CUSTOMER ENGINEERING TESTS
FOR THE 1401 DATA PROCESSING SYSTEM

51-COLUMN READ

Purpose of Test

To test the 51-Column Read Feed feature. When this feature is used, brushes 1-14 and 66-80 are disabled. Since the 51-column cards are read by brushes 15-65, Location 014 becomes the Reader Cycle Point Storage Counter and will contain an & character (CBA) upon completion of the read cycle.

Units Required

1401 Processing Unit
1402 Card Reader with Interchangeable 51-Column Read Feed and Adapter Tray
1403 Printer (optional)

Operations Used

Operation	Code
Clear	(/)
Set Word Marks	(,)
Test for Character & Branch	(B------?)
Clear Word Marks	(¤)
Load	(L)
Move	(M)
Add	(A)
Read	(1)
Compare	(C)
Branch	(B)
Print	(2)
Immediate-Space 1 and Branch	(F---J)
Stop (error)	(.)

Method of Test

The card format for instruction and constant cards is similar to the other decks with the following exceptions:

Columns 1-4   L 045 instead of L 031. This is necessary because the cards punched in columns 1-51 are read by brushes 15-65. Therefore, the standard L 031 instruction normally used must be increased by 14 positions.

Columns 33-72   Remarks normally punched in these columns are omitted due to reduced card capacity.

Columns 44-51   Block No. and Card No. in Instruction and Constant Cards only.

Columns 73-80   Block No. and Card No. in stub portion of all cards. This portion is used in the preparation of the card deck to facilitate end-printing of Block Nos. and Card Nos. on the 51-column portion. Stubs must be torn off before test can be performed on the 51-column basis.

The complete test deck consists of the following cards:

1. Title Card (OA)
2. Instruction and Constant Cards (02-58)
3. Title and Headings Print Routine (59-70)
4. Trailer Card (71)
5. 60 Detail Cards punched in columns 1-51. Block Nos. and Card Nos. (72-131) are printed on the left end of the 51-column card and punched on the right-end stub in columns 73-80. Stubs must be torn off before processing.

Two Sense Switches may be brought into play as follows:

Sense Switch C OFF - no printing for correct results.
                ON - prints for correct results.

Sense Switch E OFF - prints for error results.
                ON - stops for error results; omits printing of comment END OF TEST.

The program is executed in the following manner:

After testing for a "1" in S52 to print or by-pass the title and headings, a 60-character table, stored by the program in Locations 701-760, is expanded to a 180-character table in Locations 701-880. The Read and Punch Areas are then cleared and constants "COLUMNS,01-13&" are moved to Locations 101-114 and constants "COLUMNS,01-13" are moved to Locations 001-013; and constants "COLUMNS, 066-080" are moved to Locations 166-180 and Locations 066-080. The locations in between (115-165) will be used later to store 51 characters of the stored table; Locations 015-065 will be the normal read-in locations of the 51-column card.

A card counter is then started at "1" and incremented by "1" each time a detail card is processed. This card counter serves three purposes: 1) to print a card number in case of error print-out; 2) to end the test when the counter reaches 60; and 3) to increment a ripple counter. The purpose of the ripple counter, which is started at 750 and incremented by the card counter, is to modify the A portion of a Move instruction (Loc. 525-526) so that the appropriate 51 characters may be selected in ripple fashion from the 180-character table and moved into Locations 115-165. The characters in the working area (101-180) are then compared with the characters in the normal Read Area (Locations 001-080). If the comparison is unequal, the program branches to the Error Print Routine. The position of Sense Switch E then determines whether the machine stops to permit console checking or prints the constants, the 51 characters in the card, and the Card No. with an "ERROR" indication on the first line and the constants and the stored table to which it was compared on the second line.

When the card counter reaches 60, the comment END OF TEST is printed (Sense Switch E OFF) signalling the end of the test. The test may be repeated by reloading the 60 detail cards in the hopper and pressing the Start Key.

Checking Procedure

SENSE SWITCH E ON - Machine stops for errors.

1. Remove the last card in the stacker.
2. Re-start the program in the Single-Cycle mode at Location 535 to execute the compare instruction. With each depression of the Start Key watch the B $\neq$ A logic light until it turns ON. At this time the character in the stored table is displayed in the A Register and the character in the read area that caused the unequal comparison is displayed in the B Register.
3. Check the character in the read area with the character punched in the card.

SENSE SWITCH E OFF - Machine prints error results. Examples of error print-out:

First Line 1 Thru 80   Second Line Table

COLUMNS,01-13&AKT4 BLU5 CMV6 DNW7 EOX8 FPY8 GQZO HR+# I-,@ &$%1 .COLUMNS,066-080 ERROR 01
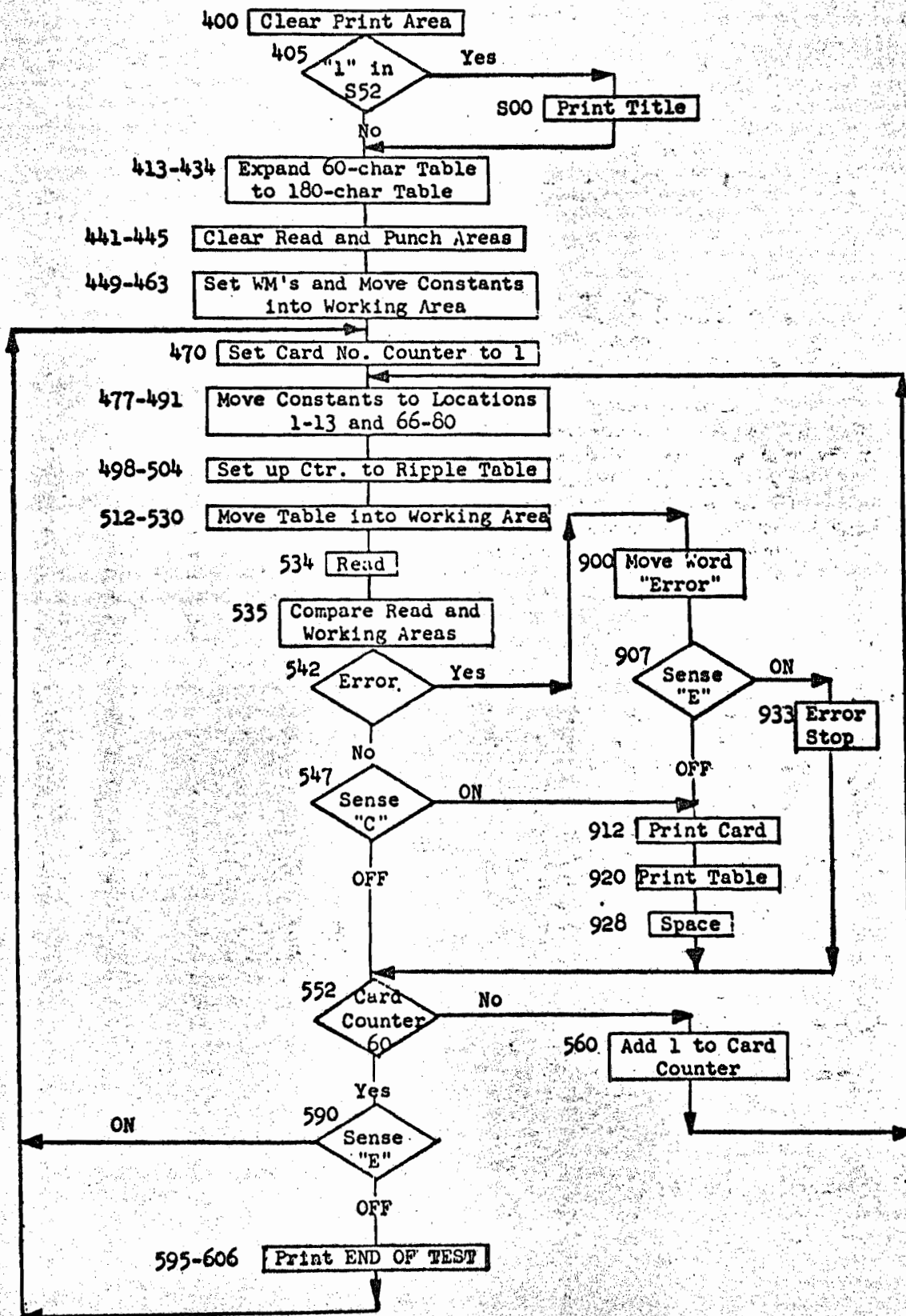COLUMNS,01-13&AKT4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .COLUMNS,066-080

SENSE SWITCH C ON - Machine prints correct results. Information on the first line agrees with information on the second line and the word "ERROR" is omitted.

NOTE: Before re-loading the 60 detail cards to repeat the test, make sure that they are in numerical sequence (72-131) because if they are not in that order error print-outs will occur.

51-COLUMN READ

FLOW CHART

400 — Clear Print Area

405 — "1" in S52 — Yes → S00 — Print Title

No

413-434 — Expand 60-char Table to 180-char Table

441-445 — Clear Read and Punch Areas

449-463 — Set WM's and Move Constants into Working Area

470 — Set Card No. Counter to 1

477-491 — Move Constants to Locations 1-13 and 66-80

498-504 — Set up Ctr. to Ripple Table

512-530 — Move Table into Working Area

534 — Read

535 — Compare Read and Working Areas

542 — Error — Yes →

900 — Move Word "Error"

907 — Sense "E" — ON →

933 — Error Stop

OFF

No

547 — Sense "C" — ON →

912 — Print Card

920 — Print Table

928 — Space

OFF

552 — Card Counter 60 — No →

560 — Add 1 to Card Counter

Yes

590 — Sense "E"

ON →

OFF

595-606 — Print END OF TEST

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PROGRAM LISTING

51-COLUMN READ   BLOCK 3800A

LOAD ADDR	INST ADDR	OP	A	B		REMARKS	
419	400	/	332			Clear Print Area	2
423	404	/				"	3
424	405	B	800	S52	1	Branch to Title Print if 1 in S52	4
432	413	X	721	741		Expand Table	5
439	420	L	760	820		"	6
446	427	L	760	880		"	7
453	434	X	761	821		"	8
460	441	/	080			Clear Read Area	9
464	445	/	199			Clear Working (Punch) Area	10
468	449	,	001	101		Set Word Marks	11
475	456	M	634	114		Move constants to working area	12
482	463	M	649	180		"	13
489	470	L	690	692		Set Card Counter to One	14
496	477	M	633	013		Move constants to Locations 1-13	15
503	484	M	649	080		Move constants to Locations 66-80	16
510	491	M	692	299		Move Card No. to Print Area	17
517	498	L	697	700		Start Ripple Counter at 750	18
524	505	A	692	700		Add Card Counter to Ripple Counter	19
531	512	,	115			Move Table to working area	20
535	516	M	700	526		"	21
542	523	M	xxx	165		"	22
549	530	X	115			"	23
553	534	1				Read	24
554	535	C	180	080		Compare Read and Working Areas	25
561	542	B	900	/		Branch to Error Print Routine if Unequal	26
566	547	B	912	C		C ON for correct print	27
571	552	B	590	691	6	Branch if Card Counter is 60	28
579	560	A	690	692		Add 1 to Card Counter if not 60	29
586	567	B	477			Branch	30
609	590	B	470	E		E OFF to Print END OF TEST	31
614	595	/	299			Clear Print Area	32
618	599	M	660	259		Move END OF TEST to Print Area	33
625	606	2	470			Print END OF TEST and Branch	34
629	610					Word Mark in Location 610	35
640	621	COLUMNS,01-13&				Constants	36
654	635	COLUMNS,066-080				"	37
669	650	END OF TEST				"	38
680	661	ERROR				"	39
708	689	01				Constant to increment Card Counter	40
710	691	xx				Card Counter	41
714	695	750				Constant to start Ripple Counter	42
717	698	xxx				Ripple Counter	43
720	701	AKT4 BLU5 CMV6 DNW7				Table	44
740	721	EOX8 FPY9 GQZ0 HR+#				Table	45
760	741	I-,@ &$%1 .#/2 XJS3				Table	46

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PROGRAM LISTING

919	900	M 665 285	Move word ERROR to Print Area	47
926	907	B 933 E	E ON to error stop	48
931	912	L 080 280	Load Locs. 1-80 into Print Area	49
938	919	2	Print card and constants	50
939	920	L 199 299	Load Working Area into Print Area	51
946	927	2	Print (Table) Working Area	52
947	928	F 552 J	Single Space	53
952	933	. 552	Error Stop	54
956	937		Word Mark	55
/39	/20	FIRST LINE 1 THRU 80	Constant	56
/59	/40		"	57
/79	/60	SECOND LINE TABLE	"	58

Title and Headings Print Routine

S19	S00	2	Print (Space)	59
S20	S01	, 033	Set WM for Title and Block No.	60
S24	S05	L 065 277	Load Title & Block No. into Print Area	61
S31	S12	2	Print Title and Block No.	62
S32	S13	/ 277	Clear Print Area	63
S36	S17	2	Print (Space)	64
S37	S18	⊐ /40 /60	Clear Word Marks	65
S44	S25	L /79 260	Load second line	66
S51	S32	2	Print second line	67
S37	S33	/ 260	Clear Print	68
S41	S37	F 413 J	Space and branch	69
S46	S42		Word Mark	70
B400		51-COLUMN READ	3800A	71

60 DETAIL CARDS	PRINTOUT NO.	END PRINT NO. **
AKT4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .	1	72
KT4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*	2	73
T4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/	3	74
4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2	4	75
BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2	5	76
BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2 ⊐	6	77
LU5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2 ⊐J	7	78
U5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2 ⊐JS	8	79
5 CMV6 DNW7 EOX8 FPY9 GQZO HR+# I-,@ &$%1 .*/2 ⊐JS3	9	80
etc.	etc.	etc.
3 AKT4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR # I-,@ &$%1	59	130
AKT4 BLU5 CMV6 DNW7 EOX8 FPY9 GQZO HR # I-,@ &$%1	60	131

(Ripple Table punched in 51-column detail cards)

**Note: End Print No. is printed on the left end of the detail cards but is not punched in the cards.

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