] REEL 63	Corporate Records	Regular	CR 100 142		100001134579	CHL-OS MICROFILM	
Open Stacks	[FILM ] REEL 64	Corporate Records	Regular	CR 100 142		100001134571	CHL-OS MICROFILM	
Secure Stacks	[CD ] ITEM 1	Corporate Records	Regular	CR 100 142		100000632091	1 C 59 3 3 // 2 (100000632222)	
Secure Stacks	[CD ] ITEM 2	Corporate Records	Regular	CR 100 142		100000632090	1 C 59 3 3 // 2 (100000632222)	
Secure Stacks	[CD ] ITEM 3	Corporate Records	Regular	CR 100 142		100000632096	1 C 59 3 3 // 2 (100000632222)	

Modifying an existing Aleph sort routine

# CHOOSING A SORT ROUTINE

# Aleph Sort Routine

- After a great deal of trial and error, we settled on the ITEM-14 sort routine.

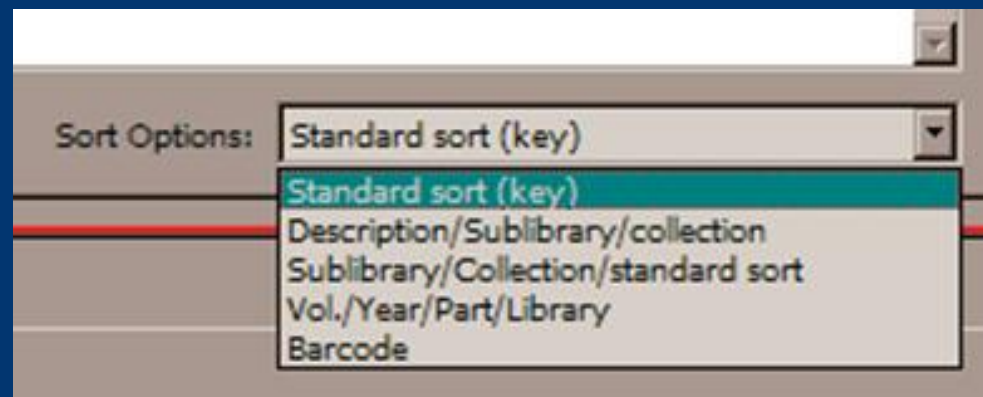
xxx50/tab\_z30\_sort

```
-----  
! 14 - by numbering or description  
! -----  
!   if enumeration not spaces then  
!     enumeration+. If enumeration-a(volume)+enumeration-b(issue)  
!     are both empty, enumeration-c is not taken into account  
!   if chronology not spaces then  
!     chronology+  
!   if supp-index-o not spaces then  
!     Supp-index-o  
!   if enumeration and chronology is spaces then  
!     Description  
! -----
```



## tab\_z30\_sort, option 14

- In xxx50/pc\_tab\_exp\_field.eng, we found ITEM-SORT-TYPE and renamed ITEM-14 sort to “Standard sort (key)”.
  - This is what will show up in the Aleph client.
- In xxx50/tab\_z30\_sort, we added ITEM-14 and specified sort routine 14, ascending.
  - ITEM-14            A 14 A 14



Creating and storing custom sort keys

# CUSTOM SORT KEYS

# Sort Order and Weighting

- We asked staff to define a sort order.
  - Sort order: sub-library + material type + collection + item status + the sequence number in the item description (REEL 1, REEL 2, REEL n).
- We further asked staff to weight each sort criteria.
  - Staff provided a 3-digit priority number for each: (1) sub-library, (2) material type and (3) collection code. (note: only sub-library is shown)
  - 000 was the highest, and 999 was the lowest.
  - These are kept in Oracle tables.
- Item status codes were ordered from the lowest (least restrictive) to highest (most restrictive).
  - Regular (01), Approval Required (02), Non-Patron (04), and Non-Circulating (08).

SUB_LIBRARY	SORT_KEY /
OSTKS	001
PROJ	002
SSTKS	003
MLIB	004
VAULT	005
GMRV	006
CSTOR	007
MUS	008
HSITE	009
CD	009
OTHER	010

# Creating the Main Sort Key

- Every time the item record is updated, the trigger creates or updates the custom sort key.
  - Sort key [S006M700C105I004] translates:
    - Sub-library sort order / weighting: 006
    - Material type sort order / weighting: 700
    - Collection code sort order / weighting: 105
    - Item status code sort order: 004
- The main sort key was put in the unused item field: Chron. Level.3 (K).

# Item Sequence Sort Key

- Using a database trigger, we expanded the sequence number from the item description.
  - Item sequence sort key (respectively):
  - FILMING 1 → FILMING 0000001
  - REEL 53 → 0000053
  - CD 5 → CD 0000005
  - ITEM 27 → ITEM 0000027
- The item sequence sort key was put in the unused item field: Sub-O / Supp-index-o.

# Adding Material Type to the Item

- Staff had already put the item sequence number in the description field.
  - FILMING 1
  - REEL 53
  - ITEM 5
  - ITEM 27
- Using a database trigger, we put the material type code [in square brackets] at the beginning of the item description.
  - [MNEG ] FILMING 1
  - [FILM ] REEL 53
  - [MULTI] ITEM 5
  - [CD ] ITEM 27
- Now staff can see the item material type + the item sequence number when looking at items.

# xxx50/Z30 Fields Modified by Trigger

- Z30\_DESCRIPTION
  - for viewing
- Z30\_CHRONOLOGICAL\_K
- Z30\_SUPP\_INDEX\_O
  - for sorting

Column Name	ID	Pk	Null?	Data Type
Z30_CALL_NO_2_KEY	20		Y	CHAR (80 Byte)
▶ Z30_DESCRIPTION	21		Y	VARCHAR2 (200 Byte)
Z30_NOTE_OPAC	22		Y	VARCHAR2 (200 Byte)
Z30_NOTE_CIRCULATION	23		Y	VARCHAR2 (200 Byte)
Z30_NOTE_INTERNAL	24		Y	VARCHAR2 (200 Byte)
Z30_ORDER_NUMBER	25		Y	VARCHAR2 (30 Byte)
Z30_INVENTORY_NUMBER	26		Y	VARCHAR2 (20 Byte)
Z30_INVENTORY_NUMBER_DATE	27		Y	NUMBER (8)
Z30_LAST_SHELF_REPORT_DATE	28		Y	NUMBER (8)
Z30_PRICE	29		Y	CHAR (10 Byte)
Z30_SHELF_REPORT_NUMBER	30		Y	CHAR (20 Byte)
Z30_ON_SHELF_DATE	31		Y	NUMBER (8)
Z30_ON_SHELF_SEQ	32		Y	NUMBER (6)
Z30_REC_KEY_2	33		Y	CHAR (19 Byte)
Z30_REC_KEY_3	34		Y	CHAR (40 Byte)
Z30_PAGES	35		Y	VARCHAR2 (30 Byte)
Z30_ISSUE_DATE	36		Y	NUMBER (8)
Z30_EXPECTED_ARRIVAL_DATE	37		Y	CHAR (8 Byte)
Z30_ARRIVAL_DATE	38		Y	CHAR (8 Byte)
Z30_ITEM_STATISTIC	39		Y	CHAR (10 Byte)
Z30_ITEM_PROCESS_STATUS	40		Y	CHAR (2 Byte)
Z30_COPY_ID	41		Y	CHAR (5 Byte)
Z30_HOL_DOC_NUMBER_X	42		Y	CHAR (9 Byte)
Z30_TEMP_LOCATION	43		Y	CHAR (1 Byte)
Z30_ENUMERATION_A	44		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_B	45		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_C	46		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_D	47		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_E	48		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_F	49		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_G	50		Y	VARCHAR2 (20 Byte)
Z30_ENUMERATION_H	51		Y	VARCHAR2 (20 Byte)
Z30_CHRONOLOGICAL_I	52		Y	VARCHAR2 (20 Byte)
Z30_CHRONOLOGICAL_J	53		Y	VARCHAR2 (20 Byte)
• Z30_CHRONOLOGICAL_K	54		Y	VARCHAR2 (20 Byte)
Z30_CHRONOLOGICAL_L	55		Y	VARCHAR2 (20 Byte)
Z30_CHRONOLOGICAL_M	56		Y	VARCHAR2 (20 Byte)
• Z30_SUPP_INDEX_O	57		Y	VARCHAR2 (30 Byte)
Z30_85X_TYPE	58		Y	CHAR (1 Byte)

# Custom Trigger Code

```
• CREATE OR REPLACE FUNCTION INVENTORY.build_sort_key
• (
•   p_sublibrary    in   varchar2,
•   p_material      in   varchar2,
•   p_collection    in   varchar2,
•   p_itemstatus    in   varchar2,
•   p_procstatus    in   varchar2 default null
• )
• RETURN VARCHAR2
• IS
• /*****
•   NAME:    build_sort_key
•   PURPOSE: Builds a sort string from sub-library, material, collection, and item status
•
•   REVISIONS:
•   Ver    Date    Author    Description
•   -----
•   1.0    10/12/2010  RawlesBA  Created this function.
•
•   NOTES: The Sub-Library, Material Type, and Collection all have tables that convert the code
• to a numeric value used in sorting.
• *****/
• v_return        varchar2(100);
• v_sublibrary     varchar2(3);
• v_material       varchar2(3);
• v_collection     varchar2(3);
• v_itemstatus     varchar2(3);
• v_procstatus     varchar2(1);
• BEGIN
•   -- Sub Library code
•   begin
•     select sort_key
•     into   v_sublibrary
•     from   sort_sublibrary
•     where  sub_library = p_sublibrary;
•   exception
•     when others then
•       v_sublibrary := '099';
•   end;
•
•   -- Modify sub library based on process status
•   if ltrim(rtrim(p_procstatus)) is null then
•     null;
•   else
•     v_sublibrary := '9'||substr(v_sublibrary,2,2);
•   end if;
•
•   -- Material code
•   begin
•     select sort_key
•     into   v_material
•     from   sort_material
•     where  material = p_material;
•   exception
•     when others then
•       v_material := '999';
•   end;
•
•   -- Collection code
•   begin
•     select sort_key
•     into   v_collection
•     from   sort_collection
•     where  collection = p_collection;
•   exception
•     when others then
•       v_collection := '999';
•   end;
•
•   -- Item Status us value
•   v_itemstatus := lpad(substr(p_itemstatus,1,3),3,'0');
•
•   v_return := substr('S'||v_sublibrary||'M'||v_material||'C'||v_collection||'|'||v_itemstatus||',',1,20);
•
•   return(v_return);
• END build_sort_key;
• /
```



Set Aleph to use the new sort routine

# USING THE RE-PURPOSED SORT ROUTINE

# Have Aleph use the Custom Sort

- Modify `\AL500\Circ\tab\GuiSys.ini` to point to the new sort routine.
  - `[ItemList]`
  - `ItemSortType=ITEM-14`

# Example (Cataloging)

Items List

Seq.	Barcode	Sublibrary	Item/Cont Desc.	Call Number	Collection	Item Status	Process Status	Notes	Loans
1570	100000618744	Secure Stacks	[MULTI] ITEM 2	CR 100 142	Corporate Records	Non-Patron	Not in Process		0
1580	100000618737	Secure Stacks	[MULTI] ITEM 3	CR 100 142	Corporate Records	Non-Patron	Not in Process		0
1590	100000618738	Secure Stacks	[MULTI] ITEM 4	CR 100 142	Corporate Records	Non-Patron	Not in Process		0
1600	100000618739	Secure Stacks	[MULTI] ITEM 5	CR 100 142	Corporate Records	Non-Patron	Not in Process		0
590	100000143604	Granite Mountain Records Vault	[MNEG] <b>FILMING 1</b>	CR 100 142	Corporate Records	Non-Patron	Not in Process	✓	0
600	100000143605	Granite Mountain Records Vault	[MNEG] FILMING 2	CR 100 142	Corporate Records	Non-Patron	Not in Process	✓	0
610	100000143606	Granite Mountain Records Vault	[MNEG] FILMING 3	CR 100 142	Corporate Records	Non-Patron	Not in Process	✓	0

Sort Options: Standard sort (key)

1. Item Display | 2. General Information (1) | 3. General Information (2) | 4. Serial Information | 5. Serial Levels | 6. HOL Links

Enum. Level.1 (A)(Vol.):  Chron. Level.1 (I)(Year):

Enum. Level.2 (B):  Chron. Level.2 (J):

Enum. Level.3 (C):  Chron. Level.3 (K):

Enum. Level.4 (D):  Chron. Level.4 (L):

Enum. Level.5 (E):

Enum. Level.6 (F):

Alt. Enum.1 (G):  Alt. Chron.(M):

Alt. Enum.2 (H):

Sub-O:

# Example (Circulation)

ACCEPT | view | Patron | Items | Circulation | Requests | Reports | Services | Help

100001094178 **BIB= 83573 ADM= 83573 - Journal history index (Historian's Office (1842?-1972)) Year..**

Items List

Loan Filter

Sublibrary	Item/Cont desc.	Collection	Item Status	Call Number	Due Date	Item Barcode	Location	Requ	Loc
Open Stacks	[FILM ] REEL 62	Corporate Records	Regular	CR 100 142		100001134578	CHL-OS MICROFILM		
Open Stacks	[FILM ] REEL 63	Corporate Records	Regular	CR 100 142		100001134579	CHL-OS MICROFILM		
Open Stacks	[FILM ] REEL 64	Corporate Records	Regular	CR 100 142		100001134571	CHL-OS MICROFILM		
Secure Stacks	[CD ] ITEM 1	Corporate Records	Regular	CR 100 142		100000632091	1 C 59 3 3 // 2 (100000632222)		
Secure Stacks	[CD ] ITEM 2	Corporate Records	Regular	CR 100 142		100000632090	1 C 59 3 3 // 2 (100000632222)		
Secure Stacks	[CD ] ITEM 3	Corporate Records	Regular	CR 100 142		100000632096	1 C 59 3 3 // 2 (100000632222)		
Secure Stacks	[CD ] ITEM 4	Corporate Records	Regular	CR 100 142		100000632095	1 C 59 3 3 // 2 (100000632222)		

Sort Options Standard sort (key)

Item Details

Item Bib Info

**Doc Number (Item Sequence)** 83573 1.0  
**Item Sublibrary** Open Stacks  
**Item Collection** Corporate Records  
**Item Call No.** CR 100 142  
**Location** CHL-OS MICROFILM  
**Item Description** [FILM ] REEL 1  
**Item Status** Regular

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# Gotchas

- General warning: be careful with custom triggers and item records (Z30) since the trigger might interfere with some Aleph (or Primo) functionality.
- Make sure the trigger that creates the custom sort key doesn't do anything for serials.
  - Configure your trigger to ignore material types that start with “ISS”.
- We created custom labels for certain fields in the Aleph client. In some cases we added the word “[AUTO]” or “[REQ]” to the end of the label as indicators to staff.
  - C:\AL500\Alephcom\tab\eng>window.dat
- In some cases, we prevent staff from changing values to certain fields (non-serials). All of this can be very confusing for the staff.

## Gotchas, cont.

- Initially we tried to use certain Z30 item fields to get the sort key working properly but encountered some odd side effects.
  - Do NOT use Enumeration Level.1 (A) (Vol) / Enumeration Level.2 (B), since Primo assumes a multi-volume collection if something is in these fields.
  - We tried to use a note field but that caused confusion for staff, and the sort key got displayed in the OPAC.
- Finally we found that Chronology Level 3 and Sub-O / Supp-index-o fields worked fine to hold the custom sort keys.
  - We also tested using some of the other Enumeration / Chronology fields (like Alt Chronology M), but in the end the two fields we selected seemed to work the best without side effects.

Test Thoroughly!

# Field Labels (Example)

1. Item Display | **2. General Information (1)** | 3. General Information (2) | 4. Serial Information | 5. Serial Levels | 6. HOL Links

Barcode [REQ]:	<input type="text" value="10000993257"/>	Item Status [REQ]:	<input type="text" value="01"/>
Sublibrary [REQ]:	<input type="text" value="OSTKS"/>	Item Process Status:	<input type="text"/>
Collection [REQ]:	<input type="text" value="CLB"/>	Enum. Level.1 (A)(Vol.):	<input type="text"/>
Copy Number:	<input type="text"/>	Enum. Level.2 (B):	<input type="text"/>
Material Type [REQ]:	<input type="text" value="BOOK"/>		
Hol. Link [REQ]:	<input type="text" value="692149"/>		
85X Type/Linking #:	<input type="text" value="0"/>	<input type="checkbox"/> Temporary Location	
<b>Call Number [AUTO]:</b>	<input type="text" value="8"/> <input type="text" value="M243.8 W8727 v. 12 1997"/>		
Location [AUTO]:	<input type="text" value="8"/> <input type="text" value="CHL-OS GENERAL BOOK LOCATION"/>		
Item/Container Desc [REQ]:	<input type="text" value="[BOOK] ITEM 1"/>		

1. Item Display | 2. General Information (1) | 3. General Information (2) | 4. Serial Information | **5. Serial Levels** | 6. HOL Links

Enum. Level.1 (A)(Vol.):	<input type="text"/>	Chron. Level.1 (I)(Year):	<input type="text"/>
Enum. Level.2 (B):	<input type="text"/>	Chron. Level.2 (J):	<input type="text"/>
Enum. Level.3 (C):	<input type="text"/>	Chron. Level.3 (K):	<input type="text" value="[5001M002C001I001]"/>
Enum. Level.4 (D):	<input type="text"/>	Chron. Level.4 (L):	<input type="text"/>
Enum. Level.5 (E):	<input type="text"/>		
Enum. Level.6 (F):	<input type="text"/>		
Alt. Enum.1 (G):	<input type="text"/>	Alt. Chron.(M):	<input type="text"/>
Alt. Enum.2 (H):	<input type="text"/>		
Sub-O:	<input type="text" value="ITEM 0000001"/>		



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Using the Z13 to get additional fields from the BIB and/or HOL records.

**MODIFY THE Z13 / Z13U**

# Modify the Z13/Z13U

- If you need to create sort keys on a field that is in the BIB or HOL record, you will need to use the Z13/Z13U tables.
  - It is not possible to pull individual fields out of the BIB/HOL records because content is stored as a BLOB.
- Use the `xxx60/tab22` and `xxx01/tab22` tables to configure the Z13/Z13U tables.
- The Z13/Z13U tables can be configured to pull fields from the BIB and/or HOL records. Up to 15 user defined fields can be defined.
- DB triggers can access BIB and HOL data in the Z13/Z13U in addition to the item level data (Z30).

# Z13/Z13U Additional Notes

- The HOL will pull from the BIB and vice-versa.

For example we store the call # in the BIB 090\$a, or the HOL 852\$h or 950\$a.

– We modified: xxx60/tab22:

- CALL-NO 1 852## h 950## a 090## a
  - Aleph will search for a value in this order: HOL 852\$h, HOL 950\$a, and then BIB 090#a until it finds a value.
- The Z13 is limited. But, it is updated by a background daemon so it is nearly always current.

# Questions



- David Bengé
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