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Mnemonic opcode Table (MOT)

Mnemonic opcode	m/c code for opcode	Class	Size of instructions
STOP	00	IS	1
ADD	01	IS	1
SUB	02	IS	1
MULT	03	IS	1
MOVER	04	IS	1
MOVEM	05	IS	1
COMP	06	IS	1
BC	07	IS	1
DIV	08	IS	1
READ	09	IS	1
PRINT	10	IS	1
START	01	AD	-----
END	02	AD	-----
ORIGIN	03	AD	-----
EQU	04	AD	-----
LTROG	05	AD	-----
DS	01	DL	-----
DC	02	DL	-----
AREG	01	RG	-----

BREG	02	RG	-----
CREG	03	RG	-----
EQ	01	CC	-----
LT	02	CC	-----
GT	03	CC	-----
LE	04	CC	-----
GE	05	CC	-----
NE	06	CC	-----
ANY	07	CC	-----

Example:1

Input File: Assembly code: input.txt

- **START 100**
- **L1 MOVEM AREG, Y**
- **ADD AREG, X**
- **BC ANY, L1**
- **Z EQU L1**
- **X DC 5**
- **Y DS 1**
- **END**

Two Pass assembler: Pass1 and Pass2

Steps for Pass1:

1. Read source program
2. Add Location Count
3. Prepared Symbol table, Literal Table, Pool Table
4. Preped Intermediate code using MOT table, Symbol table and Literal Table

Steps for Pass2:

1. It generate Machine code from **Intermediate code**

Sr.No.	Assembly Code	Statement Type	Location Count	Intermediate Code	Machine Code
1	START 100	AD	-----	(AD,01) (C,100)	-----
2	L1 MOVEM AREG, Y	IS	100	(IS,05) (RG,01) (S,1)	05 01 104
3	ADD AREG, X	IS	101	(IS,01) (RG,01) (S,2)	01 01 103
4	BC ANY, L1	IS	102	(IS,07) (CC,07) (s,0)	07 07 100
5	Z EQU L1	AD	100	(AD,04) (C,100)	-----
6	X DC 5	DL	103	(DL,02) (C,5)	02 005
7	Y DS 1	DL	104	(DL,01) (C,1)	01 001

8	END	AD		(AD,02)	-----
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Symbol Table

Index	Symbol	Address
0	L1	100
1	Y	104
2	X	103
3	Z	100

Example 2:

START 200

MOVER AREG, '=5'

MOVEM AREG, X

L1 MOVER BREG, '=2'

ORIGIN L1+3

LTORG

NEXT ADD AREG, '= 1'

SUB BREG, '=2'

BC LT, BACK.....

LTORG ...

BACK EQU L1

ORIGIN NEXT+5

MULT AREG, '=4'

STOP.....

X DS '5'.....

END

Sr. No.	Assembly Code	State ment Type	Locatio n Count	Remark	Intermediate Code	Machine Code
1	START 200	AD			(AD,01) (C,200)	----- -----
2	MOVER AREG, '=5'	IS	200		(IS,04) (RG,01) (L,0)	04 01 205
3	MOVEM AREG, X	IS	201		(IS,05) (RG,01) (S,0)	05 01 214
4	L1 MOVER BREG, '=2'	IS	202		(IS,04) (RG,02) (L,1)	04 02 206
5	ORIGIN L1+3	AD		L1+3=202+3=205	(AD,03) (C,205)	----- -----
6	LTORG	AD		'=5': 205 '=2':206	(DL,02)(C,005) (DL,02)(C,002)	00 00 005 00 00 002
7	NEXT ADD AREG, '= 1'	IS	207		(IS,01) (RG,01)(L,2)	01 01 210
8	SUB BREG, '=2'	IS	208		(IS,02)(RG,02)(L,3)	02 02 211
9	BC LT, BACK	IS	209		(IS,07)(CC,02)(S,3)	07 02 202
10	LTORG	AD		'=1':210 '=2':211	(DL,02)(C,001) (DL,02)(C,002)	00 00 001 02 00 002
11	BACK EQU L1	AD		BACK=202	(AD,04)(C,202)	----- -----
12	ORIGIN NEXT+5	AD		NEXT+5=207+5=212	(AD,03)(C,212)	----- -----
13	MULT AREG, '=4'	IS	212		(IS,03)(RG,01)(L,4)	03 01 219
14	STOP	IS	213		(IS,00)	00 00 000
15	X DS '5'	DL	214		(DL,01)(C,005)	00 00 005
16	END	AD		214+5=219	(AD,02)	----- -----
				'=4': 219	(DL,02)(C,004)	00 00 004

Symbol Table

Index	Symbol	Address
0	X	214
1	L1	202
2	NEXT	207
3	BACK	202

Literal Table

iNDEX	Literal	Address
0	=5	205
1	=2	206
2	=1	210
3	=2	211
4	=4	219

Pool Table

iNDEX	pool
0	0
1	2
2	4

Example 3

Input file:

START 100

MOVER AREG, '=5'

ADD CREG, '= 1'

A DS '3'

L1 MOVER AREG, B

ADD AREG,C

MOVEM AREG,D

LTORG

D EQU A+1

L2 PRINT D

ORIGIN A-1

SUB AREG,'=1'

MULT CREG,B

C DC '5'

ORIGIN L2+1

STOP

B DC 19

END

Sr. N o.	Assembly Code	State men	Locati on Count	Remark	Intermediate Code	Machine Code
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		t Type				
1	START 100	AD			(AD,01) (C,100)	-----
2	MOVER AREG, '=5'	IS	100		(IS,04) (RG,01)(L,0)	04 01 108
3	ADD CREG, '= 1'	IS	101		(IS,01)(RG,03)(L,1)	01 03 109
4	A DS '3'	DL	102	102+3=105	(DL,01)(C,3)	00 00 003
5	L1 MOVER AREG, B	IS	105		(IS,04) (RG,01) (S,5)	04 01 110
6	ADD AREG,C	IS	106		(IS,01)(RG,01)(S,2)	01 01 103
7	MOVEM AREG,D	IS	107		(IS,05)(RG,01)(S,3)	05 01 103
8	LTORG	AD		=5: 108 =1:109	(DL,01)(C,108) (DL,01)(C,109)	00 00 108 00 00 109
9	D EQU A+1	AD		D=A+1=102+1 =103	(AD,04)(C,103)	-----
10	L2 PRINT D	IS	108		(IS,10)(00,00) (S,103)	10 00 103
11	ORIGIN A-1	AD		102-1=101	(AD,03)(C,101)	-----
12	SUB AREG,'=1'	IS	101		(IS,02)(RG,01)(L,2)	02 01 111
13	MULT CREG,B	IS	102		(IS,03)(RG,03)(S,5)	03 03 110
14	C DC '5'	DL	103		(DL,02)(C,5)	00 00 005
15	ORIGIN L2+1	AD		108+1=109	(AD,03)(C,109)	-----
16	STOP	IS	109		(IS,00)	00 00 000
17	B DC 19	DL	110		(DL,02)(C,19)	00 00 019
18	END	AD		=1:111	(AD,02) (DL,02)(C,111)	----- 00 00 111

Symbol Table		
Index	Symbol	Address
0	A	102
1	L1	105
2	C	103
3	D	103
4	L2	108
5	B	110

Literal Table		
Index	Symbol	Address
0	=5	108
1	=1	109
2	=1	111

Pool Table		
Index	Pool	
0	0	
1	2	