

PROCESSING OF MARC TAPES FOR COOPERATIVE USE

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A centralized data base of MARC II records distributed by the Library of Congress is discussed. The data base is operated by the Oklahoma Department of Libraries and is available to any library that can make use of it. The history, creation, operation, uses, advantages, disadvantages, cost and future plans of the data base are included, as well as flowcharts (both system and detail) and sample outputs.

BACKGROUND INFORMATION

Early in 1966, college, university and public librarians in Oklahoma began meeting irregularly to discuss library automation. The incentive for such meetings was clear — libraries in Oklahoma could not justify the financial expenditure necessary to “go their own road” in library automation. Secondly, they realized that at some time in the future, cooperative automation projects begun now would pay big dividends.

With the coming of Library of Congress MARC II distribution service in April 1969, interest in library automation once again came to the forefront in Oklahoma library circles. After several general meetings, primar-

ily to find out what others were doing, planned to do, had done, or had failed to do, a MARC planning meeting was called by the Oklahoma Department of Libraries. Representatives (both administrative and technical) of the three colleges, two public library systems, and two universities that were most likely to be doing anything with MARC in the immediate future, were invited. The feeling expressed at the meeting was that if economic use of MARC were to be made in Oklahoma, there would have to be cooperative effort so that MARC data could be used at the least total cost. At the same time, libraries had planned different uses of MARC; therefore, allowance for local autonomy and creative use of MARC was important.

Since libraries were planning varying applications of MARC, it was decided that the best place to begin a cooperative effort was in the centralized maintenance of a MARC data base. Four libraries in Oklahoma had placed subscriptions with the Library of Congress for the MARC II tapes when they became available — one public library, one college library, one university library, and the Department of Libraries. The cost of maintaining four complete data bases would be large compared to the cost of maintaining one complete data base in the state for everyone's use. The money saved could then be used for utilization of MARC records rather than for housekeeping maintenance of MARC records. Mr. Ralph Funk, Director of the Oklahoma Department of Libraries, committed the Department to obtaining and maintaining a complete file of all cataloging information sent out by the Library of Congress in MARC II machine readable format (both current and, when available, retrospective) which would always be available on demand (either in part or in whole) to any library in the State.

This report describes the cooperative system developed by the Department of Libraries to maintain and make available MARC II records to any library in the State that has the computer equipment to make use of them. Unlike NELINET (1) and the Washington State System (2), which are processing MARC tapes to produce final hard-copy products for the cooperating libraries, the Oklahoma system provides the machine readable MARC records (not final products) a library needs; then that library can process these records in any way it wishes on its own equipment. None of the MARC I participants was primarily concerned with the central distribution of selected machine readable records (3). Possible future state-wide cooperative ventures with MARC (including useful products) are also discussed.

OVERVIEW OF THE SYSTEM

The system can be thought of as two sub-systems: 1) Merging and maintaining a MARC master file of all records sent out by the Library of Congress in MARC II format, and 2) retrieving—i. e., withdrawing—

selected records by LC card number from the MARC master file for specific libraries on demand.

The maintenance sub-system has four distinct programs: 1) ODL-01, which merges MARC tapes; 2) ODL-03, which drops or transfers to another tape any record or combination of records on a given MARC tape; 3) ODL-04, which prints a MARC tape in upper-case EBCDIC; 4) ODL-06, which prints the LC numbers (300/page) from any given MARC tape.

The retrieval sub-system has one program, ODL-05, which selects and copies specified LC card number records from the MARC master file to a blank magnetic tape to be sent to the requesting library for its use.

THE MAINTENANCE SUB-SYSTEM

The programs discussed in this section are used to merge and maintain the MARC data base (ODL-01 and ODL-03) and produce hard-copy by-products which are of occasional use for various purposes (ODL-04 and ODL-06). System, input and output descriptions are included for each program.

Record Merge Program

This program takes tapes in MARC format and code and merges them in LC card number sequence. During processing, messages print if any unusual conditions occur, such as a new record with status other than "n" (new), a matched record with a code other than "c" (corrected), or "d" (deleted), etc. The messages also indicate the action taken. In general, any new record is merged onto the file regardless of code, a match with code "d" causes deletion, and a match with code "c" (and any other match) results in replacement by the new record. This occasionally causes "invalid" codes to be merged onto the file, but this approach was taken for three major reasons, one being that it is usually easier, in cases of error, to remove a bad record from the master than to retrieve it from its source and then merge it onto the master.

Secondly, as files become larger, it is feasible to make minor merges of a few tapes, then merge the result onto the actual master. During the minor merge, many apparently new records with codes "c" and "d" will appear, but as the final merge is made, appropriate action is taken.

Thirdly, a library obtaining MARC records from the Department of Libraries may also want to use the ODL-01 merge for its own internal use. Some of the records requested by the local library may have been corrected at some time and are therefore coded "c". Although new to the individual library, these are coded "c", but are perfectly valid records from that library's point of view. Since the ODL-01 merge always merges a new record onto the file regardless of the code, this program can be used by the individual library without modification.

Inputs are 1) a MARC master (a tape in MARC format and code containing all records merged to date), which is in LC card number sequence; and 2) MARC "items" (a tape(s) in MARC format and code containing the new records to be merged.) Processing halts if this tape(s) is out of sequence.

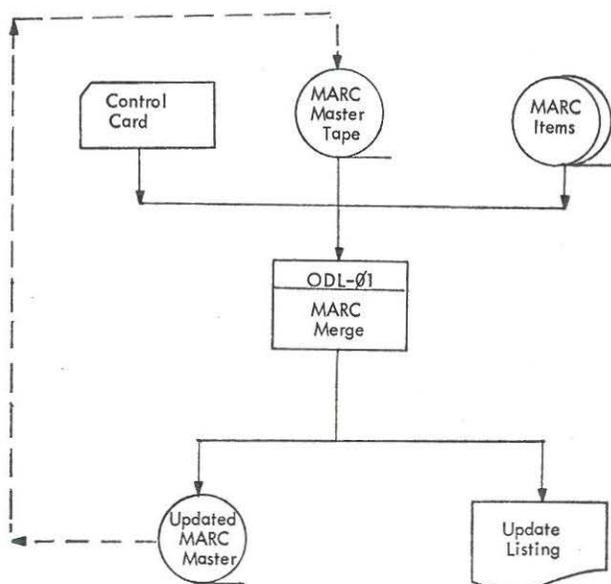


Fig. 1. Record Merge Program System Flowchart.

Outputs are 1) a MARC master, which is a tape containing records from all inputs, with appropriate corrections and deletions made; and 2) a merge listing, which contains notices of all corrections and deletions and notices of all unusual conditions. If desired, this listing can be expanded to print certain desirable information from all records merged and thus can be used as a valuable reference and check list. It will contain the LC card number, with prefixes and suffixes, and status code, and will indicate if a match was found on the master tape and the action taken.

Figure 1 explains the overall flow of the program. Figure 2 gives the program details as of September 1969.

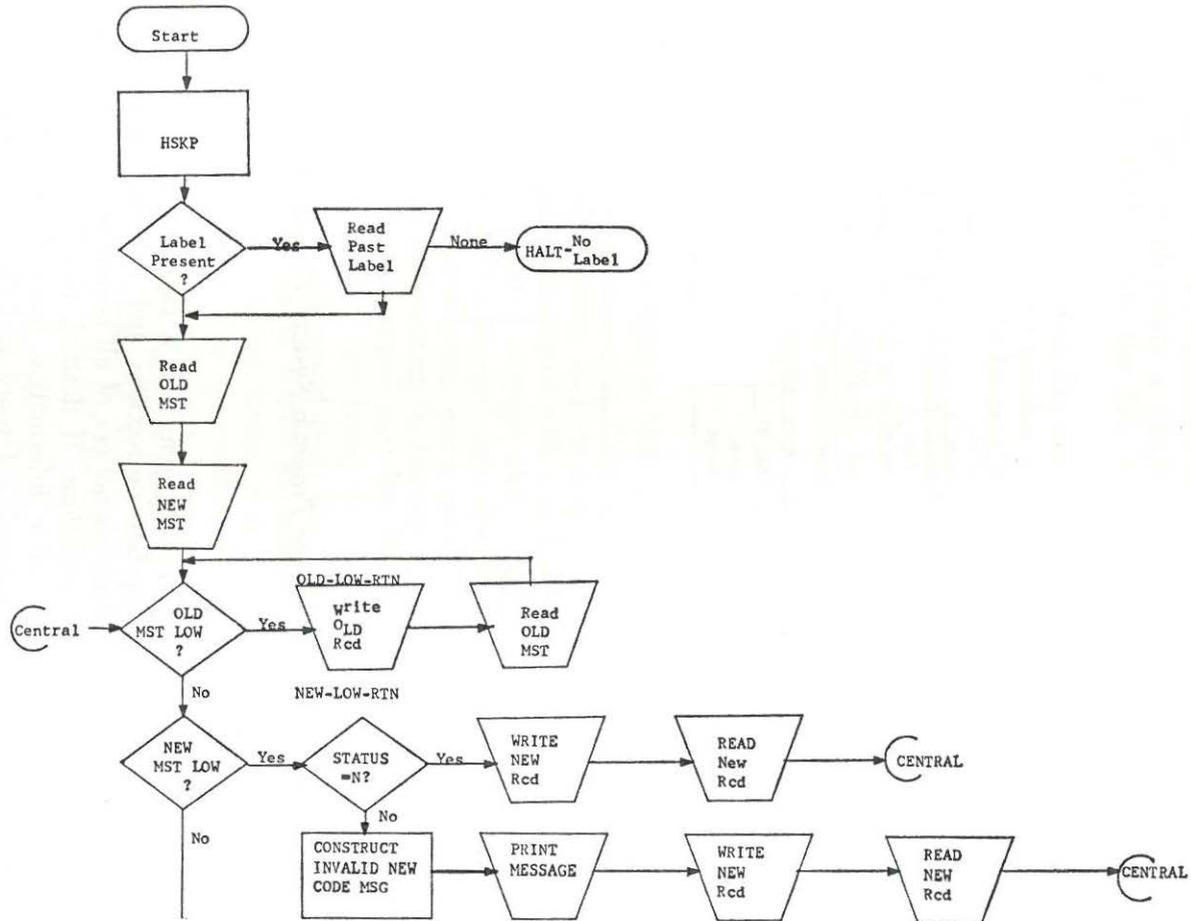


Fig. 2. Record Merge Program Detail Flowchart.

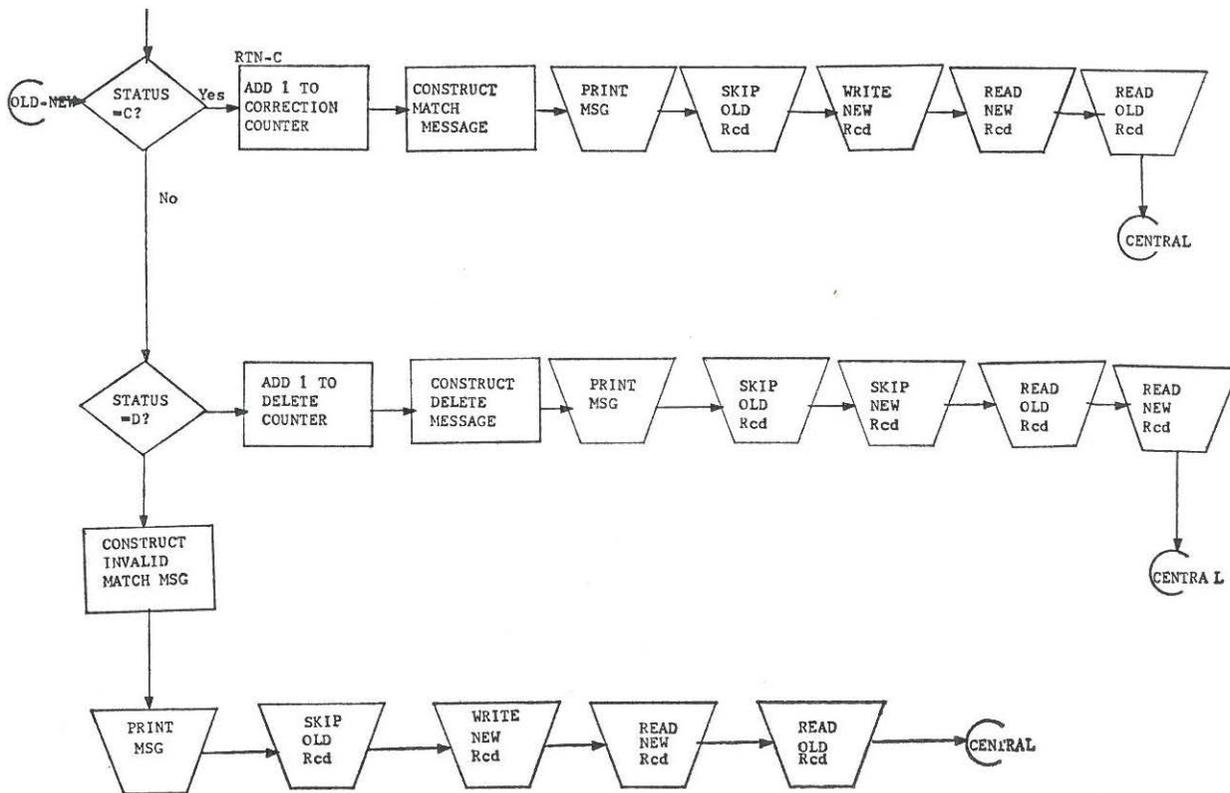


Fig. 2 continued.

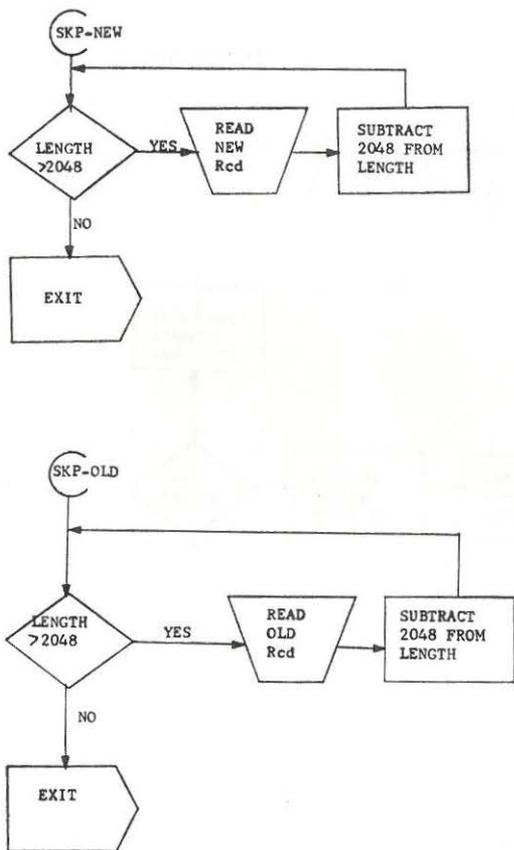
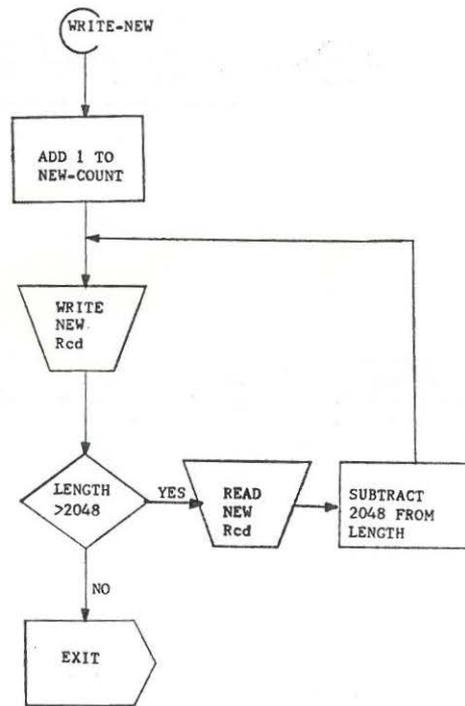


Fig. 2 continued.



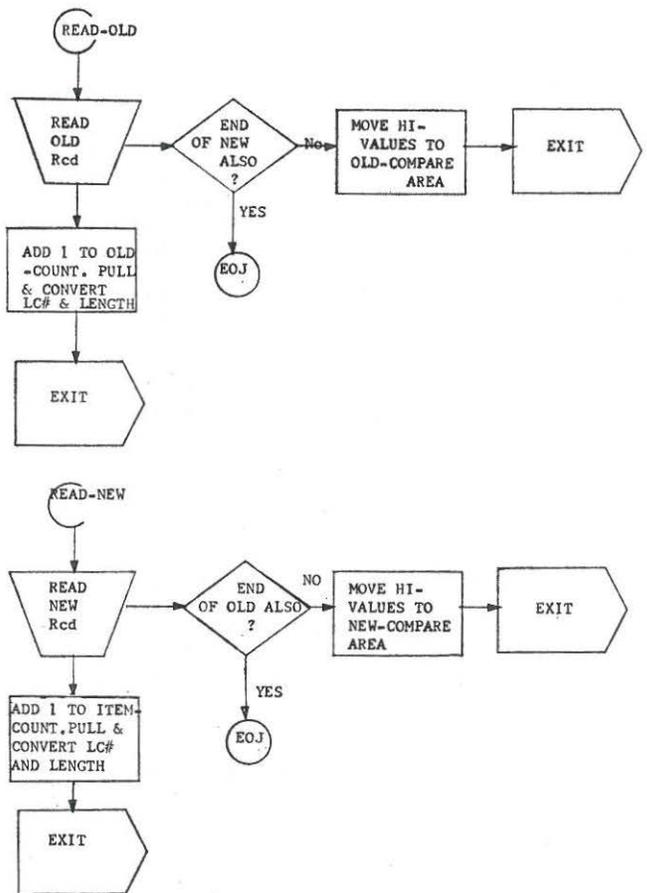
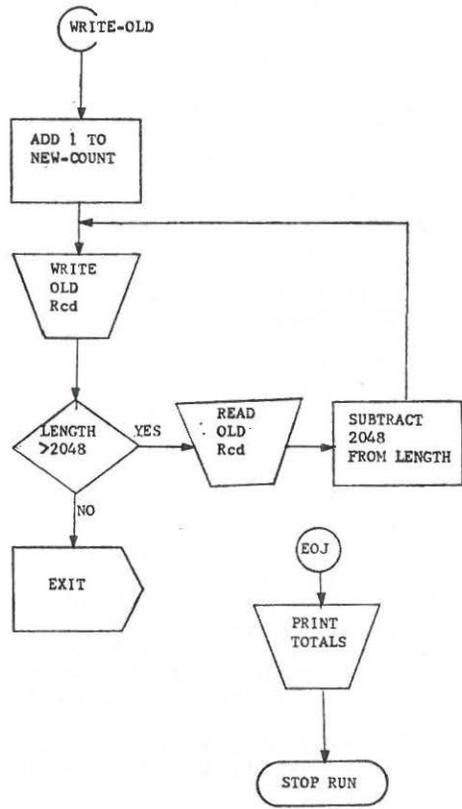


Fig. 2 continued.

00886NAM 2200205 0010013000000080041000130500021000540820018000751110093000932450119001862600
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Fig. 3. Print Record Program Output.

Drop and Transfer Records Program

This is a utility program that enables any number of LC card numbers to be entered on cards, with the option in each case of dropping the record entirely or transferring it to another tape for future action. It has proven useful for removing out-of-sequence records, purging files, etc.

Inputs are two in number: 1) any tape in MARC code and format (sequence is not checked); and 2) detail cards, each of which contains a 12-position LC card number and a code indicating if this MARC record is to be dropped or transferred to another tape. These cards must be in sequence.

There are three outputs: 1) an updated tape containing all MARC records on which no action was taken; 2) transferred tape containing, in sequence, all records transferred; and 3) a listing showing the LC number and the action taken, which is useful for verification of results.

Print Record Program

This program prints in readable form any tape in MARC code and format. The translation table, which produces a form of upper-case EBCDIC, is the same as that used for other Department of Libraries programs. It is a character-for-character translation, which, for the present, is useful for many and varied applications. Input is any tape in MARC code and format. Output is an upper-case EBCDIC translation of the tape. Figure 3 shows a sample output.

Figure 4 shows how the Oklahoma Department of Libraries is handling the MARC expanded character set with a small printer (IBM 1404-48 characters). Simply stated, the problem is that there are many more characters coded in the MARC ASCII character set than are available on the particular printer that the Department of Libraries is using. (This is a local limitation of the printer that happens to be available; it is not a limitation of computer technology, as printers with expanded character sets are readily available).

In general, rarely used punctuation and special punctuation marks not in the printer's character set print as an "*", the lower-case letters print their upper-case equivalents, and diacriticals and foreign language symbols print as "=". This translation table is used for in-house lists (for checking purposes, etc.). For production purposes, a slightly different translation table is used. Characters, particularly punctuation marks, not available on the printer are translated to their closest equivalent or left blank, whichever is more appropriate.

At the Oklahoma Department of Libraries, all translations at this time are internal and do not affect the MARC tapes, which are being left in the original ASCII code. It seemed unreasonable to centrally translate the tapes to EBCDIC until agreement among all the users could be reached as to a mutually useful translation table.

There is a good possibility that in the near future the Information and Management Services Division will make available an off-line printer with an expanded character set (upper- and lower-case letters, additional punctuation, etc.). If this does happen, then print-outs in an expanded character set would be economically possible.

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A, Y, 9	00	NUL	\$	5B	\$
A, 9	01	SOH	\$	5B	\$
B, 9	02	STX	\$	5B	\$
C, 9	03	ETX	\$	5B	\$
D, 9	04	EOT	\$	5B	\$
E, 9	05	ENQ	\$	5B	\$
F, 9	06	ACK	\$	5B	\$
G, 9	07	BEL	\$	5B	\$
H, 9	08	BS	\$	5B	\$
A, 8, 9	09	HT	\$	5B	\$
B, 8, 9	0A	LF	\$	5B	\$
C, 8, 9	0B	VT	\$	5B	\$
D, 8, 9	0C	FF	\$	5B	\$
E, 8, 9	0D	CR	\$	5B	\$
F, 8, 9	0E	SO	\$	5B	\$
G, 8, 9	0F	SI	\$	5B	\$

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
J, Y, 9	20	SP	SP	40	
Z, 1	21	!	*	5C	*
Z, 2	22	!"	*	5C	*
Z, 3	23	!"#	*	5C	*
Z, 4	24	!"#\$	*	5C	*
Z, 5	25	!"#\$%	*	5C	*
Z, 6	26	!"#\$%&	*	5C	*
Z, 7	27	!"#\$%&'	7D	'	
Z, 8	28	!"#\$%&'(4D	(
Y, 1, 9	29)	5D)	
Y, 2, 9	2A	*	5C	*	
Y, 3, 9	2B	+ *	5C	*	
Y, 4, 9	2C	, 6B,			
Y, 5, 9	2D	- , -	60	-	
Y, 6, 9	2E	. - .	4B	.	
Y, 7, 9	2F	/	/	61	/

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A, Z	40	@	*	5C	*
A, Z	41	A	A	C1	A
B, Z	42	B	B	C2	B
C, Z	43	C	C	C3	C
D, Z	44	D	D	C4	D
E, Z	45	E	E	C5	E
F, Z	46	F	F	C6	F
G, Z	47	G	G	C7	G
H, Z	48	H	H	C8	H
A, 8	49	I	I	C9	I
B, 8	4A	J	J	D1	J
C, 8	4B	K	K	D2	K
D, 8	4C	L	L	D3	L
E, 8	4D	M	M	D4	M
F, 8	4E	N	N	D5	N
G, 8	4F	O	O	D6	O

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
-	60	/	*	5C	*
Ø, 1	61	a	A	C1	A
K, Z	62	b	B	C2	B
L, Z	63	c	C	C3	C
M, Z	64	d	D	C4	D
N, Z	65	e	E	C5	E
O, Z	66	f	F	C6	F
P, Z	67	g	G	C7	G
Q, Z	68	h	H	C8	H
Y, 1	69	i	I	C9	I
&, -	6A	j	J	D1	J
Y, 3	6B	k	K	D2	K
Y, 4	6C	l	L	D3	L
Y, 5	6D	m	M	D4	M
Y, 6	6E	n	N	D5	N
Y, 7	6F	o	O	D6	O

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A, Q, 9	10	DLE	\$	5B	\$
J, 9	11	DC1	\$	5B	\$
K, 9	12	DC2 +	4E	+	
L, 9	13	DC3	\$	5B	\$
M, 9	14	DC4	\$	5B	\$
N, 9	15	NAK	\$	5B	\$
O, 9	16	SYN	\$	5B	\$
P, 9	17	ETB	\$	5B	\$
Q, 9	18	CAN	\$	5B	\$
J, 8, 9	19	EM	\$	5B	\$
K, 8, 9	1A	SUB	\$	5B	\$
L, 8, 9	1B	ESC	\$	5B	\$
M, 8, 9	1C	FS	\$	5B	\$
N, 8, 9	1D	GS	\$	5C	*
O, 8, 9	1E	RS	&	5Ø	&
P, 8, 9	1F	US	\$	5B	\$

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A, Q, Z	30	Ø	Ø	FØ	Ø
1, 9	31	1	1	F1	1
2, 9	32	2	2	F2	2
3, 9	33	3	3	F3	3
4, 9	34	4	4	F4	4
5, 9	35	5	5	F5	5
6, 9	36	6	6	F6	6
7, 9	37	7	7	F7	7
8, 9	38	8	8	F8	8
1, 8, 9	39	9	9	F9	9
2, 8, 9	3A	:	*	5C	*
3, 8, 9	3B	;	*	5C	*
4, 8, 9	3C	<	*	5C	*
5, 8, 9	3D	=	*	5C	*
6, 8, 9	3E	>	*	5C	*
7, 8, 9	3F	?	*	5C	*

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
&	50	P	P	D7	P
A, R	51	Q	Q	D8	Q
B, R	52	R	R	D9	R
C, R	53	S	S	E2	S
D, R	54	T	T	E3	T
E, R	55	U	U	E4	U
F, R	56	V	V	E5	V
G, R	57	W	W	E6	W
H, R	58	X	X	E7	X
J, 8	59	Y	Y	E8	Y
K, 8	5A	Z	Z	E9	Z
L, 8	5B	[*	5C	*
M, 8	5C	\	*	5C	*
N, 8	5D]	*	5C	*
O, 8	5E	^	*	5C	*
P, 8	5F	_	*	5C	*

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
&, -, Ø	70	p	P	D7	P
A, R, Ø	71	q	Q	D8	Q
B, R, Ø	72	r	R	D9	R
C, R, Ø	73	s	S	E2	S
D, R, Ø	74	t	T	E3	T
E, R, Ø	75	u	U	E4	U
F, R, Ø	76	v	V	E5	V
G, R, Ø	77	w	W	E6	W
H, R, Ø	78	x	X	E7	X
1, 8	79	y	Y	E8	Y
2, 8	7A	z	Z	E9	Z
3, 8	7B	{	*	5C	*
4, 8	7C		*	5C	*
5, 8	7D	}	*	5C	*
6, 8	7E	~	*	5C	*
7, 8	7F	DEL	*	5C	*

MARC hex 1C = tape marc
MARC hex 1D = end of record
MARC hex 1E = field terminator
MARC hex 1F = delimiter

Fig. 4. Conversion Table.

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A,Y	80		+	4E	+
A,Ø	81		+	4E	+
B,Ø	82		+	4E	+
C,Ø	83		+	4E	+
D,Ø	84		+	4E	+
E,Ø	85		+	4E	+
F,Ø	86		+	4E	+
G,Ø	87		+	4E	+
H,Ø	88		+	4E	+
I,Ø	89		+	4E	+
B,Y	8A		+	4E	+
C,Y	8B		+	4E	+
D,Y	8C		+	4E	+
E,Y	8D		+	4E	+
F,Y	8E		+	4E	+
G,Y	8F		+	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
J,Y	A0	›	=	7E	=
J,Ø	A1	›	=	7E	=
K,Ø	A2	›	=	7E	=
L,Ø	A3	›	=	7E	=
M,Ø	A4	›	=	7E	=
N,Ø	A5	›	=	7E	=
O,Ø	A6	›	=	7E	=
P,Ø	A7	›	=	7E	=
Q,Ø	A8	›	=	7E	=
R,Ø	A9	›	=	7E	=
K,Y	AA	›	=	7E	=
L,Y	AB	›	=	7E	=
M,Y	AC	›	=	7E	=
N,Y	AD	›	=	7E	=
O,Y	AE	›	=	4E	+
P,Y	AF	›	=	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
&,Ø	C0		+	4E	+
A	C1		+	4E	+
B	C2		+	4E	+
C	C3		+	4E	+
D	C4		+	4E	+
E	C5		+	4E	+
F	C6		+	4E	+
G	C7		+	4E	+
H	C8		+	4E	+
I	C9		+	4E	+
B,Y,9	CA		+	4E	+
C,Y,9	CB		+	4E	+
D,Y,9	CC		+	4E	+
E,Y,9	CD		+	4E	+
F,Y,9	CE		+	4E	+
G,Y,9	CF		+	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
S,8	E0	›	=	7E	=
J,Z	E1	›	=	7E	=
B	E2	›	=	7E	=
T	E3	›	=	7E	=
U	E4	›	=	7E	=
V	E5	›	=	7E	=
W	E6	›	=	7E	=
X	E7	›	=	7E	=
Y	E8	›	=	7E	=
Z	E9	›	=	7E	=
K,Y,9	EA	›	=	7E	=
L,Y,9	EB	›	=	7E	=
M,Y,9	EC	›	=	7E	=
N,Y,9	ED	›	=	7E	=
O,Y,9	EE	›	=	7E	=
P,Y,9	EF	›	=	7E	=

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A,Q	90		+	4E	+
A,-	91		+	4E	+
B,-	92		+	4E	+
C,-	93		+	4E	+
D,-	94		+	4E	+
E,-	95		+	4E	+
F,-	96		+	4E	+
G,-	97		+	4E	+
H,-	98		+	4E	+
I,-	99		+	4E	+
B,Q	9A		+	4E	+
C,Q	9B		+	4E	+
D,Q	9C		+	4E	+
E,Q	9D		+	4E	+
F,Q	9E		+	4E	+
G,Q	9F		+	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
A,Q,Ø	B0	›	=	7E	=
A,-,Ø	B1	›	=	7E	=
B,-,Ø	B2	›	=	7E	=
C,-,Ø	B3	›	=	7E	=
D,-,Ø	B4	›	=	7E	=
E,-,Ø	B5	›	=	7E	=
F,-,Ø	B6	›	=	7E	=
G,-,Ø	B7	›	=	7E	=
H,-,Ø	B8	›	=	7E	=
I,-,Ø	B9	›	=	7E	=
B,Q,Ø	BA	›	=	7E	=
C,Q,Ø	BB	›	=	4E	+
D,Q,Ø	BC	›	=	7E	=
E,Q,Ø	BD	›	=	7E	=
F,Q,Ø	BE	›	=	4E	+
G,Q,Ø	BF	›	=	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
-,Ø	D0		+	4E	+
J	D1		+	4E	+
K	D2		+	4E	+
L	D3		+	4E	+
M	D4		+	4E	+
N	D5		+	4E	+
O	D6		+	4E	+
P	D7		+	4E	+
Q	D8		+	4E	+
R	D9		+	4E	+
B,Q,9	DA		+	4E	+
C,Q,9	DB		+	4E	+
D,Q,9	DC		+	4E	+
E,Q,9	DD		+	4E	+
F,Q,9	DE		+	4E	+
G,Q,9	DF		+	4E	+

Marc char punch	Marc hex	Marc char	EBCDIC char	EBCDIC hex	EBCDIC char punch
Ø	F0	›	=	7E	=
1	F1	›	=	7E	=
2	F2	›	=	7E	=
3	F3	›	=	7E	=
4	F4	›	=	7E	=
5	F5	›	=	7E	=
6	F6	›	=	7E	=
7	F7	›	=	7E	=
8	F8	›	=	7E	=
9	F9	›	=	7E	=
B,Q,Z	FA	›	=	7E	=
C,Q,Z	FB	›	=	4E	+
D,Q,Z	FC	›	=	4E	+
E,Q,Z	FD	›	=	4E	+
F,Q,Z	FE	›	=	4E	+
G,Q,Z	FF	›	=	7E	=

(is &,5,8) is -,5,8 / is Ø,1
 + is &,6,8 = is 6,8 , is Ø,3,8
 & is f2 zone - is l1 zone † is 5,8
 \$ is -,3,8 * is -,4,8

Fig. 4 continued.

Print Card Numbers Program

This program prints all LC card numbers on any tape in MARC code and format. Numbers are 12 positions in length and print 300/page in translated form. Occasionally, a cumulative list of LC card numbers on the master tape is produced as a reference tool. Its input is any tape in MARC code and format, its output a printed listing of all Library of Congress numbers on the tape (Figure 5). A record count will appear at the end of the listing.

Figure 6, the detail flowchart for this program, appears on the following pages.

LC NUMBER LISTING

AS OF 07/03/69

62022062	65062804	66030342	66062992
63011276	65062892	66030452	66063702
63022268	65062911	66030453	66063756
63064323	65062999	66030644	66063781
63065066	65063172	66060155	66063923
64017102	65065046	66060267	66063926
64023532	65065193	66060594	66063931
64062037	65065405	66060596	66064123
64062399	65065794	66060600	66064334
64062867	65065815	66060637	66064456
64063587	65065818	66060710	66064513
64063588	66010930	66060816	66064619
64063631	66011644	66060830	66064688
64063835	66012619	66060860	66064722
64063999	66014644	66060882	66065118
64064293	66014929	66061036	66065264
64064724	66018084	66061101	66065371
64064971	66019184	66061118	66065445
64066336	66021082	66061340	66065501
65019066	66021087	66061643	66065709
65019667	66021669	66061685	66065767
65023174	66021679	66061869	66065770
65025047	66021680	66061875	67010007
65026126	66021689	66061886	67010038
65027231	66021695	66061889	67010310
65027416	66022509	66061899	67010836
65027707	66022988	66061917	67011394
65027708	66023067	66061967	67011597
65028116	66024150	66061983	67011991
65060409	66025530	66061988	67012048
65060483	66025986	66062017	67012128
65060652	66026120	66062038	67012478
65060684	66026122	66062160	67012840
65060737	66026123	66062168	67013691
65060796	66026124	66062252	67014051
65061226	66026125	66062259	67014071
65061567	66026126	66062283	67014142
65061895	66026598	66062290	67014311
65061896	66026650	66062309	67014312
65062346	66027410	66062403	67014916
65062359	66027435	66062405	67015033
65062399	66027693	66062417	67015715
65062483	66027694	66062444	67016233
65062485	66028204	66062476	67016619
65062489	66028433	66062637	67016947
65062504	66028462	66062640	67017216
65062507	66028495	66062649	67017489
65062543	66028687	66062820	67017582
65062572	66028958	66062964	67017584
65062800	66030146	66062986	67017609

Fig. 5. *Library of Congress Number Listing.*

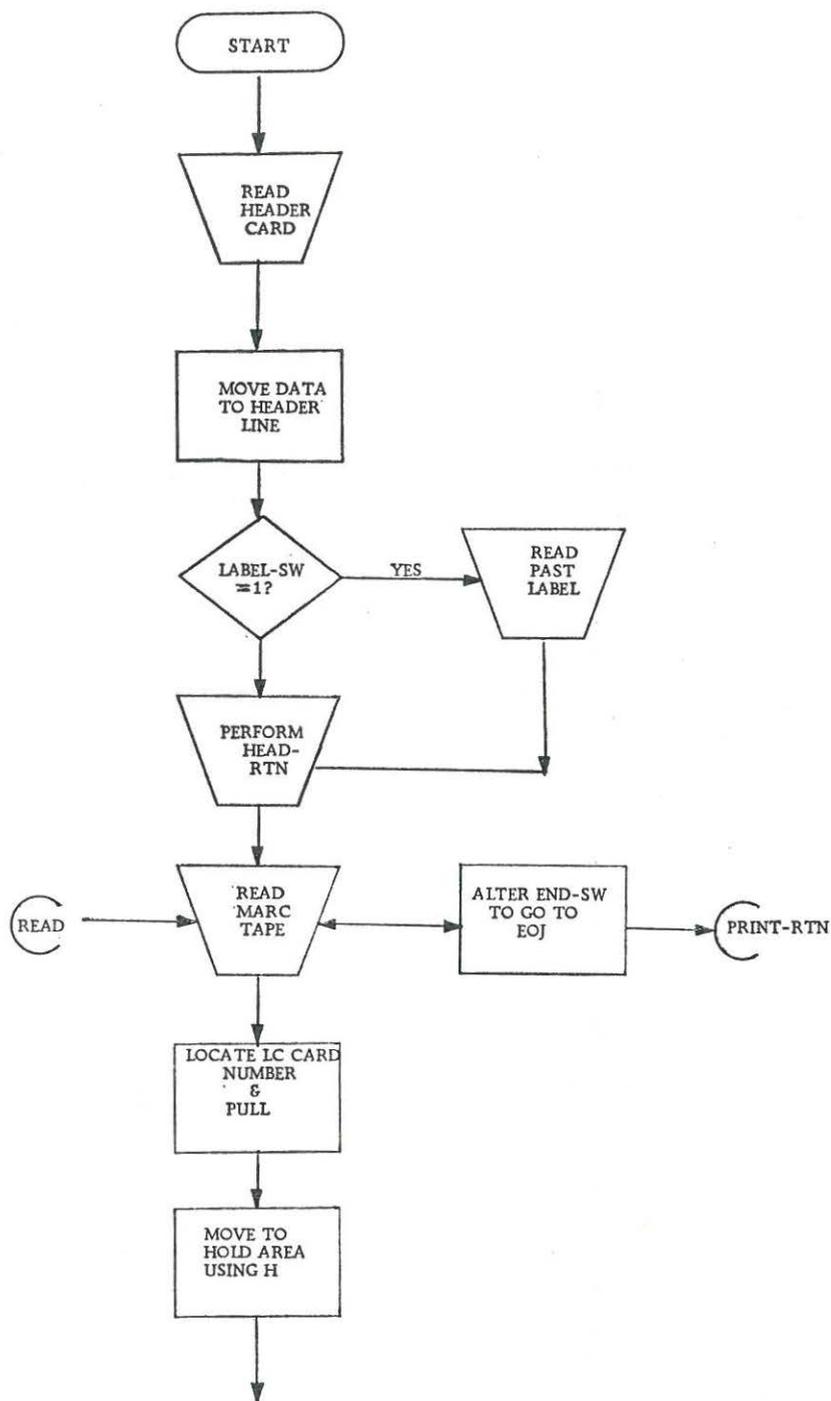


Fig. 6. Print Card Numbers Program Detail Flowchart.

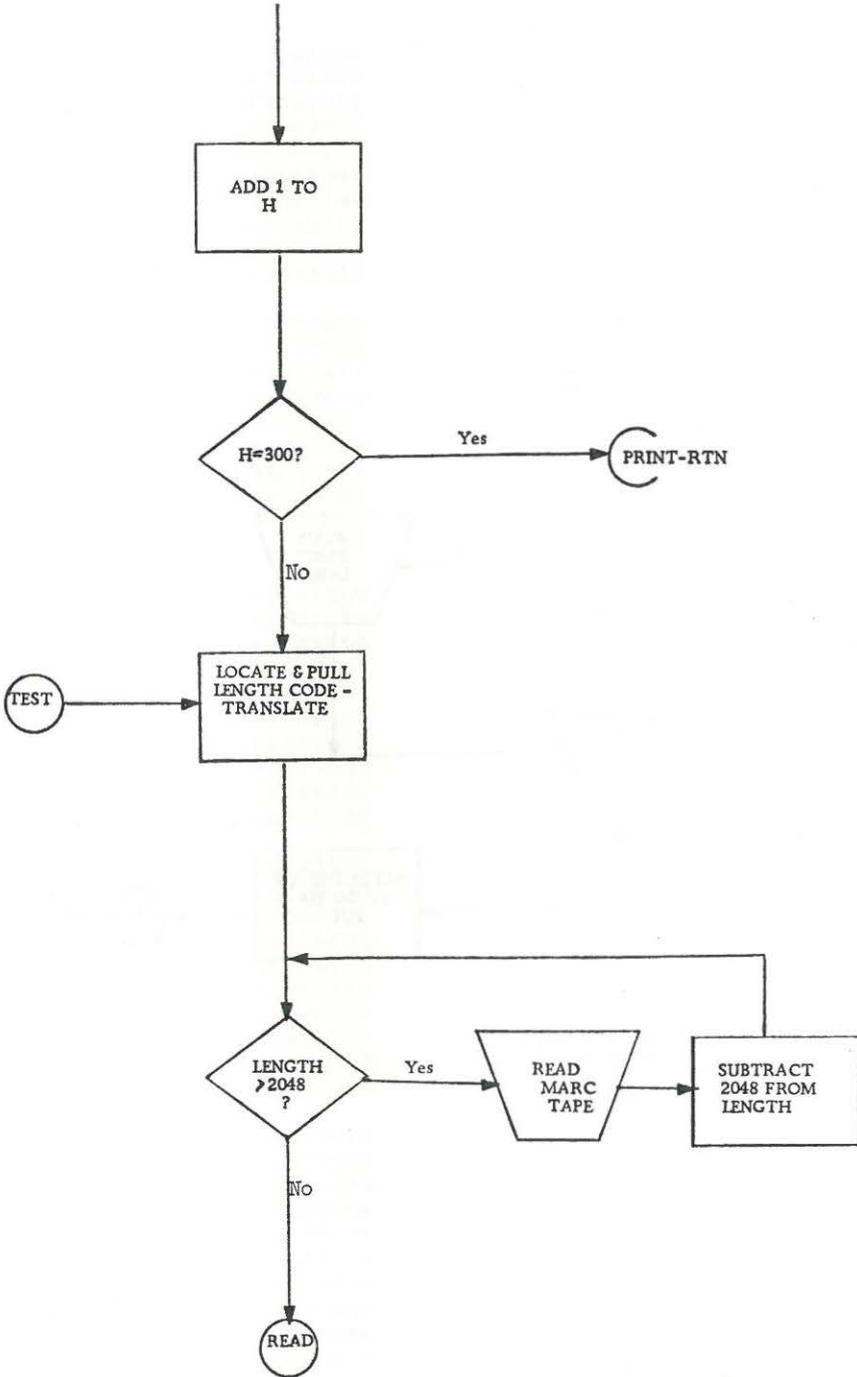


Fig. 6 continued.

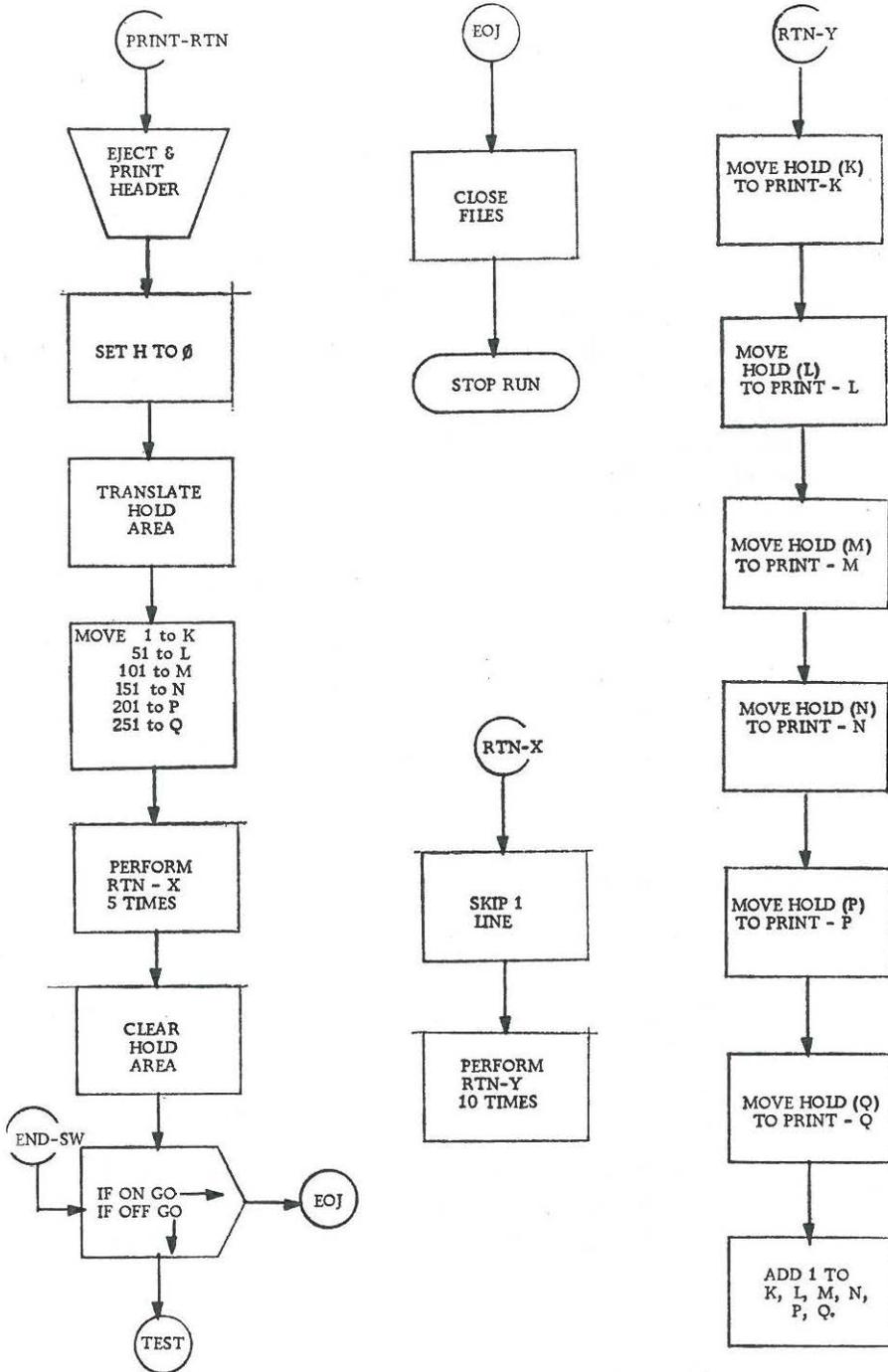


Fig. 6 continued.

RETRIEVAL SUB-SYSTEM

Withdrawing Records Program

This program withdraws records selected by LC card number and copies the complete MARC II records onto another tape. A library sends the Department of Libraries a magnetic tape containing the LC card numbers for the records it wants copied from the data base. The data base is searched and the requesting library is sent back three tapes and three hard copies. The tapes are: 1) the original finder tape, 2) an item tape containing the records which matched, and 3) a tape containing the LC card numbers of the records which did not match. The three hard copies are: 1) a list in LC card number order of the records which matched containing on the first line information from the finder tape and on the second line information from the MARC tape; 2) a listing of the card numbers and other information on the finder tape which did not match any card number in the data base; 3) a listing of card numbers and other information on the finder tape that were invalid.

There are three inputs to the system, the first being a MARC master, which is the latest merged master at the Department of Libraries; its records are in the original code and format. The second consists of finder records, which come from the individual library. Input is originally on card in the format specified in Table 1, then put on tape, blocked 5, and sorted (no tape labels are used at this time) on all 12 positions of the LC number. The tapes are unlabeled upper-case EBCDIC 1600 BPI. The third is a card that enters the appropriate date and library code into the system.

Table 1. Original Card Input Format To ODL-05

Card Columns Field Contents and Special Instructions

1	Local Library Code (assigned by Dept. of Libraries)
2 - 4	LC card number prefix (upper case alpha or blank)
5 - 12	LC card number (numeric)
13	LC card Supplement Indicator (may be blank)
14 - 28	Local Use (may be blank)
29 - 48	Local Use or first 20 positions of Author (may be blank)
49 - 76	Local Use or first 28 positions of Title (may be blank)
77 - 80	Local Use or Publication Date (may be blank)

The system gives the following five outputs:

1) Matched records, a listing of records that matched and were transferred to the individual library's item tape. This listing shows all informa-

tion from the finder record, and immediately below, the following information from the MARC record: LC card number, the first 20 characters of the author, and first 28 characters of the title and the publication date. Information pulled is as follows: author (first tag beginning with 1), which will usually be 100 or 110; title, which will always be 245; and date, which will be the 7-10 positions under tag 008. Figure 7 shows sample of output. The first line is data from the finder tape and the second line data from the MARC master tape.

MATCHED RECORDS		LIBRARY CODE X	DATE PROCESSED	06/15/69
LC NUMBER	LOCAL USE	AUTHOR	TITLE	DATE
64068336		ARCO PUBLISHING COMP ARCO PUBLISHING COMP	OPERATIONS AND MAINTENANCE OPERATIONS AND MAINTENANCE T	1966 1966
66021680		KNOX, JOHN JAY KNOX, JOHN JAY,\$D182	A HISTORY OF BANKING IN THE A HISTORY OF BANKING IN THE	1969 1969
67021200	GIL/PIC	GILBERT GILBERT, STEPHEN G.&	PICTORIAL ANATOMY OF THE CAT PICTORIAL ANATOMY OF THE CAT	1968 1968
67023086		DICKINSON, EMILY DICKINSON, EMILY,\$DI	TWO POEMS. TWO POEMS.\$C*ILLUS. AND CALL	1968 1968
68008044		GERNSHEIM, HELMUT GERNSHEIM, HELMUT,\$D	L. J. M. DAGUERRE L. J. M. DAGUERRE*\$BTHE HIST	1968 1968
68008234		RILEY, JOHN W. RILEY, JOHN W.\$I \$AT	THE STUDENT LOOKS AT HIS TEA THE STUDENT LOOKS AT HIS TEA	1969 1969
68008418		TAGIURI, RENATO TAGIURI, RENATO.\$I \$	ORGANIZATIONAL CLIMATE ORGANIZATIONAL CLIMATE*\$BEXP	1968 1968
68025737		BAZIN, GERMAIN.\$I \$A	THE BAROQUE PRINCIPLES, STY THE BAROQUE* PRINCIPLES, STY	1968 1968
69015554	36823	PHILIPS, JUDSON PHILIPS, JUDSON PENW	GIRL WITH SIX FINGERS THE GIRL WITH SIX FINGERS*\$B	1969 1969
77002574		AYLMER, G. E. AYLMER, G. E.\$I \$ATH	THE STRUGGLE FOR THE CONSTIT THE STRUGGLE FOR THE CONSTIT	1968 1968
78625296		GROVES, DORIS GROVES, DORIS.\$I \$AG	GUIDING THE DEVELOPMENT OF GUIDING THE DEVELOPMENT OF T	1968 1968
79000540		AMERICAN ASSOCIATION AMERICAN ASSOCIATION	PREPARATION FOR RETIREMENT PREPARATION FOR RETIREMENT*\$	1968 1968
AC 68004152		WELLS, ROBERT WELLS, ROBERT,\$D1913	SCIENCE=HOBBY BOOK OF WEATHE SCIENCE=HOBBY BOOK OF WEATHE	1968 1968
AGR68000145		SANTMYER, CAROLEE SANTMYER, CAROLEE,\$D	MOROCCO S AGRICULTURAL ECONO MOROCCO S AGRICULTURAL ECONO	1968 1968
GS 68000236		US GEOLOGICAL SURVEY HEATH, JO ANN,\$D1923	BIBLIOGRAPHY OF REPORTS RESU BIBLIOGRAPHY OF REPORTS RESU	1968 1968
TOTAL MATCHED RECCS		15		
ADD. GENERATED ERRS		4		

Fig. 7. Matched Records Listing.

2) Items tape, containing all records requested from the master tape. They are in MARC format and code, and the number of logical records should match the matched record count.

3) Unmatched finders listing, showing all valid finder records that did not match the MARC master tape. Figure 8 shows sample output.

4) Unmatched finders tape, containing all valid finder records that did not match the MARC master tape.

UNMATCHED RECORDS		LIBRARY CODE X		DATE PROCESSED 06/15/69	
LC NUMBER	LOCAL USE	AUTHOR	TITLE	DATE	
39015412	PADINT	PADEFORD	INTERNATIONAL LAW	1939	
60007163	346R	BELLI, MELVIN	BELLI LOOKS AT LIFE	1960	
64063588		CASWELL, BARBARA W	WORKMENS COMPENSATION BENEFI	1963	
68002763		BELLI	LAW REVOLT	1968	
68055404		ETSEMAN, ALBERTA	THE GUEST DOG		
68066507		ROBECK, MILDRED	SPECIAL CLASS PROGRAMS FOR	1968	
70003466			THE EXTENDED CARE FACILITY	1967	
71079310		REITZEL, WILLIAM	THE MEDITERRANEAN, ITS ROLF	1969	
HEW68000053	PIVENH/EDUC				
					TOTAL UNMATCHED RCDS 9

Fig. 8. Unmatched Records Listing.

ERROR LISTING		LIBRARY CODE X		DATE PROCESSED 06/15/69	
X	66016065	RICH	NECESSITIES OF LIFE	1966	INVALID LC= NUMBER
X	68055404	EISEQUEST			DUPLICATE LC NUMBER
X	73AA3622	BLEINHEIM	THE RISE AND FALL OF THE	1970	INVALID LC= NUMBER
J	95000001				INVALID LIBRARY CODE
JG9	68000038	4683986			INVALID LIBRARY CODE
JG9	68000038	4683986			INVALID LC= PREFIX
JHEW73697836	HEISBLUE				INVALID LIBRARY CODE
XHE3A332609Z					INVALID LC= PREFIX
XHE3A332609Z					INVALID LC= NUMBER
XH3W79000366	JONES	RELATIONSHIPS AMONG	1969		INVALID LC= PREFIX
J326680000G9	CURTIS	THE MAKING OF A PRESIDENT	1969		INVALID LIBRARY CODE
J326680000G9	CURTIS	THE MAKING OF A PRESIDENT	1969		INVALID LC= PREFIX
J326680000G9	CURTIS	THE MAKING OF A PRESIDENT	1969		INVALID LC= NUMBER
X32669005736	HEW3265H132				INVALID LC= PREFIX
					TOTAL ERRORS = 14

Fig. 9. Errors Listing.

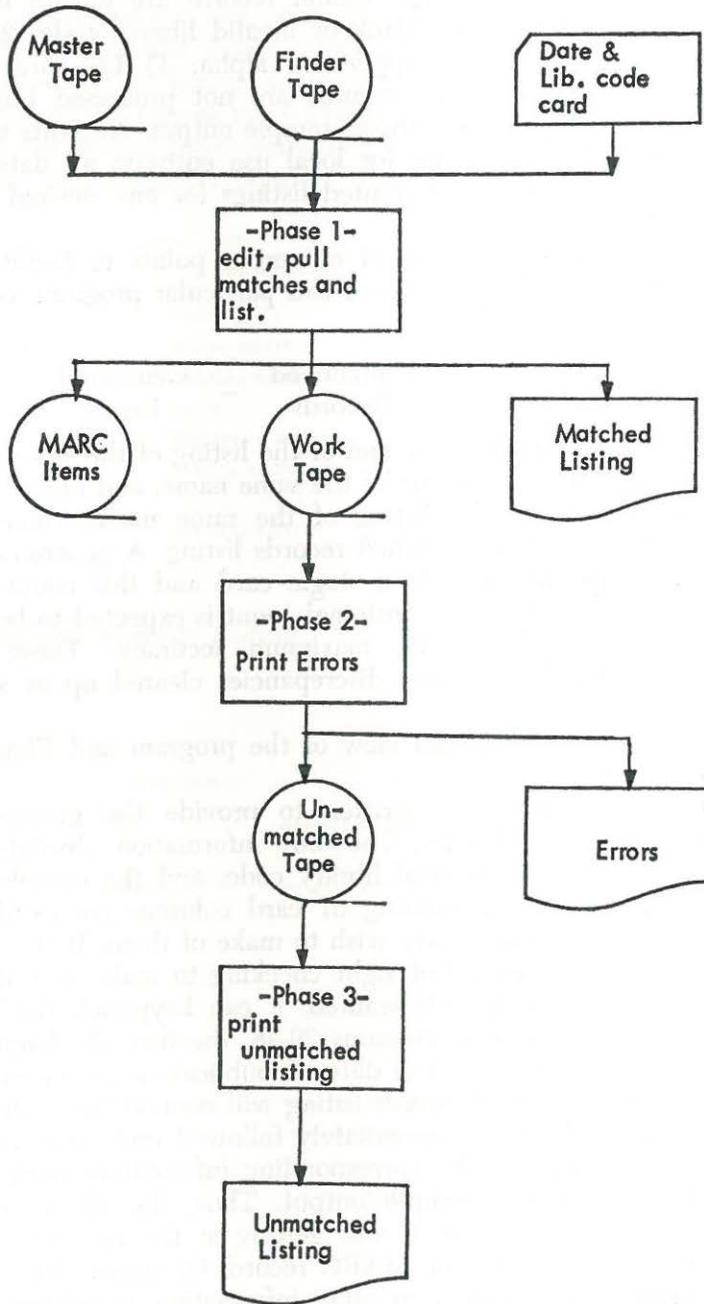


Fig. 10. *Withdrawing Records Program System Flowchart.*

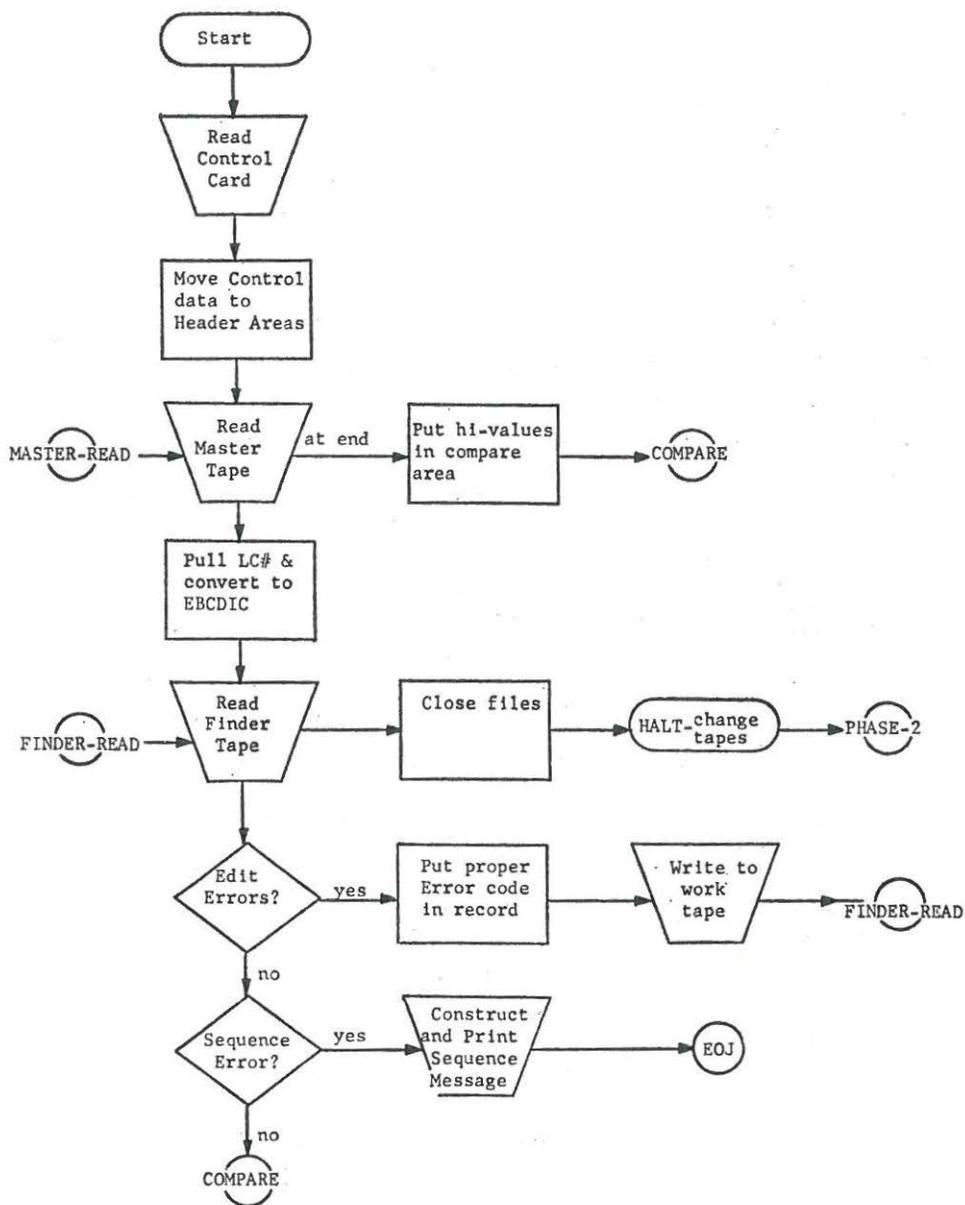


Fig. 11. Withdrawing Records Program Detail Flowchart.

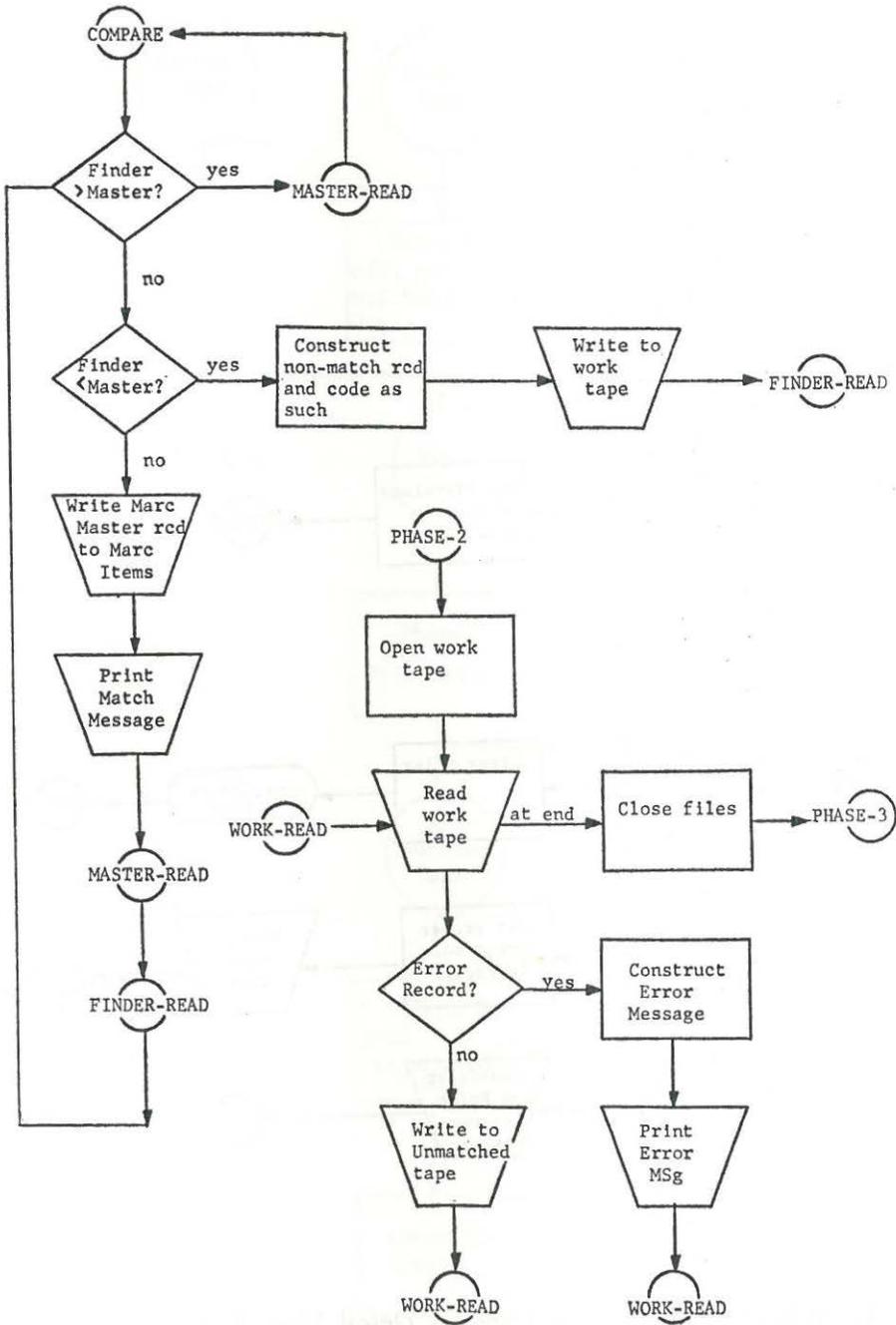


Fig. 11 continued.

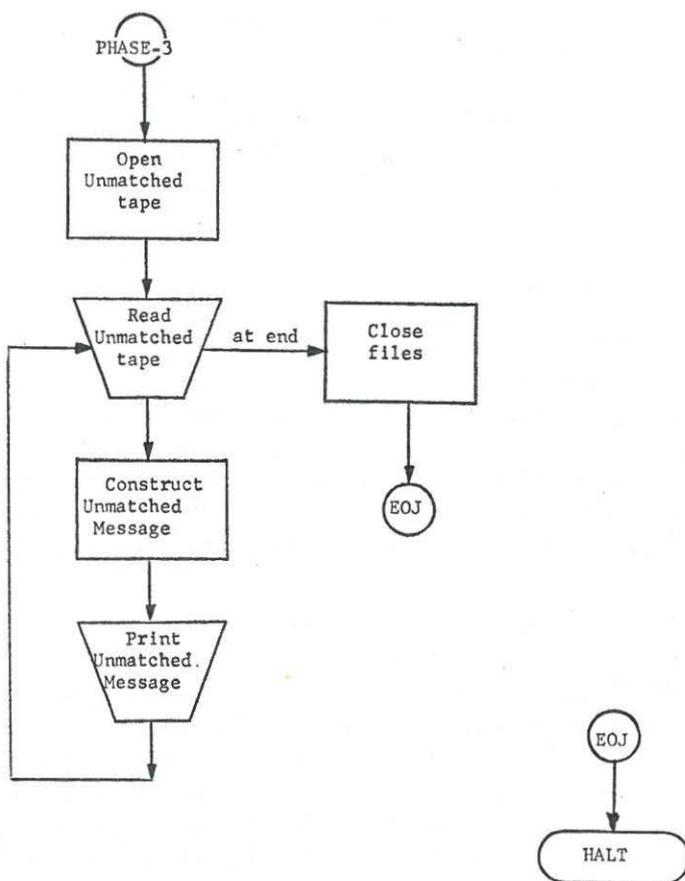


Fig. 11 continued.

Another convenience for the local library is that it has to do no original programming to use the system. All that is needed are standard sort, merge and card-to-tape programs. Any of the programs written by the Department of Libraries is available to users on demand. They may find the merge or LC card number print programs useful.

Another consideration for the user is the ease with which invalid finder records and unmatched finder records can be resubmitted into the system. To correct finder records in error, the library simply repunches cards from the error listing, with necessary corrections, and resubmits them in the next cycle with new cards. Unmatched finder records can be merged with any new finder records in the next cycle and resubmitted, no repunching being necessary.

WHAT IS PRESENTLY BEING DONE

The variety of applications for MARC presently being worked on in Oklahoma libraries is most interesting. Central State College, Edmond, Oklahoma, is currently subscribing to the weekly MARC tapes and producing an index of available materials which cumulates for two months and then drops off the older entries. The library is receiving its own subscription to the MARC tapes for this purpose but does not plan to maintain a complete file of MARC records.

The Tulsa City-County Library System, Tulsa, Oklahoma, is currently using MARC records from the State data base for bibliographic information for its machine produced book catalog. It originally had a subscription to the MARC tape service, but with the operation of the state-wide data base, is dropping it.

The University of Oklahoma, Oklahoma State University, and Oklahoma County Libraries have no immediate plans for utilization of the MARC records as distributed by the Library of Congress; however, when they do move in this area it will probably be for use in their technical processing departments and the State MARC Data Base will form a basis for their use.

COMPUTER AND LANGUAGE USED

The computer being used for the Department of Libraries MARC program is an IBM 360/30 located in the State Budget Bureau but under the administrative control and operation of the Information and Management Services Division of the Board of Affairs (the centralized state computer center for the Capitol complex). The computer has 32K core size, one on-line card read/punch, Model 2540, four magnetic tape drives, Model 2415, two magnetic disk drives, Model 2311, and one on-line printer Model 1404.

The programs are written in COBOL for the 360/30, operating under DOS, with a COBOL compiler. Very little modification would be required to operate under OS. The merge program (ODL-01) requires three tape drives. The withdrawing program (ODL-05) requires four tape drives but could be modified to operate with only three tape drives. In agreement with Henriette Avram and Julius Droz (4), the Department of Libraries has found that COBOL can easily be used to process MARC records.

The Information and Management Services Division has assigned a programmer to the Department of Libraries who has done, and will do, all the MARC programming. She is actually employed by the IMSD and the Department of Libraries contracts with them for her services. Presently, the Department is being charged about \$7.00 an hour for programming time. The planning, system design, actual programming, and production are all closely supervised by the Data Processing Coordinator of the Library, and he is on the Department of Libraries' staff.

The relationship between the IMSD and the ODL has been extremely beneficial for the Library. Thus far, the centralized computer center has provided fast and excellent service at a minimum cost. Having a full-time data processing coordinator on the staff of the library has negated the communication barrier which so often exists between a computer service center and a user library.

COST

Cost figures for use of MARC are very difficult to find. Few of the MARC I participants (3) give anything but a fleeting reference to cost. The reason is clear: cost figures are difficult to determine and even more difficult to evaluate meaningfully. Table 2 is a breakdown of the charges to the Department of Libraries for programming and machine time; it does not include Department of Libraries' staff time or overhead costs. The figures are accurate through the end of February 1970.

Table 2. *Costs*

System design	\$1,102.00
Programming	2,467.00
Machine cost for program testing, debugging and machine and operator cost for merging through 2/28/70	2,026.00
Total	<u>\$5,595.00</u>

For the first year, the Department of Libraries is absorbing all the costs of merging and maintaining the MARC master file, as well as the costs of all programming, as a form of state aid to libraries. The machine costs of comparing a finder tape with the master file, copying the desired records, and printing the various hard-copy lists, is being absorbed by the user library. The user also supplies the two blank tapes which are needed for each run. The machine time costs are based on the rate of \$80.00 an hour of CPU time.

PLANS FOR THE FUTURE OF THE STATE-WIDE MARC MASTER FILE

Two major problems are apparent in the system as it is now set up. The system was initially created as a sequential tape system because this was the easiest and quickest way to establish a working system, and because it was felt that this would be practical for at least the first year of operation. One problem is that the sequential file will become expensive to maintain and does not allow direct access to a particular record without a sequential search. Another problem is that the present system allows entry into the file only by LC card number and does not allow entry directly with bibliographic information.

In accordance with present plans, in March 1970 work will begin on converting the storage medium from tape to a direct access device (disk or data cell) as the RECON Study suggests (5). At that time the file will cease to be maintained in LC card number order and will be maintained in the order in which the records are received from the Library of Congress. Various indices to the MARC data base will be produced; author and title indices will enable the data base to be searched by bibliographic information when the LC card number is not known. In this way, only the indices (which would be comparatively much smaller), and not the complete data base, would have to be merged and searched. In terms of the data base itself, this will be the next major change.

In the long run, it will be desirable for libraries that want access to the MARC data base to have such access directly via terminals. At the present time, the cost of this kind of access is not worth the increased speed of access, nor is the money presently available; however, in the future, the cost of such a system will surely be reduced by technological improvements and increased importance of instantaneous access to the data base. When need balances with cost, such a set-up will be feasible.

The geographical expansion of the system is a possibility. Economically, this is most desirable, because the more ways the cost of maintaining the data base is split, the cheaper it is for all involved. Some preliminary investigation along these lines with bordering states is being made and hopefully at some time in the future there will be a regional data base which many libraries can use.

PLANS FOR FUTURE COOPERATIVE USE OF MARC

The cooperative use of MARC thus far in Oklahoma only affects the larger libraries which have access to computers and automation personnel. Essentially, each library is autonomous and is free to use MARC in any manner it wishes. It will remain true in Oklahoma that individual libraries will always be free to use the data base to retrieve part or all of the data base for any purpose. However, plans are under way for more cooperative use of MARC with libraries that do not have automation capabilities that would result in useful hard copy products for such libraries.

Two such cooperative plans have been proposed for immediate implementation. The first of these is a current awareness service. Selected subjects would be compared against the data base on a bi-weekly (or other period) basis and complete bibliographic information for books representing the selected subjects would be printed as a personalized current awareness service. For example, all law titles on the MARC tapes for two weeks could be pulled and listed, and the listing distributed to the county and state law offices, attorney firms, the Law School Library, etc., for selection and order purposes. The same could be done with library

science or any other subject. Subject lists of interest to various agencies of state government could be produced and sent to them. Another possibility is a profile of a legislative session by subject and then weekly or monthly lists of current materials available on these subjects for ordering by the Department of Libraries and possible lists to be made available to the legislative members. There are many possible uses for such a system which could be done fairly inexpensively. Work began on this project in October 1969, and the service became operational on a cost basis in February 1970.

A second possibility is catalog card and processing aids production. This would probably be done as a pilot project with several libraries throughout the state and then, if successful, expanded to any library in the state wanting to use the service. Catalog card sets with subject headings printed at the top, and call numbers printed if the library accepts LC or LC Dewey classification (there would be several options available within the system), spine labels, and book and circulation card labels would be provided. A by-product of such a state-wide operation would be the maintenance of book location information in machine readable form in a central place for future use as a basis for a machine readable state-wide union catalog.

A project not in the immediate future but certainly being considered is that of cooperative retrospective conversion. That is, several libraries in the State would like to have bibliographic information in MARC format for all books in their collections. Whether the Department of Libraries would go ahead with such an ambitious project or wait for it to be done nationally (RECON Study) would depend on timeliness on the national scene, need on the local scene, and available financial resources. Eventually, Oklahoma would like to have in machine readable form a complete union catalog of the entire library resources of the State that could be used for cooperative acquisitions programs, for strengthening subjects which are weak within the State, and as a location tool for interlibrary loan. Such a data base would later be used also for reference functions. Needless to say, such an ambitious project as this is not in the immediate future.

CONCLUSION

Early in the game, Oklahoma libraries learned that the most economical means to library automation was cooperative automation. The creation of a state-wide MARC data base is an important step toward cooperative library automation, while still allowing each local library to maintain its individuality for uses of the data. Many areas of cooperation still remain untouched. The future success of library automation in Oklahoma lies in the imaginative and creative projects that could be designed and implemented cooperatively to the mutual cost savings and benefit of all.

PROGRAMS

Copies of the programs mentioned in this paper may be obtained from National Auxiliary Publications Service of ASIS as follows: 1) "A Program to Merge All MARC II Tapes Received from the Library of Congress onto a Single Tape" (NAPS 00815); 2) "A Program to Drop Given Records or to Transfer Them to a Separate Tape" (NAPS 00816); 3) "A Program to Print MARC Tapes in Readable Form" (NAPS 00817); 4) "A Program to Pull Selected Records from the MARC Master Tape for a Single Library" (NAPS 00818); and 5) "A Program to Print a Listing of All Library of Congress Card Numbers on a Given MARC Tape" (NAPS 00819).

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