

## Number of Cycles for Each Operation:

- **Any 2-OP Except [(MOV – CMP)->Subtract One instruction]**

1. Direct src – Direct Dest: 4 +2(fetch decode) + 1(save result)
2. Direct src – Ind Reg Dest: 5 +2(fetch decode) + 1(save result)
3. Auto Inc src – Auto Inc Dest / Direct src – Auto Inc Dest: 6(Dir) / 7(Indir)  
+2(fetch decode) + 1(save result)
4. Auto Dec Dest - Direct src / Direct src – Auto Dec Dest : 6(Dir) / 7(Indir)  
+2(fetch decode) + 1(save result)
5. Index Dest - Direct src / Direct src – Index Dest: 8(Dir) / 9(Indir)  
+2(fetch decode) + 1(save result)

1. Ind Reg src -Ind Reg Dest : 6 +2(fetch decode) + 1(save result)
2. Auto Inc src -Ind Reg Dest / Ind Reg src -Auto Inc Dest : 7(Dir) / 8(Indir)  
+2(fetch decode) + 1(save result)
3. Auto Dec src -Ind Reg Dest / Ind Reg src -Auto Dec Dest : 7(Dir) / 8(Indir)  
+2(fetch decode) + 1(save result)
4. Index src -Ind Reg Dest / Ind Reg src -Index Dest : 9(Dir) / 10(Indir)  
+2(fetch decode) + 1(save result)

1. Auto Inc src -Auto Inc Dest : 10(Indir)/10(Indir) 9(Dir)/10(Indir) 10(Indir)/9(dir)  
+2(fetch decode) + 1(save result)
2. Auto dec src -Auto Inc Dest / Auto Inc src -Auto dec Dest: 10(Indir)/10(Indir)  
9(Dir)/10(Indir) 10(Indir)/9(dir) +2(fetch decode) + 1(save result)
3. Index src -Auto Inc Dest /Auto Inc src -Index Dest : 12(Indir)/12(Indir)  
11(Dir)/12(Indir) 12(Indir)/11(dir) +2(fetch decode) + 1(save result)

1. Index src– Auto Dec Dest/Auto Dec src– Index Dest: 12(Indir)/12(Indir)  
11(Dir)/ 12(Indir) 12(Indir)/11(dir) +2(fetch decode) + 1(save result)
2. Auto Dec src– Auto Dec src : 10(Indir)/10(Indir) 9(Dir)/10(Indir) 10(Indir)/9(dir)  
+2(fetch decode) + 1(save result)

1. Index src– Index Dest : 14(Indir)/14(Indir) 13(Dir)/14(Indir) 14(Indir)/13(dir)  
+2(fetch decode) + 1(save result)

- **Any 1-OP**

1. Direct : 3 +2(fetch decode) + 1(save result)
2. Indir : 4 +2(fetch decode) + 1(save result)
3. Auto Inc: 4(Dir)/5(Indir) +2(fetch decode) + 1(save result)

- 4. Auto Dec : 4(Dir)/5(Indir)                      +2(fetch decode) + 1(save result)
  - 5. Index : 7(Dir)/8(Indir)                        +2(fetch decode) + 1(save result)
  
  - **branch instruction**                                +2(fetch decode)
- 3

Number of Fetches Excluding/Including Fetching Instruction:

- 1. Direct : 0    +1(fetch decode)
- 2. Indir : 1     +1(fetch decode)
- 3. Auto Inc: 1(Dir)/2(Indir)                      +1(fetch decode)
- 4. Auto Dec : 1(Dir)/2(Indir)                    +1(fetch decode)
- 5. Index : 2(Dir)/3(Indir)                       +1(fetch decode)

**CPI : 10.2  $\simeq$  11**