IBM®

problem solutions

705 ELECTRONIC DATA-PROCESSING MACHINE

ACTUAL AND AUTOCODER PROGRAMMING

Form 22-6732-0

PROBLEM 1. INPUT-OUTPUT (Tape to Card)

		B	C	2	3	2	0	8	9	2	8	0	7	3	0	0	4	0	2	0	2	‡																					
		0800 Emp. No.						0804 S.S. No.																0813 W.T.C.	0815 Rate									0819	0820										
2	0	2	0	0	Y	0	8	0	0	2	0	3	0	0	R	0	8	0	0	1	0	0	0	4																					

0000 Instr. 1 | 0004 Instr. 2 | 0009 Instr. 3 | 0014 Instr. 4 | 0019 Instr. 5 | 0024

01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select tape unit 1
0009	RD	0800						Read tape record into memory
0014	SEL	0300						Select card punch 1
0019	WR	0800	00					Punch record in card
0024	TR	0004						Transfer to start.

PROBLEM 2. INPUT-OUTPUT (Card to Tape)

		J	G	4	3	-	4	G	A	S	K	E	T	b	b	b	b	b	b	b	b	0	1	5	9	7	5	0	4	0	0	1	0	3	‡				
		6001 Part No.					6006 Description																				6020 Cost						6026 Min Bal		6029 Qty.				6033	6034		
2	0	1	0	0	Y	6	0	0	1	2	0	2	0	0	R	6	0	0	1	1	0	0	0	4																

01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0100						Select card reader 1
0009	RD	6001						Read card into memory
0014	SEL	0200						Select tape unit 1
0019	WR	6001	00					Write record on tape
0024	TR	0004						Transfer to start.

PROBLEM 3. INPUT-OUTPUT

J	O	H	N	b	A	D	A	M	S	b	b	b	b	b	b	1	3	5	9	6	7	0	0	0	1	3	5	9	++

11001 Name 11016 Customer Number 11023 Amount 11029 11030

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0100						Select card reader 1
0009	RD	11001						Read card into memory
0014	SEL	0200						Select tape unit 1
0019	WR	11001	00					Write complete record on tape
0024	SEL	0400						Select printer 1
0029	WR	11017	00					Print partial record on printer
0034	TR	0004						Transfer to start.

Note: For greater visual clarity, memory addresses are expressed here as 5 digit fields. Note, however, that where the memory position is above 9999 the high order position becomes an alphabetic character. Therefore, memory position 15742 is converted into 5742 with 01 zoning over the 5. A 5 with 01 zoning over it is identical to a V, and the address may be expressed as V742 although designating the appropriate zoning over the numeric figure is preferable. Memory position 24733 (in Model II which has 40,000 positions of memory) becomes 4733 with 10 or minus zoning over the 4, i.e. M733.

PROBLEM 4. ADDITION

b	0	5	8	2	3	+1	0	0	9	4	8	1	+7	b	b	b	b	b	b	b	++

9000 A 9006 B 9013 T 9020 9021

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select tape unit 1
0009	RD	9001						Read record into memory
0014	RAD	9006	00	a058231	+			Reset add factor A
0019	ADD	9013	00	a0153048	+			Add factor B to produce T
0024	ST	9020	00	a0153048	+			Store T in memory
0029	SEL	0201						Select tape unit 2
0034	WR	9001	00					Write record on tape
0039	TR	0004						Transfer to start.

PROBLEM 5. ADDITION/SUBTRACTION

4	1	7	8	2	A	1	1	0	5	+0	0	9	2	+5	1	7	7	+5	b	b	b	b	b	++

9990 Emp. No. 9995 Base Pay 10000 O. T. Pay 10004 Ded 10008 Net Pay 10013 10014

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select tape unit 1
0009	RD	9990						Read record into memory
0014	RAD	10000	06			a11050	+	Reset add base pay
0019	ADD	10004	06			a11975	+	Add overtime pay
0024	SUB	10008	06			a10200	+	Subtract deductions
0029	ST	10013	06			a10200	+	Store net pay
0034	SEL	0201						Select tape unit 2
0039	WR	9990	00					Write record on tape
0044	TR	0004						Transfer to start.

PROBLEM 6. MULTIPLICATION

b	0	2	3	4	8	+9	9	9	+0	b	b	b	b	b	b	b	b	++

30498 A 30504 B 30507 P 30516 30517

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0205						Select input tape unit
0009	RD	30499						Read record into memory
0014	RAD	30504	00	a023489	+			Reset add A (rate) multiplier
0019	MPY	30507	00	a023254110	+			Multiply by B (total hours)
0024	ST	30516	00	a023254110	+			Store product in memory
0029	SEL	0202						Select output tape unit
0034	WR	30499	00					Write record on tape
0039	TR	0004						Transfer to start.

PROBLEM 7. MULTIPLICATION

4	F	9	7	1	J	0	1	3	+9	0	2	9	3	+8	2	+7	b	b	b	b	b	b	b	b	b	b	b	b	+++								

0901 Part No. 0906 Qty Assem 0910 Unit Cost 0915 As Rq. 0917 Qty. Req. 0923 Total Cost 0930 0931

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select tape unit 1
0009	RD	0901						Read record into memory
0014	RAD	0910	00	a0139	+			Reset add assemblies required
0019	MPY	0917	00	a003753	+			Multiply by qty. per assembly
0024	ST	0923	00	a003753	+			Store result in memory
0029	MPY	0915	00	a00011026314	+			Multiply by unit cost
0034	RND	0001	00	a0001102631	+			Round and 1/2 adj. one place
0039	SET	0007	00	a1102631	+			Adjust acc. to 7 positions
0044	ST	0930	00					Store result
0049	SEL	0201						Select tape unit 2
0054	WR	0901	00					Write record on output tape
0059	TR	0004						Transfer to step 0004.

PROBLEM 8. PARTIAL PAYROLL PROBLEM

J	O	H	N	b	J	.	b	D	O	E	b	b	b	b	b	0	+1	+3	1	5	4	+7	4	2	+5	0	1	0	2	-0	b	b	b	b	b	b	b	b

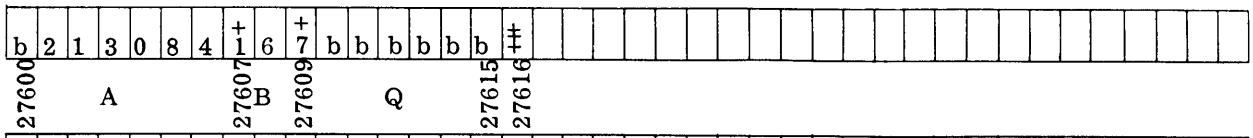
9015 Name 9030 Dp No 9032 9033 Rate 9037 Hr Wkd 9040 Ded 9045 Current With 9050 Gross Pay

b	b	b	b	b	b	+++		b	1	3	0	-0	1	8																								

9055 Net Pay 9060 9061 9500 Exem Amt 9503 9505

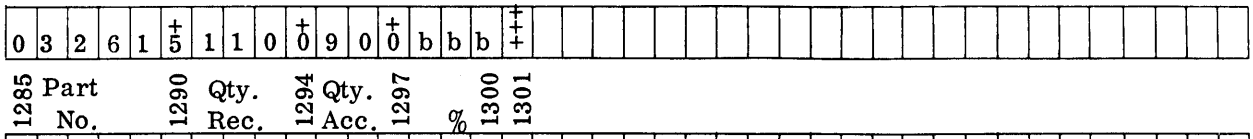
INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select input tape unit
0009	RD	9015						Read record into memory
0014	RAD	9040	00	a425	+			R add hours worked-multiplier
0019	MPY	9037	00	a0657475	+			Multiply by rate per hour
0024	RND	0002	00	a06575	+			Round
0029	ST	9055	00	a06575	+			Store gross pay
0034	RAD	9033	00	a3	+			R add tax class
0039	MPY	9503	00	a03900	-			Multiply by exemption amount
0044	ADD	9055	00	a02675	+			Add gross = taxable amount
0049	MPY	9505	00	a0048150	-			Multiply by 18%
0054	RND	0002	00	a00482	-			Round
0059	ST	9050	00	a00482	-			Store current withholding tax
0064	ADD	9055	00	a06093	+			Add gross pay
0069	ADD	9045	00	a05073	+			Subtract deductions = net pay
0074	ST	9060	00	a05073	+			Store net pay
0079	SEL	0201						Select output tape unit
0084	WR	9015	00					Write record on tape
0089	TR	0004						Transfer to start.

PROBLEM 9. DIVISION



INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select input tape unit
0009	RD	27601						Read record into memory
0014	RAD	27607	00	a2130841	+			Reset and add factor A
0019	DIV	27609	00	a31803	+			Divide by B
0024	RND	0001	00	a3180	+			Round
0029	SET	0006	00	a003180	+			Set Left 6 places
0034	ST	27615	00	a003180	+			Store Q
0039	SEL	0201						Select output tape unit
0044	WR	27601	00					Write record on output tape
0049	TR	0004						Transfer to start.

PROBLEM 10. DIVISION

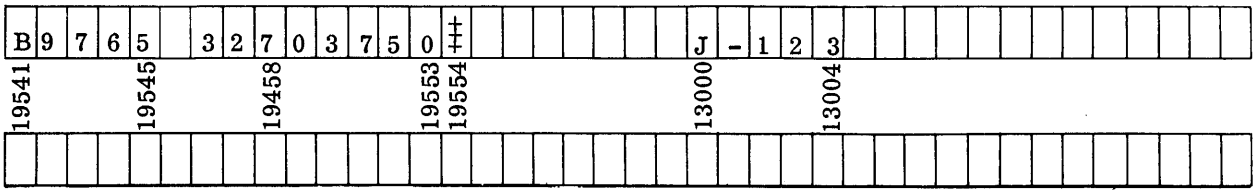


INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SEL	0200						Select input tape unit
0009	RD	1285						Read record into memory
0014	RAD	1297	00	a900	+			R add qty accepted-dividend
0019	SET	0004	00	a0900	+			Prepare dividend
0024	LNG	0004	00	a09000000	+			Lengthen
0029	DIV	1294	00	a8181	+			Divide = % accepted
0034	RND	0001	00	a818	+			Round
0039	ST	1300	00					Store % accepted
0044	SEL	0201						Select output tape unit
0049	WR	1285	00					Write record on output tape
0054	TR	0004						Transfer to start.

PROBLEM 11.

Memory		Accumulator Before	Acc. Sign	Accumulator After	Acc. Sign.	
ADD	+3265+	a55	+	a320	+	
	b79+	a33	+	a112	+	Overflow Check Ind.
	A650	a320	-	a330	+	Sign Check Ind.
SUB	++63276+	a200	+	a076	-	
	b38	a38	+	a00	+	Sign Check Ind.
	A87+	a14	-	a101	-	Overflow Check Ind.
R ADD	+3721-	a0	+	a721	-	
	AB124+	a91	-	a124	+	
	b318	aCA4	-	a318	+	Sign Check Ind.
R SUB	A127	a0	+	a127	-	Sign Check Ind.
	+6322-	a1279	-	a322	+	
	+1837653+	a6273	+	a837653	-	
MPY	++525	a4	+	a100	+	
	b330	a02	-	a00660	-	Sign Check Ind.
	+-55	a6	-	a30	+	
DIV	++222	a08ε	-	a4	-	
	b20+	a600	+	a0	+	Overflow and Zero Ind.
	A5+	a0295	+	a059	+	
STORE	+37298+	a22	-	Memory After ++37222-		
	-64521++	a321	+	-65321+		
	ABC215	a216	+	ABC216+		

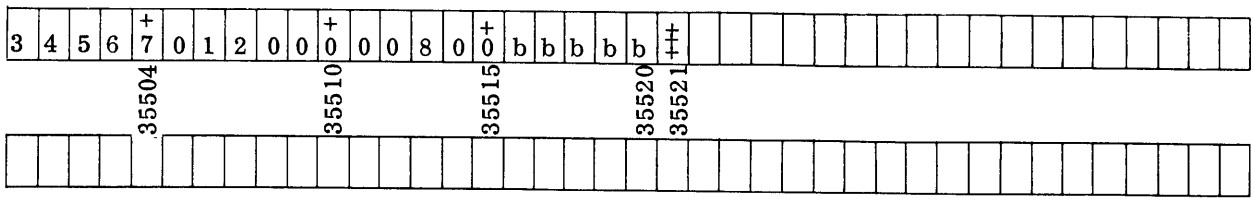
PROBLEM 12. LOAD/COMPARE



J-123							
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0005	01			a00000	+	Housekeeping
0009	LOD	13004	01			aJ-123	+	Load the constant part number
0014	SEL	0200						Sel input tape unit
0019	RD	19541						Read tape record
0024	CMP	19545	01					Compare constant vs. record
0029	TRH	0044						Constant higher than record
0034	TRE	0059						Constant equal to record
0039	HLT	0001						Constant lower than record
0044	SEL	0201						Sel output tape unit
0049	WR	19541	00					Write record on tape
0054	TR	0014						Transfer to start
0059	SEL	0400						Sel printer
0064	WR	19541	00					Write the record on printer
0069	TR	0014						Transfer to start.

PROBLEM 13. SEQUENCE CHECK



				a00000			
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0005	05			a00000	+	Prepare ASU 5
0009								
0034	SEL	0200						Input tape unit
0039	RD	35500						Read record into memory
0044	CMP	35504	05			a00000	+	Comp part no. to previous
0049	TRH	0109						Part no. out of sequence
0054	TRE	0109						Part no. out of sequence
0059	LOD	35504	05			a34567	+	Load part no. for next comp.
0064	RAD	35510	00	a012000	+			Total cost
0069	SET	0009	00	a000012000	+			Adjust dividend
0074	LNG	0002	00	a000001200000	+			Adjust dividend
0079	DIV	35515	00	a001500	+			Div by qty for unit cost
0084	RND	0001	00	a00150	+			Adjust quotient
0089	ST	35520	00					Store unit cost
0094	SEL	0201						Select output tape
0099	WR	35500	00					Write record
0104	TR	0034						Tr to start
0109	SEL	0400						Select printer
0114	WR	35500	00					Write record
0119	TR	0034						Tr to start.

PROBLEM 14. END OF FILE

G/M							
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	0180	01			a‡	+	Group mark
0014	UNL	19022	01			a‡	+	Put G/M in output record
0034	SEL	0200						Input tape
0039	RD	19000						Read record
0044	TRS	0094						To end of file routine
0049	RAD	19013	00	a0050	+			Unit cost
0054	MPY	19009	00	a00006250	+			x quantity = total cost
0059	ST	19021	00					Store total cost
0064	SEL	0201						Output tape
0069	WR	19000	00					Write record
0074	TR	0034						Transfer to main routine
0094	RWD							Rewind input tape
0099	SEL	0201						Output tape
0104	WTM							Tape mark output tape
0109	RWD							Rewind output tape
0114	SEL	0500						Typewriter
0119	WR	0156	00					Message to operator.
0124	HLT	0001						

PROBLEM 15. END OF FILE

G/M							
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	2000	01			a‡	+	Group mark
0014	UNL	12092	01			a‡	+	Put G/M in output record
0034	SEL	0200						Input tape
0039	RD	12073						Read record
0044	TRS	0099						End of file
0049	RAD	12084	00	a076325	+			R add year to date issues
0054	SET	0007	00	a0076325	+			Adjust dividend
0059	DIV	12086	00	a38162	+			Ytd issues ÷ mo. = mo. usage
0064	ST	12091	00	a38162	+			Store result
0069	SEL	0201						Output tape
0074	WR	12073	00					Write record
0079	TRS	0129						End of file
0084	TR	0034						
0099	RWD							Rewind input tape
0104	SEL	0201						Output tape
0109	WTM							Record TM output tape
0114	RWD							Rewind output tape
0119	HLT	9999						End of job
0129	WTM							Record TM output tape
0134	RWD							Rewind output tape
0139	HLT	0001						End of tape, put on new reel.

PROBLEM 16. RECEIVE AND TRANSMIT USING ACC. 00

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	Prepare ASU 01
0009	LOD	1505	01			a‡	+	Group mark
0014	UNL	12060	01			a‡	+	Put group mark in output record
0034	SEL	0200						Input tape unit
0039	RD	6000						Read record
0044	RCV	11564						Designate output area
0049	TMT	6004	00					Transmit to output area
0054	SEL	0201						Output tape unit
0059	WR	11560	00					Write record
0064	TR	0034						Tr to start of main routine.

PROBLEM 17. RECEIVE AND TRANSMIT USING ASU 01-15

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0004	04			a0000	+	Prepare ASU 04
0009	SET	0007	07			a0000000	+	Prepare ASU 07
0014	SET	0001	01			a0	+	Prepare ASU 01
0019	LOD	0905	01			a‡	+	Group mark
0024	UNL	6227	01			a‡	+	Put G/M at end of output area
0064	SEL	0200						Input tape unit
0069	RD	1017						Read record
0074	RCV	6212						Designate output field C
0079	TMT	1028	04					Transmit field C
0084	TMT	1017	04					Transmit field A
0089	TMT	1021	07					Transmit field B
0094	SEL	0201						Output tape
0099	WR	6212	00					Write record
0104	TR	0064						Tr to start of main routine

PROBLEM 18. RECEIVE AND TRANSMIT

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0004	06			a0000	+	Prepare ASU 06
0009	SET	0001	07			a0	+	Prepare ASU 07
0014	LOD	10000	07			a‡	+	Group mark
0019	UNL	5065	07			a‡	+	Put G/M at end of output record
0024	UNL	19370	07			a‡	+	Put G/M at end of variation record
0029	SET	0005	05			a00000	+	Prepare ASU 05
0099	SEL	0200						Input master tape
0104	RD	16035						Read record
0109	SEL	0202						Input variation tape
0114	RD	19361						Read record
0119	LOD	19365	05			a32561	+	Load employee no.
0124	CMP	16039	05			a32561	+	Comp employee numbers
0129	TRE	0154						Transfer on equal
0134	TRH	0164						Transfer on high
0139	SEL	0500						Select typewriter
0144	WR	19361	00					Write variation record
0149	TR	0099						Transfer
0154	RCV	16040						Designate master rate field
0159	TMT	19366	06					Transmit rate
0164	RCV	5054						Designate output work area
0169	TMT	16039	00					Transmit master record
0174	SEL	0201						Select output tape
0179	WR	5050	00					Write record
0184	TR	0099						Transfer to start.

PROBLEM 19. READ WHILE WRITING

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	Prepare ASU 01
0009	LOD	1505	01			a‡	+	Group mark
0014	UNL	12060	01			a‡	+	Put G/M in output record
0019	SEL	0200						Input tape unit
0024	RD	6000						Read first record
0034	RCV	11584						Designate output work area
0039	TMT	6004	00					Transmit to output work area
0044	SEL	0200						Input tape unit
0049	RWW	6000						Prepare to read while writing
0054	SEL	0201						Output tape unit
0059	WR	11580	00					Read and write simultaneously
0064	TR	0034						Transfer to main routine.

PROBLEM 20. READ WHILE WRITING

G/M							
01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0003	12			a000	+	Prepare ASU 12
0009	SET	0005	13			a00000	+	Prepare ASU 13
0014	SET	0006	14			a000000	+	Prepare ASU 14
0019	SET	0001	01			a0	+	Prepare ASU 01
0024	LOD	2005	01			a‡	+	Group mark
0029	UNL	15088	01			a‡	+	Put G/M in output record
0034	SEL	0200						Input tape
0039	RD	1000						Read first record
0084	RCV	15063						Designate payroll no. output
0089	TMT	1000	12					Transmit payroll no. to output
0094	RCV	15068						Designate emp. no. output
0099	TMT	1003	14					Transmit emp. no. to output
0104	RCV	15076						Designate ins. output
0109	TMT	1009	13					Transmit ins. to output
0114	RCV	15083						Designate adv. output
0119	TMT	1014	13					Transmit adv. to output
0124	SEL	0200						Input tape
0129	RWW	1000						Prepare to read while write
0134	SEL	0201						Output tape
0139	WR	15063	00					R/W simultaneously
0144	TR	0084						Transfer to main routine.

PROBLEM 21. Page 1 of 2

Memory		Acc. Storage Before	Acc. Sign	Acc. Storage After	Acc. Sign	Check Indicators
ADD	+6573	a61	-	a512	+	
	b82V	a134	+	a959	+	Sign Check
	+62243	a3765	+	1522	+	
SUB	A827	a28	-	a855	-	Sign Check
	+7376	a12781	+	a12405	+	
	+73274	a3274	-	a0000	+	
R ADD	b83S	a7215	-	a832	+	Sign Check
	K375	a16	+	a375	+	
	+-54381	a9654	+	a381	-	
R SUB	+421	a521	+	a21	+	
	b538X	a151	-	a387	-	Sign Check
	+53743	a9	+	a3743	-	
MPY	-560	a5	-	a300	+	
	D120	a003	+	a000360	+	
	b15	a325	-	a04875	-	Sign Check
DIV	+765	a70	+	a70	+	Zero Indicator
	b5	a075	+	a15	+	
	b5	a75	+	a0	+	Overflow and Zero Check
	A9	a81	+	a9	+	Sign Check
LOAD	A36	a9	-	a6	+	
	DOEbJ	a65431	+	aDOEbJ	+	
	-563AB5	a32761	+	a63AB5	+	

PROBLEM 21. Page 2 of 2

	Accumulator Storage	Acc. Sign	Memory Before	Memory After
STORE	a37	-	643382	643337
	a37982	+	A65213A	A637982
	a21	+	DOEb15	DOEb21
	a7	-	bA76532	bA76537
UNLOAD	a219	+	bAB5600	bAB5219
	aDOEbJ	+	DOEbM56	DODOEbJ
	a15	-	77B4681	77B4615

Instruction		Accumulator Storage Before	Acc. Sign	Accumulator Storage After	Acc. Sign
SHOR	0001	a3976	+	a397	+
LENG	0002	a7653	+	a765300	+
SHOR	0002	a375	-	a3	-
LENG	0000	a5762	+	a5762	+
SET L	0004	a006512	+	a6512	+
SET L	0005	a372	-	a00372	-
ROUND	0001	a796	+	a80	+
ROUND	0003	a37352	+	a37	+
ROUND	0004	a68712	-	a7	-

PROBLEM 22. PAYROLL Page 1 of 2

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	1013	01			a‡	+	Group mark
0014	UNL	12061	01			a‡	+	Put G/M in output record
0019	SET	0004	02			a0000	+	4 zeros for no w.h.
0024	SET	0003	03			a000	+	3 zeros for no FICA
0029	SEL	0200						Input tape
0034	RD	1150						Read first record
								Transmit record to output area
0039	RCV	12024						Designate output area
0044	TMT	1154	00					Transmit to output area
								Test for withholding tax
0049	RAD	12027	00	a5	+			Tax class
0054	MPY	1003	00	a06500	-			Tax class x 13.00 = exempt. amt.
0059	ADD	12048	00	a12075	+			Gross - exmpt. amt. = tax gross
0064	TRP	0079	00					To calc. withholding tax
0069	ST	12052	02					No withholding tax - put 4 zeros
								in output
0074	TR	0104						To test for FICA
								Calc. withholding tax
0079	MPY	1005	00	a0217350	+			Taxable amt. x 18% w.h. tax
0084	RND	0002	00	a02174	+			Adjust to nearest cent
0089	SET	0004	00	a2174	+			Adjust to 4 places
0094	ST	12052	00	a2174	+			Put w.h. tax in output record
0099	ADM	12039	00	a2174	+			Adjust y.t.d. w.h. tax
								Test for FICA
0104	RAD	1012	00	a420000	+			42000
0109	SUB	12033	00	a005000	+			Y.t.d. gross
0114	TRP	0129	00					To test for partial FICA
0119	ST	12055	03					No FICA - put 3 zeros in output
0124	TR	0179						To calc. net pay
0129	SUB	12048	00	a013575	-			Gross
0134	TRP	0149	00					To full FICA calc.
								Partial FICA calc.
0139	ADD	12048	00	a005000	+			Add back gross
0144	TR	0154		·				To multiply by 2%.

PROBLEM 22. PAYROLL Page 2 of 2

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
								Full FICA calc.
0149	RAD	12048	00	a18575	+			Gross
0154	MPY	1006	00	a0010000	+			Gross x 2% = FICA
0159	RND	0002	00	a00100	+			Adjust FICA to nearest end
0164	SET	0003	00	a100	+			Adjust to 3 places
0169	ST	12055	00	a100	+			Put FICA in output record
0174	ADM	12043	00	a100	+			Adjust y.t.d. FICA
								Calc. net pay
0179	RAD	12048	00	a18575	+			Gross
0184	ADM	12033	00	a18575	+			Adjust y.t.d. gross
0189	SUB	12052	00	a16401	+			Withholding tax
0194	SUB	12055	00	a16301	+			FICA
0199	ST	12060	00	a16301	+			Put net pay in output record
								Write record
0204	SEL	0200						Input tape
0209	RWW	1150						Prepare input to read
0214	SEL	0201						Output tape
0219	WR	12020	00					Write record and read simul.
0224	TRS	0284						End of output tape
0229	SEL	0200						Sel input tape unit
0234	TRS	0344						End of input file
0239	TR	0039						Transfer to start
0284	WTM							Tape mark on output tape
0289	RWD							Rewind output tape
0294	HLT	0001						Stop
0299	TR	0229						Transfer to Sel input tape
0344	RWD							Rewind input tape
0349	SEL	0201						Select output
0354	WTM							Tape mark on output tape
0359	RWD							Rewind output tape
0364	HLT	9999						End of job.

PROBLEM 23. DRUM SEARCH

G/M	a0014	a2007	a0000			a0000000	
01	02	03	04	05	06	07	08
				a13			
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	5016	01			a‡	+	Group mark
0014	UNL	2190	01			a‡	+	Put G/M at end of record
0019	RAD	5008	02			a0014	+	Constant 0014
0024	RAD	5004	03			a2007	+	Address of first shop order no.
0029	SET	0004	04			a0000	+	
0034	SET	0007	07			a0000000	+	
0039	RAD	5014	13			a13	+	Initialize counter
0044	SEL	0100						Card reader
0049	RD	4001						Read a card
0054	LOD	4016	04			a1206	+	Shop order suffix no.
0059	UNL	0069	04					Adjust sel. instr. for reading
0064	UNL	0144	04					Adjust sel. instr. for writing
0069	SEL	(1206)						Drum section
0074	RD	2001						Reading drum section
0079	LOD	4012	07			aQR7170B	+	Shop order no. from card
0084	CMP	(2007)	07					To shop order no. from drum
0089	TRE	0119						Shop order no. located
0094	SUB	5015	13					Subt. 1 from counter
0099	TRZ	0114						Have tried 14 s.o. nos.
0104	ADM	0084	02					Adjust comp. instruction
0109	TR	0084						To comp next shop order no.
0114	HLT	0001						Wrong section
0119	LOD	0084	04			a2021	+	Address of eq. shop order no.
0124	ADD	5012	04			a2028	+	Address of cost amt.
0129	UNL	0139	04			a2028	+	Adjust
0134	RAD	4021	00	a0941	+			Cost from card
0139	ADM	(2028)	00					Adjust cum. shop order cost
0144	SEL	(1206)						Drum section
0149	WR	2001	00					Write back on drum
0154	UNL	0084	03					Reset comp. address
0159	TR	0039						To read another card.

PROBLEM 24. READING PROGRAM INSTRUCTIONS FROM DRUM

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	RAD	1533	01			a10	+	Constant 10
0009	RAD	1537	02			a1014	+	Drum section address
0014	SEL	(1014)						Drum section
0019	RD	7750						Each group of drum instructions
0024	TR	7754						To program from drum
								Program from drum
7754	ADM	0014	01					Adjust select instruction
								To next drum section to be used
9744	TR	0014						To select and read next drum
								section
								Last drum section
7754	UNL	0014	02					Reset select instruction
								to address of first
								drum section used
9744	TR	0014						To select and read 1st drum section.

PROBLEM 25. ERROR CORRECTION ROUTINE

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	5003	01			a‡	+	Group mark
0014	UNL	6381	01			a‡	+	Put G/M at end of record
0029	RAD	5001	03			a2	+	Place 2 in ASU 03
0034	SEL	0200						Input tape
0039	RD	6363						Read record
0044	SEL	0902						R/W indicator
0049	TRS	0104						Tr on error
0054	RAD	6374	00	a0120990	+			Commission %
0059	MPY	6367	00	a000483960	+			% x sales amt. = comm. amt.
0064	RND	0002	00	a0004840	+			Adjust to nearest cent
0069	SET	0006	00	a004840	+			Prepare for storing
0074	ST	6380	00	a004840	+			Store result
0079	SEL	0201						Output tape
0084	WR	6363	00					Write record
0089	TR	0029						Transfer to main routine
0104	SEL	0200						Input tape
0109	BSP							Backspace tape
0114	SUB	5002	03					Counter goes to +1, 0 and -1
0119	TRP	0039	03					To re-read
0124	HLT	0001						3rd read error.

PROBLEM 26. TRANSFER ANY TO DETECT END OF FILE AND READING ERRORS USING NORMALIZE AND TRANSFER COUNTER

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	02			a0	+	
0009	LOD	17003	02			a‡	+	Group mark
0014	UNL	19106	02			a‡	+	Unload group mark
0029	SET	0003	03			a000	+	Counter for normalize & transfer
0034	SEL	0200						Input tape
0039	RD	19000						Read record
0044	TRA	0604						0902 - EOF
0049								Main routine
0409	SEL	0400						Printer
0414	WR	19000	00					Write record
0419	TRA	0704						0902 - 0903 - EOF
0424								
				Input				
0604	TRS	0624						End of file
0609	SEL	0902						R/W check indicator
0614	TRS	0634						R/W error
0619	TR	0049						Continue main routine
0624	RWD							Rewind tape
0629	HLT	0001						
0634	SEL	0200						Input tape
0639	BSP							Backspace
0644	NTR	0039	03					To re-read
0649	HLT	0002						3rd read error
				Output				
0704	TRS							End of page
0709	SEL	0902						
0714	TRS							R/W error
0719	SEL	0903						
0724	TRS							P/P error.
0729	TR	0424						

PROBLEM 27. Page 1 of 2

I. SET
LOD
CMP
TRH
TRE

II. RAD
CMP
TRH
TRE

III.

RAD	4063	xxxxx.xx
SET	0008	oxxxxx.xx
LNG	0002	oxxxxx.xxoo
DIV	4067	xx.xxxx
RND	0001	xx.xxx
ST	4072	

IV. 1. If size of sum is longer than either operand when adding and subtracting.
2. Value of divisor is < or = same number of digits on left side of dividend.
3. Overflow when rounding.
Turn OFF by interrogating 0904 by Sel 0904 and Tr Sig instructions.

V. Store - Moves sign of accumulator with unit digit stored
Operates on only numerical part of characters
Checks position on left of high order digit stored. (If it is a number it is signed plus.)

Unload - Moves characters as they appear
Sign of accumulator has no effect.

VI.

R Add	Non-Numerical character in memory
Read (from tape)	Inter-record gap
Unload	"a" storage mark
Subtract	Non-Numerical character and storage mark
Write	00 Group Mark (01) memory position 19999 - 39999
Read (from card)	End of card
Store	"a" storage mark
Load	"a" storage mark
Read (from drum)	Drum mark
Compare	"a" mark
Multiply	"a" storage mark
ADD Memory (signed field)	Non-Numerical character
ADD Memory (unsigned field)	"a" storage mark
Transmit 00	R/M in units position of any five characters transmitted
Transmit 01-15	"a" storage mark

VII. Sum of number of digits in multiplier and multiplicand.

Difference between number of digits in divisor and dividend.

VIII.

		a0145638
RND	0004	a015
SET	0002	a15
LNG	0002	a1500

IX.

Tape (Write Status)	Reflective Spot
Tape (Read Status)	Tape Mark
Card Reader	Read Instruction following processing of last card
Printer	Hole in channel 12 of carriage tape
Drum	Attempting to read or write off drum

X. The zone bit structure over the tens and hundreds position of the address.

XI. Any end of file or check indicator will cause the Tr Any instruction to be effective.

XII. (a) When an invalid character is sensed when moving characters from memory to the record storage unit.

PROBLEM 28. LOW NUMBER SEARCH

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0005	00	a00000	+			Prepare accum. 5 positions
0009	LOD	5774	00					Load first number
0014	CMP	5779	00					Compare first and second number
0019	TRH	0039						If first number is high go to 0039
0024	CMP	5884	00					If low number compare to 3
0029	TRH	0059						If number is high go to 0059
0034	TR	0064						If number is low number is found
0039	LOD	5779	00					Load number 2
0044	CMP	5884	00					Compare 2 to 3
0049	TRH	0059						If number 2 is high, go to 0059
0054	TR	0064						If number 2 is low, go to 0064
0059	LOD	5884	00					Load number 3
0064	UNL	9004	00					Unload low number
0069	HLT	0001						Stop machine.

PROBLEM 29. INSTRUCTION MODIFICATION PROBLEM; ADDING 100 FACTORS.

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	RAD	1904	01			a0003	+	Constant 0003
0009	RAD	1908	02			a0006	+	Constant 0006
0014	RAD	1912	03			a1003	+	Address of first 3 digit total
0019	RAD	1916	04			a1306	+	Address of first 6 digit total
0024	RAD	1920	05			a1300	+	Address of last 3 digit total
1029	UNL	1039	03			a1003	+	Adjust to first 3 digit address
1034	UNL	1044	04			a1306	+	Adjust to first 6 digit address
1039	RAD	(1003)	00					3 digit total
1044	ADM	(1306)	00					3 digit total and 6 digit total
1049	CMP	1039	05					Comp. address of last 6 dig. total
1054	TRE	1074						Continue program
1059	ADM	1039	01					Increase r add address by 3
1064	ADM	1044	02					Increase add mem address by 3
1069	TR	1039						To repeat accumulation
1074								Continue program
4149	TR	1029						Repeat program.

PROBLEM 30. CHANGE TAPE ADDRESS ON END OF FILE

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	RAD	13069	00	a0201	+			
0009	UNL	0104	00	a201	+			Initialize input tape unit
0014	RAD	13073	00	a0202	+			
0019	UNL	0119	00	a0202	+			Initialize output tape unit
0024	SET	0002	02			a00	+	Set ASU 02 two places
0104	SEL	(0201)						Input tape unit
0109	RD	1000						Read record
0114	TRS	0204						End of file
0119	SEL	(0202)						Output tape unit
0124	WR	1000	00					Write record
0129	TRS	0304						End of file
0134	TR	0104						
0204	RWD							Rewind input tape
0209	IOF							Turn indicator off
0214	LOD	0104	02			a01	+	Low order position of address
0219	SUB	13065	02			a05	-	Subt from constant
0224	UNL	0104	02			a05	-	Unload in Sel address
0229	TR	0119						
0304	WTM							Tape mark on output tape
0309	RWD							Rewind tape
0314	IOF							Turn indicator off
0319	LOD	0119	02			a02	+	Low order positions of address
0324	SUB	13065	02			a04	-	Subt from constant
0329	UNL	0119	02			a04	-	Unload in Sel address.
0334	TR							

PROBLEM 31. NOP/TR SWITCH

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	1560	01			a‡	+	Group mark
0014	UNL	3034	01			a‡	+	
0019	SET	0003	02			a000	+	
0024	SET	0005	03			a00000	+	
0029	SEL	0200						Input tape unit
0034	RD	3001						Master record
0039	(NOP)	0114						Switch
0044	SEL	0100						Card reader
0049	RD	2021						Change card
0054	LOD	2025	03			a64027	+	Employee no.
0059	CMP	3005	03			a64027	+	Card vs. master
0064	TRH	0104						Tr to set switch
0069	TRE	0079						Tr to change rate
0074	HLT	0001						Unmatched card - stop
0079	RCV	3031						Get rate from card
0084	TMT	2026	02					Transmit to master
0089	SEL	0201						Output tape
0094	WR	3001	00					Master record
0099	TR	0029						To read another record
0104	SGN	0035	00	a&	+			Set switch to B
0109	TR	0089						To write master
0114	SGN	0035	00	a&	+			&
0119	ADM	0035	00	a&	+			Set switch to A
0124	TR	0059						To compare.

PROBLEM 32. NOP/TR SWITCH

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0001	01			a0	+	
0009	LOD	1563	01			a‡	+	Group mark
0014	UNL	4042	01			a‡	+	Put G/M at end of master record
0019	UNL	5034	01			a‡	+	Put G/M at end of detail record
0024	SET	0004	04			a0000	+	
0029	SEL	0200						Input tape
0034	RD	4001						Read master record
0039	(NOP)	0059						Switch 1
0044	SEL	0202						Detail input tape
0049	RD	5020						Read detail record
0054	LOD	5023	04			aB439	+	Detail product no.
0059	CMP	4004	04			aB439	+	Detail vs. master
0064	TRE	0089						Detail = master
0069	SGN	0069	03			a&	+	&
0074	ADM	0085	03			a&	+	Set switch 2 to No Op
0079	TRH	0129						Detail > master
0084	HLT	0001						Unmatched detail
0089	(NOP)	0109						Switch 2
0094	SGN	0085	03			a&	+	Set switch 2 to Tr
0099	ADM	0035	03			a&	+	Set switch 1 to No Op
0104	SEL	0201						Output tape
0109	WR	4001	00					Write master record
0114	SEL	0201						Output tape
0119	WR	5020	00					Write detail line
0124	TR	0044						To read another detail
0129	SGN	0035	03			a&	+	Set switch 1 to Tr
0134	TR	0029						To read master.

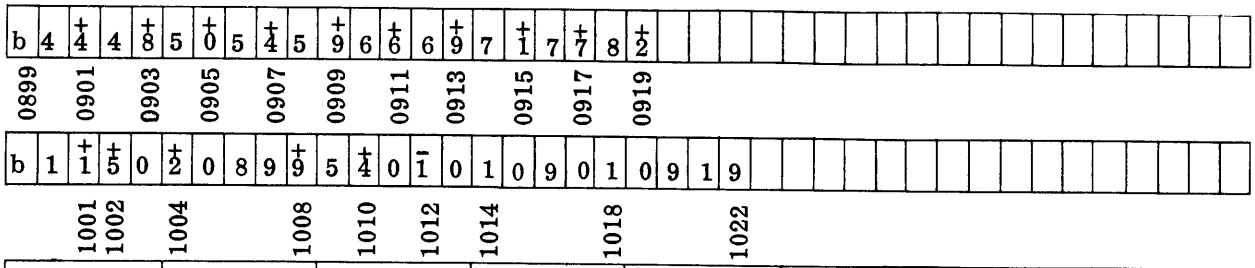
PROBLEM 33. DIGIT SELECTION; VARIABLE INTERVAL CODE

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0404	RAD	0910	01			a09	+	Code from trans. record
0409	CMP	0612	01			a09	+	01
0414	TRE	--						Sub routine for 01
0419	CMP	0614	01					04
0424	TRE	--						Sub routine for 04
0429	CMP	0616	01					09
0434	TRE	--						Sub routine for 09
0439	CMP	0618	01					26
0444	TRE	--						Sub routine for 26
0449	CMP	0620	01					34
0454	TRE	--						Sub routine for 34
0459	HLT	0001						Unmatched trans. record.

PROBLEM 34. DIGIT SELECTION; UNIFORM INTERVAL CODE

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	SET	0004	01			a0000	+	
0009	LOD	0917	01			a9979	+	Address of first code
0014	UNL	0034	01			a9979	+	Set transfer
0019	RAD	0910	00	a6	+			Code
0024	MPY	0913	00	a0030	+			x005
0029	ADM	0034	00					Adjust pivot address
0034	TR	(10009)						Transfer address
9979	TR	--						0 sub routine
9984	TR	--						1 sub routine
9989	TR	--						2 sub routine
9994	TR	--						3 sub routine
9999	TR	--						4 sub routine
10004	TR	--						5 sub routine
10009	TR	--						6 sub routine
10014	TR	--						7 sub routine.
10019	HLT	0001						8
10024	HLT	0002						9

PROBLEM 35. TABLE LOOK-UP



01	02	03	04	05	06	07	08
09	10	11	12	13	14	15	

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	RAD	1001	00	a11	+			Number of items plus one
0009	CMP	1014	00	a11	+			n to constant one
0014	TRH	0024	00					When n > one
0019	HLT	0001						If n = one
0024	MPY	1002	00	a055	+			n x 5
0029	RND	0001	00	a06	+			Round n
0034	ST	1001	00	a06	+			Store n for next try
0039	MPY	1004	00	a012	+			n x length of items
0044	ADD	1008	00	a0911	+			+ calculated address = address
0049	ST	1008	00	a0911	+			of first item. Address of first
0054	CMP	1018	00	a0911	+			item used to check if search is
								beyond limits of table
0059	TRH	0089						To compare against address of
								last item
0064	TRE	0099						To compare number when
0069	SGN	1004	01			a-	-	Calculated addr. is lower than
0074	SGN	1014	01			a&	+	the address of the first item
0079	ADM	1004	01			a&	+	sign length field plus
0084	TR	0004						TR to recalc. n address
0089	CMP	1022	00					Check if search is
								beyond limits of table
0094	TRH	0134						To change length to minus
0099	UNL	0109	00					Calc. address into load instr
0104	SET	0002	00					Prepare storage unit
0109	LOD	( )	00					Item at calc. address
0114	CMP	1010	00					Number searched for
0119	TRH	0134						To change length to minus
0124	TRE	0159						Number located
0129	TR	0069						To change length to plus
0134	SGN	1004	01			a&	+	Change sign of
0139	SGN	1012	01			a-	-	Length field
0144	ADM	1012	01					to minus
0149	ADM	1004	01					
0154	TR	0004						Repeat.

PROBLEM 36. SALES DISCOUNT PROBLEM (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
007		SET	1	1	
008		LOD	1	(≠)	
009		UNL	1	GM	
010		SET	6	6	
020		LOD	6	(+010000)	
030	RD RCD	SEL		200	
040		RD		SALES RCD	
050		CMP	6	GR SALES	
060		TRH		LODISC	Sales below 100.00
070		TRE		LODISC	
080		RAD		(+03)	
090		TR		CALC	
100	LODISC	RAD		(+02)	
110	CALC	ST		DISC %	
120		MPY		GR SALES	
130		RND		2	
131		SET		5	
140		ST		DISC AMT	
150		RSU		DISC AMT	
160		ADD		GR SALES	
170		ST		NET SALES	
180		SEL		201	
190		WR		SALES RCD	
200		TR		RD RCD	
210					
220	SALES RCD	DRCD			
230	INV NO		6		
240	DATE		5		
250	CUST NAME		33		
010	GR SALES		6		
020	DISC %		2		
030	DISC AMT		5		
040	NET SALES		6		
050	GM		1		

PROBLEM 37. STORE FOR PRINT (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
009		SET	1	1	
010		LOD	1	(.)	
020		UNL	1	OUCOST -4	
030		UNL	1	OVALUE -3	
040		SET	15	30	
050		SET	6	6	
060	MAIN RT	SEL		200	
070		RD		INPUT RCD	
080		LOD	1	(,)	
090		UNL	1	OVALUE -7	
100		UNL	1	OVALUE -11	
110		RCV	6	OCODE	
120		TMT	6	ICODE	
130		RCV	15	ODESCR	
140		TMT	15	IDESCR	
150		RAD		IQTY	
160		SPR		OQTY	
170		MPY		IUCOST	To get value
180		RND		1	
190		SPR		OVALUE	
200		RAD		IUCOST	
210		SPR		OUCOST	
220		SEL		200	
230		RWW		INPUT RCD	
240		SEL		201	
250		WR		OUTPUT RCD	
260		TR		MAIN RT	
010	INPUT RCD	DRCD			
020	ICODE		6		
030	IDESCR		30		
040	IQTY		5		
050	IUCOST		5		
060	OUTPUT RCD	DRCD			
070	O CODE		7		
080	ODESCR		31		
090	OQTY		6		
100	OUCOST		7		
110	OVALUE		13		
120		DCON			
130	GM		1	‡	

PROBLEM 38. ALTERNATOR (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
010	INITIAL	SGN		(-1)	Restore alternator
020		SGN		(-5)	constant to minus
030		ADM		(-5)	
040		ADM		(-1)	
050	RD RCD	SEL		200	
060		RD		PAY RCD	
070		SEL		902	
080		TRS		902 ERR	
090					Normal Routine
100	902 ERR	SEL		200	
110		BSP			
120		RSU		(-1)	
130		ST		(-1)	
140		TRP		RD RCD	
150		HLT		1111	
160		TR		INITIAL	
170					
180					
190					
200					
210					
220					
230					
240					
250					

PROBLEM 39. WRITE AND ERASE (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
008		SET	4	4	
009		SET	2	2	
010		SET	15	20	
019		SET	1	1	
020	BEGIN RT	SEL		200	
021		RD		INPUT RCD	
022		LOD	1	(.)	
030		UNL	1	PSALES -2	
031		LOD	1	(∓)	
032		UNL	1	GM	
040		RAD		ISALES	
050		SPR		PSALES +1	
060		RCV	15	PSALESMAN	
070		TMT	15	ISALESMAN	
080		LOD	4	ISTATE	State & district
090		CMP	4	(0000)	Previous district & state
100		TRE		PRINT	Same district & state
110		TRH		NEW STATE	
120		HLT		1111	Error
130	NEW STATE	LOD	2	ISTATE	
140		UNL	2	(0000)	
150		UNL	2	PSTATE	
160		LOD	2	IDISTR	
170		CMP	2	(0000) -2	Previous district
180		TRE		PRINT	Same district
190		UNL	2	(0000) -2	District
200		UNL	2	PDISTR	
210	PRINT	SEL		400	
220	OFLOW	WRE		PRINT RCD	
230		TR		BEGIN RT	
010	INPUT RCD	DRCD			
020	IDISTR		2		
030	ISTATE		2		
040	ISALESMAN		20		
050	ISALES		7		
060	PRINT RCD	DRCD			
069	CTRL CHAR		1		
070	PDISTR		2		
080			3		
090	PSTATE		2		
100			3		
110	PSALESMAN		20		
120			3		
130	PSALES		8		
140			1		
150	GM		1		

PROBLEM 40. CARRIAGE CONTROL (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
011		RAD	5	(+0)	
012		RAD	6	(+1)	
201		UNL	5	CTRL CHAR	For double space
211		TRS		CARCON	
240	CARCON	UNL	6	CTRL CHAR	For skipping
250		IOF			
260		TR		OFLOW	

PROBLEM 41. NORMALIZE AND TRANSFER (AUTOCODER SOLUTION)

LINE	TAG	OPERATION	NUM.	OPERAND	COMMENTS
009		SET	1	1	
010		LOD	1	($)	
020		UNL	1	OUTPUT -8	
030		LOD	1	(.)	
040		UNL	1	OUTPUT -3	
050		LOD	1	(*)	
060		RAD	7	(+0001)	
070		SET		4	
080		LOD		ADDR $	Restore control
090		UNL		CALC ADDR	
100		SET	6	6	
110		LOD	6	INPUT	
120	NORMALIZE	NTR	6	ADDR ADJ	
130	PRINT	SPR	6	OUTPUT	
131		TR			Continue Main Routine
140	ADDR ADJ	ADM.	7	CALC ADDR	
150		LOD		CALC ADDR	Adjusted * address
160		UNL		PLACE ADJ	
170	PLACE ADJ	UNL	1		
180		CMP		CTRL ADDR	
190		TRE		PRINT	
200		TR		NORMALIZE	
210	ADDR $	LACON	1	OUTPUT	
220	ADDR *	LACON		OUTPUT +4	
230		DCON			
240	CALC ADDR		4	0000	
250	INPUT	DRCD	6		
260	OUTPUT	DRCD	9		