IBM
TRADE MARK

ELECTRONIC DATA-PROCESSING MACHINES

SOLUTIONS TO

TYPE 705 PRACTICE PROBLEMS

| | | A | E | 4 | 9 | 8 | 2 | 0 | 6 | 9 | 7 | 2 | 9 | 8 | 6 | 0 | 4 | 1 | 1 | 5 | ‡ | | | | | | | | | | | | | | |

| 1201 | Emp. No. | 1205 | | S. S. No. | | 1214 | w h cl | 1216 | Rate | 1219 | 1220 |

| 2 | 0 | 1 | 0 | 0 | Y | 1 | 2 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | R | 1 | 2 | 0 | 1 | 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		STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
	OPER.	ADDRESS						
0004	Sel	0100						Select card reader #1
0009	Read	1201						Read card into memory
0014	Sel	0200						Select tape unit #1
0019	Write	1201	00					Write record on tape
0024	Tr	0004						Transfer to start.

| | | A | 4 | 3 | 2 | - | 1 | G | E | N | E | R | A | T | O | R | b | b | b | 1 | 2 | 3 | 0 | 0 | 3 | 9 | 5 | 0 | ‡ | | | | | | |

| 7001 | Part No. | 7006 | | Description | | 7018 | Quan | 7021 | | Cost | | 7027 | 7028 |

| 2 | 0 | 2 | 0 | 0 | Y | 7̄ | 0 | 0 | 1 | 2 | 0 | 3 | 0 | 0 | R | 7̄ | 0 | 0 | 1 | 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		STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
	OPER.	ADDRESS						
0004	Sel	0̄200						Select tape unit #1
0009	Read	7001						Read tape record into memory
0014	Sel	0300						Select card punch #1
0019	Write	7̄001	00					Punch record in card
0024	Tr	0004						Transfer to start.

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

| 1001 | Name | | 1016 Customer Number | | 1023 Amount | | 1029 1030 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

01	02	03	04	05	06	07	08

| 09 | | 10 | 11 | 12 | 13 | 14 | | 15 |

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0100						Select card reader #1
0009	Read	1001						Read card into memory
0014	Sel	0200						Select tape unit #1
0019	Write	1001	00					Write complete record on tape
0024	Sel	0400						Select printer #1
0029	Write	1017	00					Print partial record on printer
0034	Tr	0004						Transfer to start.

| b | 0 | 7 | 3 | 2 | †1 | 0 | 3 | 2 | 1 | 1 | 5 | 0 | +0 | b | b | b | b | b | b | b | b | ‡ | | | | | | | | | | | | |

| 7000 A | 7005 B | 7012 T | 7019 7020 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| 09 | | 10 | 11 | 12 | 13 | 14 | | 15 |

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0200						Select tape unit #1
0009	Read	7001						Read record into memory
0014	R Add	7005	00	a07321	+			Reset add factor A
0019	Add	7012	00	a0328471	+			Add factor B to produce T
0024	Store	7019	00	a0328471	+			Store T in memory
0029	Sel	0201						Select tape unit #2
0034	Write	7001	00					Write record on tape
0039	Tr	0004						Transfer to start.

5	5	4	7	5	0	3	1	5	2	5	0	2	4	5	0	0	5	0	5	0	b	b	b	b	b	b	‡												

3988 Emp. No.   3992 Base Pay   3998 O'time Pay   4003 Ded.   4008 Net Pay   4014 4015

	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	Read	3988						Read record into memory
0014	R Add	3998	01			a031525	+	Reset add base pay
0019	Add	4003	01			a033975	+	Add overtime pay
0024	Subt	4008	01			a028925	+	Subtract deductions
0029	Store	4014	01			a028925	+	Store net pay
0034	Sel	0201						Select tape unit #2
0039	Write	3988	00					Write record on tape
0044	Tr	0004						Transfer to start.

b	1	4	0	0	4	4	5	b	b	b	b	b	b	b	b	‡																						

0705 A   0708 B   0712 P   0719 0720

	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	0203						Select input tape unit
0009	Read	0706						Read record into memory
0014	R Add	0708	00	a140	+			Reset add A (rate) multiplier
0019	Mpy	0712	00	a0062300	+			Multiply by B (total hours)
0024	Store	0719	00	a0062300	+			Store product in memory
0029	Sel	0200						Select output tape unit
0034	Write	0706	00					Write record on tape
0039	Tr	0004						Transfer to start

| 5 | T | 8 | 1 | 3 | A | 0 | 2 | +1 | 0 | 1 | 6 | +9 | 1 | 5 | +9 | b | b | b | b | b | b | b | b | b | b | b | b | b | ‡ | | | | | | | | | |

0403 Part No.	0408 Quan 0411	Unit Cost	0416 As 0418 Rq	Qty Req	0423 Total Cost	0429 0430

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0200						Select tape unit #1
0009	Read	0403						Read record into memory
0014	R Add	0418	00	a59	+			Reset add assemblies required
0019	Mpy	0411	00	a01239	+			Multiply by Qty per assembly
0024	Store	0423	00					Store result in memory
0029	Mpy	0416	00	a0002095149	+			Multiply by unit cost
0034	Round	0001	00	a000209515	+			Round and 1/2 adj. one place
0039	Set L	0006	00	a209515	+			Adjust acc. to 6 positions
0044	Store	0429	00					Store result
0049	Sel	0201						Select tape unit #2
0054	Write	0403	00					Write record on output tape
0059	Tr	0004						Transfer to step 0004.

| J | O | H | N | b | J | . | b | D | O | E | b | 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 | ‡ | | 1 | 3 | 0 | 0 | 1 | 8 | | | | | | | |

9055 Net Pay	9060 9061	0500 Exem Amt.	0503 % 0505

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0200						Select input tape unit
0009	Read	9015						Read record into memory
0014	R Add	9040	00	a425	+			R add hours worked - multiplier
0019	Mpy	9037	00	a0657475	+			Multiply by rate per hour
0024	Round	0002	00	a06575	+			Round
0029	Store	9055	00					Store gross pay
0034	R Add	9033	00	a3	+			R add tax class
0039	Mpy	0503	00	a03900	-			Multiply by exemption amount
0044	Add	9055	00	a02675	+			Add gross = taxable amount
0049	Mpy	0505	00	a0048150	-			Multiply by 18%
0054	Round	0002	00	a00482	-			Round
0059	Store	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	Store	9060	00	a05073	+			Store net pay
0079	Sel	0201						Select output tape unit
0084	Write	9015	00					Write record on tape
0089	Tr	0004						Transfer to start.

b		1	7	6	0	8	+5	2	+1	b	b	b	‡																							

6020   A   6026 B   6028   Q   6031   6032

	01		02		03		04		05		06		07		08

	09		10		11		12		13		14		15

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0200						Select input tape unit
0009	Read	6021						Read record into memory
0014	R Add	6026	00	a176085	+			Reset and add factor A
0019	Div	6028	00	a8385	+			Divide by B
0024	Round	0001	00	a839	+			Round
0029	Store	6031	00					Store Q
0034	Sel	0201						Select output tape unit
0039	Write	6021	00					Write record on output tape
0044	Tr	0004						Transfer to start.

0	3	2	6	1	+5	1	1	0	0	+0	9	0	+0	b	b	b	‡																			

1285 Part No.   1290 Qty Rec.   1294 Qty Acc.   1297 %   1300 1301

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Sel	0200						Select input tape unit
0009	Read	1285						Read record into memory
0014	R Add	1297	00	a900	+			R add qty accepted - dividend
0019	Set L	0004	00	a0900	+			Prepare dividend
0024	Leng	0004	00	a09000000	+			Lengthen
0029	Div	1294	00	a8181	+			Divide = % accepted
0034	Round	0001	00	a818	+			Round
0039	Store	1300	00					Store % accepted
0044	Sel	0201						Select output tape unit
0049	Write	1285	00					Write record on output tape
0054	Tr	0004						Transfer to start.

	Memory	Accumulator Before	Acc. Sign	Accumulator After	Acc. Sign	
ADD	$\overset{\ddagger}{3}26\overset{\ddagger}{5}$	a55	+	a320	+	
	$b7\overset{\ddagger}{9}$	a33	+	a112	+	Overflow Check Ind.
	A650	a320	-	a330	+	Sign Check Ind.
SUB	$\overset{\ddagger\ddagger}{6}327\overset{\ddagger}{6}$	a200	+	a076	-	
	b38	a38	+	a00	+	Sign Check Ind.
	$A8\overset{\ddagger}{7}$	a14	-	a101	-	Overflow Check Ind.
R ADD	$\overset{\ddagger}{3}72\overline{1}$	a0	+	a721	-	
	$AB12\overset{\ddagger}{4}$	a91	-	a124	+	
	b318	aCA4	-	a318	+	Sign Check Ind.
R SUB	A127	a0	+	a127	-	Sign Check Ind.
	$\overset{\ddagger}{6}32\overline{2}$	a1279	-	a322	+	
	$\overset{\ddagger}{1}83765\overset{\ddagger}{3}$	a6273	+	a837653	-	
MPY	$\overset{\ddagger}{5}2\overset{\ddagger}{5}$	a4	+	a100	+	
	b330	a02	-	a00660	-	Sign Check Ind.
	$\overset{\ddagger}{5}\overline{5}$	a6	-	a30	+	
DIV	$\overset{\ddagger}{2}2\overset{\ddagger}{2}$	a088	-	a4	-	
	$b2\overset{\ddagger}{0}$	a600	+	a0	+	Overflow and Zero Ind.
	$A\overset{\ddagger}{5}$	a0295	+	a059	+	
STORE	$37\overset{\ddagger}{2}9\overset{\ddagger}{8}$	a22	-	Memory After $37\overset{\ddagger}{2}2\overline{2}$		
	$65\overline{4}\overset{\ddagger}{2}\overset{\ddagger}{1}$	a321	+	$6\overline{5}32\overset{\ddagger}{1}$		
	ABC215	a216	+	$ABC21\overset{\ddagger}{6}$		

| B | 9 | 7 | 6 | 5 | 3 | 2 | 7 | 0 | 3 | 7 | 5 | 0 | ‡ | | | | | | | | A | - | 1 | 2 | 3 | | | | | | | | | |

| 9541 Part No. | 9545 Part Loc. | 9548 Unit Cost | 9553 9554 | | 3000 Part No. | 3004 |

A-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 L	0005	01					Housekeeping
0009	Load	3̄004	01			A-123	+	Load the constant part number
0014	Sel	0200						Sel input tape unit
0019	Read	9̄541						Read tape record
0024	Comp	9̄545	01					Compare constant vs. record
0029	Tr Hi	0044						Constant higher than record
0034	Tr Eq	0059						Constant equal to record
0039	Stop	0001						Constant lower than record
0044	Sel	0201						Sel output tape unit
0049	Write	9̄541	00					Write record on tape
0054	Tr	0014						Transfer to start
0059	Sel	0400						Sel printer
0064	Write	9̄541	00					Write the record on printer
0069	Tr	0014						Transfer to start

1	2	3	4	5	+	0	1	6	0	0	0	+	0	0	0	5	0	0	+	b	b	b	b	b	‡														

5500 Part No.	5504 Total Cost	5510 Total Qty.	5515 Unit Cost	5520 5521

01	02	03	04	05	06	07	08

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INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01–15	SIGN	EXPLANATION	
0004	Set L	0005	02			a00000	+	Prepare ASU 2	
0009									
0034	Sel	0200						Input tape unit	
0039	Read	5500						Read record into memory	
0044	Comp	5504	02					Comp part no. to previous	
0049	Tr Hi	0109						Part no. out of sequence	
0054	Tr Eq	0109						Part no. out of sequence	
0059	Load	5504	02					Load part no. for next comp.	
0064	R Add	5510	00	a016000	+			Total cost	
0069	Set L	0009	00	a000016000	+			Adjust dividend	
0074	Leng	0002	00	a00001600000	+			Adjust dividend	
0079	Div	5515	00	a000320	+			Div by qty for unit cost	
0084	Round	0001	00	a00032	+			Adjust quotient	
0089	Store	5520	00					Store unit cost	
0094	Sel	0201						Select output tape	
0099	Write	5500	00					Write record	
0104	Tr	0034						Tr to start	
0109	Sel	0400						Select printer	
0114	Write	5500	00					Write record	
0119	Tr	0034						Tr to start	

10

01	02	03	04	05	06	07	08

09	10		11	12	13	14	15

| INSTR. LOCATION | INSTRUCTION | | STOR. CODE | ACCUMULATOR 00 | SIGN | AUXILIARY STORAGE 01-15 | SIGN | EXPLANATION |
	OPER.	ADDRESS						
0004	Set L	0001	01					
0009	Load	0180	01					Group mark
0014	Unload	9022	01					Put G/M in output record
0034	Sel	0200						Input tape
0039	Read	9000						Read record
0044	Tr Sig	0094						To end of file routine
0049	R Add	9013	00	a0050	+			Unit cost
0054	Mpy	9009	00	a00006250	+			X quantity = total cost
0059	Store	9021	00					Store total cost
0064	Sel	0201						Output tape
0069	Write	9000	00					Write record
0074	Tr	0034						Transfer to main routine
0094	Ctrl	0002						Rewind input tape
0099	Sel	0201						Output tape
0104	Ctrl	0001						Tape mark output tape
0109	Ctrl	0002						Rewind output tape
0114	Sel	0500						Typewriter
0119	Write	0156	00					Message to operator
0124	Stop	0001						

01	02	03	04	05	06	07	08

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INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0001	01					
0009	Load	2000	01					Group mark
0014	Unload	2̄092	01					Put G/M in output record
0034	Sel	0200						Input tape
0039	Read	2̄073						Read record
0044	Tr Sig	0099						End of file
0049	R Add	2̄084	00	a076325	+			R Add year to date issues
0054	Set L	0007	00	a0076325	+			Adjust dividend
0059	Div	2̄086	00	a38162	+			Ytd issues ÷ mo. = mon. usage
0064	Store	2̄091	00					Store result
0069	Sel	0201						Output tape
0074	Write	2̄073	00					Write record
0079	Tr Sig	0129						End of file
0084	Tr	0034						
0099	Ctrl	0002						Rewind input tape
0104	Sel	0201						Output tape
0109	Ctrl	0001						Record T. M. output tape
0114	Ctrl	0002						Rewind output tape
0119	Stop	0001						End of job
0129	Ctrl	0001						Record T. M. output tape
0134	Ctrl	0002						Rewind output tape
0139	Stop	0002						End of tape. Put new reel on

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0001	01			a0		Prepare ASU 01
0009	Load	1505	01			a‡	+	Group mark
0014	Unload	2060	01					Put group mark in output record
0034	Sel	0200						Input tape unit
0039	Read	6000						Read record
0044	RCV	1564						Designate output area
0049	Tsmt	6004	00					Transmit to output area
0054	Sel	0201						Output tape unit
0059	Write	1560	00					Write record
0064	Tr	0034						Tr to start of main routine.

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0004	13					Prepare ASU 13
0009	Set L	0007	14					Prepare ASU 14
0014	Set L	0001	15					Prepare ASU 15
0019	Load	0905	15			a‡	+	Group mark
0024	Unload	6227	15					Put G/M at end of output area
0064	Sel	0200						Input tape unit
0069	Read	1017						Read record
0074	RCV	6212						Designate output field C
0079	Tsmt	1028	13					Transmit field C
0084	Tsmt	1017	13					Transmit field A
0089	Tsmt	1021	14					Transmit field B
0094	Sel	0201						Output tape
0099	Write	6212	00					Write record
0104	Tr	0064						Tr to start of main routine

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0004	06					Prepare ASU 06
0009	Set L	0001	07					Prepare ASU 07
0014	Load	0̄000	07			a ‡	+	Group mark
0019	Unload	5065	07					Put G/M at end of output record
0024	Unload	9̄370	07					Put G/M at end of variation record
0029	Set L	0005	05					Prepare ASU 05
0099	Sel	0200						Input master tape
0104	Read	6̄035						Read record
0109	Sel	0201						Input variation tape
0114	Read	9̄361						Read record
0119	Load	9̄365	05					Load employee no.
0124	Comp	6̄039	05					Comp employee numbers
0129	Tr Eq	0154						Transfer on equal
0134	Tr Hi	0164	00					Transfer on high
0139	Sel	0500						Select typewriter
0144	Write	9̄361	00					Write variation record
0149	Tr	0099						Transfer
0154	RCV	6̄040						Designate master rate field
0159	Tsmt	9̄366	06					Transmit rate
0164	RCV	5054						Designate output work area
0169	Tsmt	6̄039	00					Transmit master record
0174	Sel	0202						Select output tape
0179	Write	5050	00					Write record
0184	Tr	0099						Transfer to start

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0001	01			a 0	+	Prepare ASU 01
0009	Load	1505	01			a ‡	+	Group mark
0014	Unload	2̄060	01					Put G/M in output record
0019	Sel	0200						Input tape unit
0024	Read	6000						Read first record
0034	RCV	1̄584						Designate output work area
0039	Tsmt	6004	00					Transmit to output work area
0044	Sel	0200						Input tape unit
0049	R/W	6000						Prepare to read while writing
0054	Sel	0201						Output tape unit
0059	Write	1̄580	00					Read and write simultaneously
0064	Tr	0034						Transfer to main routine.

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 L	0003	12					Prepare ASU 12
0009	Set L	0005	13					Prepare ASU 13
0014	Set L	0006	14					Prepare ASU 14
0019	Set L	0001	01					Prepare ASU 01
0024	Load	2005	01			a ‡	+	Group mark
0029	Unload	5̄088	01					Put G/M in output record
0034	Sel	0200						Input tape
0039	Read	1000						Read first record
0084	RCV	5̄063						Designate payroll no. output
0089	Tsmt	1̄000	12					Transmit payroll no. to output
0094	RCV	5̄068						Designate emp. no. output
0099	Tsmt	1003	14					Transmit emp. no to output
0104	RCV	5̄076						Designate ins. output
0109	Tsmt	1009	13					Transmit ins. to output
0114	RCV	5̄083						Designate adv. output
0119	Tsmt	1014	13					Transmit adv. to output
0124	Sel	0200						Input tape
0129	R/W	1000						Prepare to read while write
0134	Sel	0201						Output tape
0139	Write	5̄063	00					R/W simultaneously
0144	Tr	0084						Transfer to main routine.

Memory		Acc. Storage Before	Acc. Sign		Acc. Storage After	Acc. Sign	Check Indicators
ADD	$\overset{+}{6}\overset{+}{5}73$	a61	−		a512	+	
	b82V	a134	+		a959	+	Sign Check
	$\overset{+}{6}2\overset{-}{2}43$	a3765	+		1522	+	
SUB	A827	a28	−		a855	−	Sign Check
	$\overset{+}{7}3\overset{+}{7}6$	a12781	+		a12405	+	
	$\overset{+}{7}32\overset{-}{7}4$	a3274	−		a0000	+	
R ADD	b83S	a7215	−		a832	+	Sign Check
	K37$\overset{+}{5}$	a16	+		a375	+	
	$\overset{+-}{5}43\overset{-}{8}1$	a9654	+		a381	−	
R SUB	$\overset{+}{4}2\overset{-}{1}$	a521	+		a21	+	
	b$\overset{-}{5}$38X	a151	−		a387	−	Sign Check
	$\overset{+}{5}3\overset{+}{7}43$	a9	+		a3743	−	
MPY	$\overset{-}{5}6\overset{-}{0}$	a5	−		a300	+	
	D12$\overset{+}{0}$	a003	+		a000360	+	
	b15	a325	−		a04875	−	Sign Check
DIV	$\overset{+}{7}\overset{+}{6}5$	a70	+		a70	+	Zero indicator
	b$\overset{+}{5}$	a075	+		a15	+	
	b$\overset{\pm}{5}$	a75	+		a0	+	Overflow and Zero Check
	A9	a81	+		a9	+	Sign Check
LOAD	A3$\overset{+}{6}$	a9	−		a$\overset{+}{6}$	+	
	DOEbJ	a65431	+		aDOEbJ	+	
	$\overset{-}{5}63AB\overset{+}{5}$	a32761	+		a$\overset{-}{6}3AB\overset{+}{5}$	+	

	Accumulator Storage	Acc. Sign	Memory Before	Memory After
STORE	a37	-	$6\overset{+}{4}33\overset{+}{8}2$	$6\overset{+}{4}3\overset{+}{3}3\overset{-}{7}$
	a37982	+	$\overset{+}{A}6\overset{+}{5}21\overset{+}{3}A$	$A\overset{+}{6}3798\overset{+}{2}$
	a21	+	$DOEb1\overset{+}{5}$	$DOEb2\overset{+}{1}$
	a7	-	$bA76532$	$bA765\overset{+}{3}\overset{-}{7}$
UNLOAD	a219	+	$bAB560\overset{+}{0}$	$bAB5219$
	aDOEbJ	+	$DOEbM5\overset{-}{6}$	$DODOEbJ$
	a15	-	$\overset{+}{7}7B4\overset{-}{6}8\overset{-}{1}$	$\overset{+}{7}7B4\overset{-}{6}15$

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	-

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	Z SIGN	AUXILIARY STORAGE 01-15	Z SIGN	EXPLANATION
0004	Set L	0001	01			a0	+	
0009	Load	1013	01			a‡	+	Group mark
0014	Unload	$\overline{2061}$	01					Put G/M in output record
0019	Set L	0004	02			a0000	+	4 zeros for no W.H.
0024	Set L	0003	03			a000	+	3 zeros for no FICA
0029	Sel	0200						Input tape
0034	Read	1150						Read first record
								Transmit record to output area
0039	RCV	$\overline{2024}$						Designate output area
0044	Tsmt	1154	00					Transmit to output area
								Test for withholding tax
0049	R Add	$\overline{2027}$	00	a5	+			Tax class
0054	Mpy	1003	00	a06500	-			Tax class x 13.00 = exmpt. amt.
0059	Add	$\overline{2048}$	00	a12075	+			Gross - exmpt. amt.=tax. gross
0064	Tr Pls	0079	00					To calc. withholding tax
0069	Store	$\overline{2052}$	02					No withholding tax - put 4 zeros in output
0074	Tr	0104						To test for FICA
								Calc. withholding tax
0079	Mpy	$\overline{1005}$	00	a0217350	+			Taxable amt. x 18% w. h. tax
0084	Round	0002	00	a02174	+			Adjust to nearest cent
0089	Set L	0004	00	a2174	+			Adjust to 4 places
0094	Store	$\overline{2052}$	00					Put w. h. tax in output record
0099	Add Mem	$\overline{2039}$	00					Adjust y. t. d. w. h. tax
								Test for FICA
0104	R Add	1012	00	a420000	+			42000
0109	Subt	$\overline{2033}$	00	a005000	+			Y. t. d. gross
0114	Tr Pls	0129	00					To test for partial FICA
0119	Store	$\overline{2055}$	03					No FICA - put 3 zeros in output
0124	Tr	0179						To calc. net pay
0129	Subt	$\overline{2048}$	00	a013575	-			Gross
0134	Tr Pls	0149	00					To full FICA calc.
								Partial FICA calc.
0139	Add	$\overline{2048}$	00	a005000	+			Add back gross
0144	Tr	0154						To multiply by 2%

INSTR. LOCATION	INSTRUCTION		STOR. CODE	ACCUMULATOR 00	Z SIGN	AUXILIARY STORAGE 01-15	Z SIGN	EXPLANATION
	OPER.	ADDRESS						
								Full FICA calc.
0149	R Add	$\bar{2}$048	00	a18575	+			Gross
0154	Mpy	1006	00	a0010000	+			Gross x 2% = FICA
0159	Round	0002	00	a00100	+			Adjust FICA to nearest cent
0164	Set L	0003	00	a100	+			Adjust to 3 places
0169	Store	$\bar{2}$055	00					Put FICA in output record
0174	Add Mem	$\bar{2}$043	00					Adjust y.t.d. FICA
								Calc. net pay
0179	R Add	$\bar{2}$048	00	a18575	+			Gross
0184	Add Mem	$\bar{2}$033	00					Adjust y.t.d. gross
0189	Subt	$\bar{2}$052	00	a16401	+			Withholding tax
0194	Subt	$\bar{2}$055	00	a16301	+			FICA
0199	Store	$\bar{2}$060	00					Put net pay in output record
								Write record
0204	Sel	0200						Input tape
0209	R/W	1150						Prepare input to read
0214	Sel	0201						Output tape
0219	Write	$\bar{2}$020	00					Write record and read simul.
0224	Tr Sig	0284						End of output tape
0229	Sel	0200						Sel Input tape unit
0234	Tr Sig	0344						End of input file
0239	Tr	0039						Transfer to start
0284	Ctrl	0001						Tape mark on output tape
0289	Ctrl	0002						Rewind output tape
0294	STOP	0001						Stop
0299	Tr	0229						Transfer to Sel input tape
0344	Ctrl	0002						Rewind input tape
0349	Sel	0201						Select output
0354	Ctrl	0001						Tape mark on output tape
0359	Ctrl	0002						Rewind output tape
0364	STOP	0002						End of job

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

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	N Z SIGN	AUXILIARY STORAGE 01-15	N Z SIGN	EXPLANATION
0004	Set L	0001	01					
0009	Load	5013	01			a ‡		Group mark
0014	Unload	2190	01					Put G/M at end of record
0019	R Add	5008	02			a0014	+	Constant 0014
0024	R Add	5004	04			a2007	+	Address of first shop order no.
0029	Set L	0004	05			a0000	+	
0034	Set L	0007	06			a0000000	+	
0039	Sel	0100						Card reader
0044	Read	4001						Read a card
0049	Load	4016	05			a1206	+	Shop order suffix no.
0054	Unload	0064	05					Adjust sel. instr. for reading
0059	Unload	0134	05					Adjust sel. instr. for writing
0064	Sel	(1206)						Drum section
0069	Read	2001						Read drum section
0074	Load	4012	06			aQR7170B	+	Shop Order no. from card
0079	Comp	(2007)	06					To shop order no. from drum
0084	Tr Eq	0109						Shop Order no. located
0089	Tr Hi	0099						Try next shop order no.
0094	Stop	0001						Wrong section
0099	Add Mem	0079	02					Adjust comp. instruction
0104	Tr	0079						To comp. next shop order no.
0109	Load	0079	05			a(2021)	+	Address of eq. shop order no.
0114	Add	5012	05			a(2028)	+	Address of cost amt.
0119	Unload	0129	05					Adjust
0124	R Add	4021	00	a0941	+			Cost from card
0129	Add Mem	(2028)	00					Adjust cum. shop order cost
0134	Sel	(1206)						Drum section
0139	Write	2001	00					Write back on drum
0144	Unload	0079	04					Reset comp. address
0149	Tr	0039						To read another card.

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

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	R Add	1533	01			a10	+	Constant 10
0009	R Add	1537	02			a1014	+	Drum section address
0014	Sel	(1014)						Drum section
0019	Read	7750						Each group of drum instructions
0024	Tr	7754						To program from drum
								Program from drum
7754	Add Mem	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	Unload	0014	02					Reset select instruction
								to address of first
								drum section used
9744	Tr	0014						To select and read first drum
								section.

01	02	03	04	05	06	07	08

09	10	11	12	13	14	15

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	Z SIGN	AUXILIARY STORAGE 01-15	Z SIGN	EXPLANATION
0004	Set L	0001	01					
0009	Load	1004	01					Group mark
0014	Unload	8031	01					Put G/M at end of record
0029	R Add	1002	02			a2	+	Place 2 in ASU 02
0034	Sel	0200						Input tape
0039	Read	8014						Read record
0044	Sel	0902						R/W indicator
0049	Tr Sig	0104						Tr on error
0054	R Add	8025	00	a03	+			Commission %
0059	Mpy	8023	00	a000112950	+			% x sales amt. = comm. amt.
0064	Round	0002	00	a0001130	+			Adjust to nearest cent
0069	Set L	0005	00	a01130	+			Prepare for storing
0074	Store	8030	00					Store result
0079	Sel	0201						Output tape
0084	Write	8014	00					Write record
0089	Tr	0029						Transfer to main routine
0104	Sel	0200						Input tape
0109	Ctrl	0004						Backspace tape
0114	Subt	1003	02			a1	+	Count re-read
0119	Tr Pl	0039	02					To re-read
0124	Stop	0001						3rd read error.

| INSTR. LOCATION | INSTRUCTION | | STOR. CODE | ACCUMULATOR 00 | Z/SIGN | AUXILIARY STORAGE 01-15 | Z/SIGN | EXPLANATION |
	OPER.	ADDRESS						
0004	Set L	0001	02					
0009	Load	7003	02					Group mark
0014	Unload	9106	02					
0029	Set L	0003	03			a000	+	Counter for normalize & transfer
0034	Sel	0200						Input tape
0039	Read	9000						Read record
0044	Tr Any	0604						To sub-routine
0049								Main routine
0409	Sel	0400						Printer
0414	Write	9000	00					Write record
0419	Tr Any	0704						To sub-routine
0424								
				Input				
0604	Tr Sig	0624						End of file
0609	Sel	0902						R/W check indicator
0614	Tr Sig	0634						R/W error
0619	Tr	0049						Continue main routine
0624	Ctrl	0002						Rewind tape
0629	Stop	0001						
0634	Sel	0200						Input tape
0639	Ctrl	0004						Backspace
0644	Norm Tr	0039	03					To re-read
0649	Stop	0002						3rd read error
				Output				
0704	Tr Sig							End of page
0709	Sel	0902						
0714	Tr Sig							R/W error
0719	Sel	0903						
0724	Tr Sig							P/P error
0729	Tr	0424						

I.   Set L
        Load
        Comp
        Tr Hi
        Tr Eq

II.   R Add
        Comp
        Tr Hi
        Tr Eq

III.   R Add   4063   XXXXX. XX
        Set L   0008   OXXXXX. XX
        Leng   0002   OXXXXX. XXOO
        Div   4067   XX. XXXX
        Round   0001   XX. XXX
        Store   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 signs if 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) 20,000 memory position
        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

Round	0004	a015
Set L	0002	a15
Leng	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.

(b) An unequal comparison between the odd-even longitudinal count of the numerical portion of the characters moved from memory to the record storage unit and an odd-even type wheel echo impulse longitudinal count of the numeric portion of the character printed.

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

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

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	R Add	3065	03			a5	+	
0009	Sel	0201						Input tape unit
0014	Read	--						Read record
0019	Tr Sig	0294						End of file
0024								
0169	Sel	0203						Output tape unit
0174	Write	--	00					Write record
0179	Tr Sig	0324						End of file
0184	Tr	0009						
0294	Ctrl	0002						Rewind input tape
0299	Add Mem	0009	03					Change input tape addr.
0304	Tr	0009						To read record
0324	Ctrl	0001						Record tape mark on output tape
0329	Ctrl	0002						Rewind tape
0334	Add Mem	0169	03					Change output tape addr.
0339	Tr	0009						Continue program

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0001	01					
0009	Load	1560	01			a‡	+	Group mark
0014	Unload	3034	01					
0019	Set L	0003	02			a000	+	
0024	Set L	0005	03			a00000	+	
0029	Sel	0200						Input tape unit
0034	Read	3001						Master record
0039	(No Op)	0114						Switch
0044	Sel	0100						Card reader
0049	Read	2021						Change card
0054	Load	2025	03			a64027	+	Employee no.
0059	Comp	3005	03					Card vs. master
0064	Tr Hi	0104						Tr to set switch
0069	Tr Eq	0079						Tr to change rate
0074	Stop	0001						Unmatched card - stop
0079	RCV	3031						Rate from card and put
0084	Tsmt	2026	02					put rate in master
0089	Sel	0201						Output tape
0094	Write	3001	00					Master record
0099	Tr	0029						To read another record
0104	Sign	0035	00	a&	+			Set switch to B
0109	Tr	0089						To write master
0114	Sign	0035	00	a&	+			&
0119	Add Mem	0035	00					Set switch to A
0124	Tr	0059						To compare.

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN Z	AUXILIARY STORAGE 01-15	SIGN Z	EXPLANATION
0004	Set L	0001	01					
0009	Load	1563	01			a ‡		Group mark
0014	Unload	2040	01					Put G/M at end of master record
0019	Unload	1518	01					Put G/M at end of detail record
0024	Set L	0004	02			a0000	+	
0029	Sel	0200						Input tape
0034	Read	2001						Read master record
0039	Sel	0201						Input tape
0044	Read	1502						Read detail record
0049	Load	1505	02			aA149	+	Detail product no.
0054	Comp	2004	02					Detail vs. master
0059	Tr Eq	0084						Detail = master
0064	Sign	0064	03			a&	+	&
0069	Add Mem	0080	03					Set switch to A (No Op)
0074	Tr Hi	0119						Detail > master
0079	Stop	0001						Unmatched detail
0084	(No Op)	0104						Switch
0089	Sign	0080	03			a&	+	Set switch to B (Tr)
0094	Sel	0202						Output tape
0099	Write	2001	00					Write master record
0104	Sel	0202						Output tape
0109	Write	1502	00					Write detail line
0114	Tr	0039						To read another detail
0119	Sel	0200						Output tape
0124	Read	2001						Read master record
0129	Tr	0054						To comp detail vs. master
								To beginning.

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

PROBLEM 34

INSTR. LOCATION	INSTRUCTION OPER.	INSTRUCTION ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	Set L	0004	01					
0009	Load	0917	01			a9979	+	Address of first code
0014	Unload	0034	01			a9979		Set transfer
0019	R Add	0910	00	a6	+			Code
0024	Mpy	0913	00	a0030	+			x005
0029	Add Mem	0034	00					Adjust pivot address
0034	Tr	(0̄009)						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
0̄004	Tr	--						5 sub routine
0̄009	Tr	--						6 sub routine
0̄014	Tr	--						7 sub routine
0̄019	Stop	0001						8
0̄024	Stop	0001						9
								Note:
								To begin routine for next
								transaction, transfer to 0014.

b	0	+8	+1 2	+1 4	+1 6	2	+1 2	6	+3 2	3	+4										

0399 0401 0403 0405 0407 0409 0411 0413 0415

b	+9 5	+0 2	0 3	+9 9	+1 4	0	1	0	-1 0	4	0	1	0	4	1	5					

0500 0501 0503 0507 0509 0511 0513 0517 0521

01	02	03	04	05	06	07	08

09	10	11	12	13	14	15

INSTR. LOCATION	INSTRUCTION OPER.	ADDRESS	STOR. CODE	ACCUMULATOR 00	SIGN	AUXILIARY STORAGE 01-15	SIGN	EXPLANATION
0004	R Add	0500	00	a9	+			Number of items plus one
0009	Comp	0513	00					N to constant one
0014	Tr Hi	0024						When N > one
0019	Stop	0001						If N = one
0024	Mpy	0501	00	a45	+			N x 5
0029	Round	0001	00	a5	+			Round N
0034	Store	0500	00	a5	+			Store N for next try
0039	Mpy	0503	00	a010	+			N x length of items
0044	Add	0507	00	a0409	+			+ calculated address = address
0049	Store	0507	00	a0409	+			of first item. Address of first
0054	Comp	0517	00	a0409	+			item used to check if search is
								beyond limits of table
0059	Tr Hi	0089						To compare against address of
								last item
0064	Tr Eq	0099						To compare number when
0069	Sign	0503	02			a-	-	calculated address is lower than
0074	Sign	0513	02			a&	+	the address of the first item
0079	Add Mem	0503	02					sign length field plus.
0084	Tr	0004						Tr to recalc. N address.
0089	Comp	0521	00					Check if search is
								beyond limits of table.
0094	Tr Hi	0134						To change length to minus
0099	Unload	0109	00					Calc address into load instr.
0104	Set L	0002	00					Prepare storage unit
0109	Load	(0409)	00	a21	+			Item at calc. address
0114	Comp	0509	00					Number searched for
0119	Tr Hi	0134						To change length to minus
0124	Tr Eq	0159						Number located
0129	Tr	0069						To change length to plus
0134	Sign	0503	02			a&	+	Change sign of
0139	Sign	0511	02			a-	-	length field
0144	Add M	0511	02					to minus
0149	Add M	0503	02					
0154	Tr	0004						Repeat

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCREMENT ±	SIGN	DATA OR DESCRIPTION
6		00 00 0			0 00 0			Assignment Entry
7		00 00 1						Sales discount problem
7		06 00 0						Sales record
5	006	06 01 0						Invoice number
5	005	06 02 0						Date
5	033	06 03 0						Customer name and address
5	006	06 04 0						Gross sales
5	002	06 05 0						Discount %
5	005	06 06 0						Discount amount
5	006	06 07 0						Net sales
5	001	06 08 0						Group mark
7		05 00 0						Constant data
2	002	05 01 0					+	b2
2	001	05 02 0					+	3
2	006	05 03 0					+	010000
2	001	05 04 0						‡
7		01 00 0						Program instructions
1		01 01 0	SET	01	0 00 1			Prepare storage unit 01
		02	LOD	01	05 04 0			Load group mark
		03	UNL	01	06 08 0			Place group mark at end of record
1		04	SET	02	0 00 6			Prepare storage unit 02
		05	LOD	02	05 03 0			Load one hundred dollars
1		02 01 0	SEL		0 20 0			Select input tape unit
		02	RD		06 01 0	- 005		Read record into memory
		03	CMP	02	06 04 0			Compare 010000 to gross sales
		04	TRH		04 01 0			Gross sales less than 100.00
		05	TRE		04 01 0			Gross sales equal to 100.00
		03 01 0	RAD	00	05 02 0			R add 3 percent
		02	TR		04 02 0			Transfer for calculation
		04 01 0	RAD	00	05 01 0			R add 2 percent
		02	ST	00	06 05 0			Store percent in record
		03	MPY	00	06 04 0			Gross sales x percent
1		04	RND	00	0 00 2			Round result
		05	ST	00	06 06 0			Store discount amount
		06	RSU	00	06 06 0			R Sub discount amount
		07	ADD	00	06 04 0			Add gross sales
		08	ST	00	06 07 0			Store net sales
1		09	SEL		0 20 1			Sel output tape
		10	WR	00	06 01 0	- 005		Write record
		11	TR		02 01 0			Transfer to read input tape

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCRE-MENT ±	SIGN	DATA OR DESCRIPTION
6		00 00 0			0 00 0			Assignment Entry
7		10 00 0						Input record
5	006	10 01 0						Item code
5	030	10 02 0						Description
5	005	10 03 0						Quantity
5	005	10 04 0						Unit cost
7		11 00 0						Output record
5	006	11 01 0						Item code
5	031	11 02 0						Description
5	007	11 03 0						Quantity
5	007	11 04 0						Unit cost
5	013	11 05 0						Value
5	001	11 06 0						Group mark
7		09 00 0						Constants
2	001	09 01 0						. (period)
2	001	09 02 0						, (comma)
2	001	09 03 0						‡ (group mark)
					Program			
1		01 01 0	SET	01	0 00 1			Prepare auxiliary storage unit 01
		02	LOD	01	09 01 0			Load period
		03	UNL	01	11 04 0	- 004		Unload period in unit cost
		04	UNL	01	11 05 0	- 003		Unload period in value
		05	LOD	01	09 03 0			Load group mark
		06	UNL	01	11 06 0			Unload group mark at end of print line
1		07	SET	02	0 03 0			Set L storage unit 02
1		08	SET	04	0 00 6			Set L storage unit 04
1		09	SEL		0 20 0			Select input tape
		10	RD		10 01 0	- 005		Read input tape
		02 01 0	LOD	01	09 02 0			Load comma
		02	UNL	01	11 05 0	- 007		Unload comma into value print line
		03	UNL	01	11 05 0	- 011		Unload comma into value print line
		04	RCV		11 01 0	- 005		Receive instructions for item code
		05	TMT	04	10 01 0	- 005		Transmit code to print line
		06	RCV		11 01 0	+ 002		Receive instruction for description
		07	TMT	02	10 01 0	+ 001		Transmit description to print line
		08	RAD	00	10 03 0			R add quantity
		09	SPR	00	11 03 0			Store for print in print line
		10	MPY	00	10 04 0			Mpy by unit cost ‡ value
1		11	RND	00	0 00 1			Round answer by l
		12	SPR	00	11 05 0			Store for print value in print line
		13	RAD	00	10 04 0			R add unit cost
		14	SPR	00	11 04 0			Store for print unit cost in print line
1		15	SEL		0 20 0			Select input tape for R/W
		16	RWW		10 01 0	- 005		R/W prepare to read while writing
1		17	SEL		0 20 1			Select output tape
		18	WR	00	11 01 0	- 005		Read and write simultaneously
		19	TR		02 01 0			Transfer for next record

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCREMENT ±	SIGN	DATA OR DESCRIPTION
		01 01 0	SGN		06 01 0			
		02	SGN		06 02 0			Restore alternator constant to minus
		03	ADM		06 02 0			
		04	ADM		06 01 0			
1		05	SEL		0 20 0			Select input tape
		06	RD		12 01 0	− 005		Read a record into memory
1		07	SEL		0 90 2			Select R/W check indicator
		08	TRS		05 01 0			Transfer to R/W error routine
		09						Normal routine
1		05 01 0	SEL		0 20 0			Select input tape
1		02	BSP					Backspace tape
		03	RSU		06 01 0			Change sign of 1 to plus
		04	ST		06 01 0			Store 1 as plus
		05	TRP		01 06 0			If plus transfer to read
1		06	HLT		0 00 1			Error second read
		07	TR		01 01 0			
7		06 00 0						Constants
2	002	06 01 0					−	b1
2	001	06 02 0					−	5

APPLICATION __Write and Erase - Problem 39__

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCREMENT ±	SIGN	DATA OR DESCRIPTION
6		00 00 1			0 00 0			Assignment entry
7		07 00 0						Constant data
2	001	07 01 0						(decimal point)
2	002	07 02 0						00 (previous district)
2	002	07 03 0						00 (previous state)
2	001	07 04 0						‡ (group mark)
7		08 00 0						Input record
5	002	08 01 0						District
5	002	08 02 0						State
5	020	08 03 0						Salesman
5	007	08 04 0						Sales
7		09 00 0						Print record
5	002	09 01 0						District
5	003	09 02 0						Blanks
5	002	09 03 0						State
5	003	09 04 0						Blanks
5	020	09 05 0						Salesman
5	003	09 06 0						Blanks
5	008	09 07 0						Sales
5	001	09 08 0						Blank
					Program			
1	.	01 01 0	SET	01	0 00 1			Prepare storage unit 1
		02	LOD	01	07 04 0			Load group mark
		03	UNL	01	09 08 0	+ 001		Unload group mark in print area
1		04	SET	02	0 02 0			Prepare storage unit 2
1		05	SET	03	0 00 4			Prepare storage unit 3
1		06	SET	04	0 00 2			Prepare storage unit 4
		07	LOD	01	07 01 0			Load decimal
		08	UNL	01	09 07 0	- 002		Unload decimal point into sales
		02 01 0	RAD	00	08 04 0			R add sales
		02	SPR	00	09 08 0			Store for print sales in print area
		03	RCV		09 04 0	+ 001		Select area for transmission
		04	TMT	02	08 02 0	+ 001		Transmit salesman
		05	LOD	03	08 02 0			Load state and district
		06	CMP	03	07 03 0			Compare to previous state and district
		07	TRE		04 01 0			Transfer on equal to print
		08	TRH		03 01 0			Transfer on high
1		09	HLT		0 00 1			Stop
		03 01 0	LOD	04	08 02 0			Load state number
		02	UNL	04	07 03 0			Unload state no. in constant area
		03	UNL	04	09 03 0			Unload state no. in print area
		04	LOD	04	08 01 0			Load district no.
		05	CMP	04	07 02 0			Compare to previous district no.
		06	TRE		04 01 0			Transfer to print
		07	UNL	04	07 02 0			Unload district no. into constant area
		08	UNL	04	09 01 0			Unload district no. into print area
1		04 01 0	SEL		0 40 0			Select printer
		02	WRE	00	09 01 0	- 001		Write and erase record
		03	TR		01 07 0			

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCRE-MENT ±	SIGN	DATA OR DESCRIPTION
		01 09 0	Rad	05	07 05 0			R add 0
		10	Rad	06	07 06 0			R add 1
		03 09 0	Unl	05	09 01 0	- 002		Unload 0 in print line for double space
		04 01 1	Trs		04 05 0			Channel 12
		04 05 0	Unl	06	09 01 0	- 002		Unload 1 in print line
1		06	Iof					Turn off I/O indicator
		07	Tr		04 02 0			To write record

CLASS	LENGTH	SYMBOLIC LOCATION	OPERATION	ACCUM.	ADDRESS	ADDRESS INCRE-MENT ±	SIGN	DATA OR DESCRIPTION
6		00 00 0			0 20 0			Assignment entry
7		06 00 0						Constant data
2	001	06 01 0						$ (dollar sign)
2	001	06 02 0						. (period)
2	001	06 03 0						* (asterisk)
2	001	06 04 0					+	1
2	004	06 05 0						Address of dollar
2	004	06 06 0						Control address of asterisk
2	004	06 07 0						0000 calculated address (control counter)
7		01 00 0						Normalize and transfer problem
1		01 01 0	Set	02	0 00 1			Prepare storage unit 02
		02	Lod	02	06 01 0			Load dollar sign
		03	Unl	02	07 01 0			Unload dollar sign in output record
		04	Lod	02	06 02 0			Load decimal
		05	Unl	02	07 06 0			Unload decimal in output record
		06	Lod	02	06 03 0			Load asterisk
1		07	Set	03	0 00 4			Prepare storage unit 3
		08	Rad	04	06 04 0			R add constant 1
		02 01 0	Lod	03	06 05 0			Restore control
		02	Unl	03	06 07 0			Address
		03	Ntr	01	03 01 0			Transfer if zero in amount
		04	Spr	01	07 09 0			Print normalized amount
		05	Tr					Continue main routine
		03 01 0	Adm	04	06 07 0			Plus 1 to address of *
		02	Lod	03	06 07 0			Adjusted address
		03	Unl	03	03 04 0			Unload to next step
		04	Unl	02	(07 02 0)			Put asterisk in print line
		05	Cmp	03	06 06 0			Compare to control address
		06	Tre		02 04 0			Transfer to print amount
		07	Tr		02 03 0			Transfer to repeat normalize