

# EXAMPLE PROGRAM USING LABELS

Hewlett Packard AS68000 V(01.20 10Mar88) Page 1 Mon Oct 29 13:46:500

Cmdline - as68k -L labels.s

Line Address

```

1 00006000          DATA    EQU    $6000
2 00004000          PROGRAM  EQU    $4000
3 00000006          FFSET   EQU    $6
4
5                  ORG     DATA
6                  * TABLE OF FACTORIALS
7 00006000 0001     FTABLE  DC    1          0!=1
8 00006002 0001     DC      1          1!=1
9 00006004 0002     test    DC    2          2!=2
10 00006006 0006    DC      6          3!=6
11 00006008 0018    DC     24          4!=24
12 0000600A 0078    DC    120          5!=120 ($78)
13 0000600C 02D0    DC    720          6!=720
14 0000600E 13B0    DC    5040         7!=5040
15 00006010          VALUE   DS.B   1          input to factorial
16 00006011          DS.B   1          align on word
boundary
17 00006012          RESULT  DS.W   1          result of factorial
18
19
20                  ORG     PROGRAM
21 00004000 4E71     NOP
22 00004002 307C 6000  main  MOVEA.W #FTABLE,A0  gets $6000
23 00004006 3278 6000    MOVEA.W FTABLE,A1  gets $1
24 0000400A 347C 6000    MOVE.W  #FTABLE,A2  gets $6000
25 0000400E 303C 6000    MOVE.W  #FTABLE,D0  gets $6000
26 00004012 3238 6000    MOVE.W  FTABLE,D1  gets $1
27
28 00004016 3628 0006    MOVE.W  FFSET(A0),D3 test displacemene
30 0000401A 31FC 0005 6010  MOVE.W  #5,VALUE  input to fact is 5
32 00004020 3A38 6010  fact  MOVE.W  VALUE,D5  get input
33 00004024 DA45          ADD.W   D5,D5      double for word
offset
34 00004026 47F8 6000    LEA    FTABLE,A3  get base address
35 0000402A 3C33 5000    MOVE.W 0(A3,D5),D6 get result
36 0000402E 31C6 6012    MOVE.W D6,RESULT  output
37
38                  END main

```

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Symbol Table

Label	Value
DATA	00006000
FFSET	00000006
FTABLE	00006000
PROGRAM	00004000
RESULT	00006012
VALUE	00006010
fact	00004020
main	00004002

test

00006004

```

=====Monitor=====12=====Stack=====
==14=
|1                                     ||
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72
|4
00000004=4E724E72
|5                                     SP-
>00000000=4E724E72
=====
=====
Code                                     11
=====Registers=====13=
00004002 307C 6000      MOVEA.W #$6000,A0      |PC=00004002
pi=00000000
00004006 3278 6000      MOVEA.W DATA,A1      D0=00000000
A0=00000000
0000400A 347C 6000      MOVEA.W #$6000,A2      D1=00000000
A1=00000000
0000400E 303C 6000      MOVE.W  #$6000,D0      D2=00000000
A2=00000000
00004012 3238 6000      MOVE.W  DATA,D1      D3=00000000
A3=00000000
00004016 3628 0006      MOVE.W  $6(A0),D3      D4=00000000
A4=00000000
0000401A 31FC 0005 6010  MOVE.W  #$5,VALUE      D5=00000000
A5=00000000
fact:                                     D6=00000000
A6=00000000
=====Journal=====
==10=
| auto halt at address 0x00004002.
|
|
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >

Breakpoint  Debugger Expression  File  Memory  Program  Symbol  Window
Execution  HP-UX_Shell  Macro  Option  Pause  Quit  Level  Directory
?(Help

```

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          0                                     ||
00000010=4E724E72
|2  @A0          0
0000000C=4E724E72
|3  @D1          0
00000008=4E724E72

```

```

|4
00000004=4E724E72
|5
>00000000=4E724E72
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$6000,A0      |PC=00004002
pi=00000000
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00000000
A0=00000000
0000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000000
A1=00000000
0000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00000000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000000
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3     D4=00000000
A4=00000000
0000401A 31FC 0005 6010  MOVE.W   #$5,VALUE     D5=00000000
A5=00000000
fact:
A6=00000000
D6=00000000
=====Journal=====
==10=
|> Expression Monitor Value @A1
0> Expression Monitor Value @A1
|> Expression Monitor Value @D1
STATUS: Command      68000  MODULE: labels_2      BREAK #: 0
HELP=F5 >
> Expression Monitor Value @D1
Breakpoint Debugger Expression File Memory Program Symbol Window
C_Expression Fprintf Printf Monitor Display_Value

```

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          0                               ||
00000010=4E724E72
|2  @A0          24576                           ||
0000000C=4E724E72
|3  @D1          0                               ||
00000008=4E724E72
|4
00000004=4E724E72
|5
>00000000=4E724E72                               SP-
=====
=====
Code                               11
=====Registers=====13=
0004002 307C 6000      MOVEA.W  #$6000,A0      |PC=0004006
pi=0004002
0004006 3278 6000      MOVEA.W  DATA,A1      D0=00000000
A0=00006000
000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000000
A1=00000000
000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00000000
0004012 3238 6000      MOVE.W   DATA,D1      D3=00000000
A3=00000000
0004016 3628 0006      MOVE.W   $6(A0),D3     D4=00000000
A4=00000000
000401A 31FC 0005 6010  MOVE.W   #$5,VALUE     D5=00000000
A5=00000000
fact:
A6=00000000
0004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 0004024 DA45      ADD.W   D5,D5
SR=0010011100000000
| 0004026 47F8 6000      LEA    DATA,A3      T S III
XNZVC
=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint Debugger Expression File Memory Program Symbol Window
Display_Source Find_Source Run Interrupt Load Context Pc_Reset
Step

```

## Debugger error occurs with instruction MOVEA.W DATA,A1

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          1                               ||
00000010=4E724E72

```

```

|2  @A0          24576
0000000C=4E724E72
|3  @D1          0
00000008=4E724E72
|4
00000004=4E724E72
|5
>00000000=4E724E72
SP-
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$6000,A0      |PC=0000400A
pi=00004006
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00000000
A0=00006000
1 0000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000000
A1=00000000
0000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00000000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000000
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3      D4=00000000
A4=00000000
0000401A 31FC 0005 6010  MOVE.W   #$5,VALUE      D5=00000000
A5=00000000
fact:
A6=00000000
00004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 00004024 DA45          ADD.W   D5,D5
SR=0010011100000000
| 00004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC
=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint Debugger Expression File Memory Program Symbol Window
Display_Source Find_Source Run Interrupt Load Context Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          1                               ||
00000010=4E724E72
|2  @A0          24576
0000000C=4E724E72
|3  @D1          0
00000008=4E724E72
|4
00000004=4E724E72
|5
>00000000=4E724E72          SP-
=====
=====
Code                               11
=====Registers=====13=
  0004002 307C 6000      MOVEA.W  #$6000,A0      |PC=0004012
pi=000400E
  0004006 3278 6000      MOVEA.W  DATA,A1      D0=0006000
A0=0006000
1 000400A 347C 6000      MOVEA.W  #$6000,A2      D1=0000000
A1=0000000
  000400E 303C 6000      MOVE.W   #$6000,D0      D2=0000000
A2=0006000
  0004012 3238 6000      MOVE.W   DATA,D1      D3=0000000
A3=0000000
  0004016 3628 0006      MOVE.W   $6(A0),D3     D4=0000000
A4=0000000
  000401A 31FC 0005 6010  MOVE.W   #$5,VALUE     D5=0000000
A5=0000000
fact:
A6=0000000
  0004020 3A38 6010      MOVE.W   VALUE,D5      |D7=0000000
A7=0000000
| 0004024 DA45          ADD.W    D5,D5
SR=0010011100000000
| 0004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC

=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
  Breakpoint  Debugger  Expression  File  Memory  Program  Symbol  Window
  Display_Source  Find_Source  Run  Interrupt  Load  Context  Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          1                               ||
00000010=4E724E72
|2  @A0          24576
0000000C=4E724E72
|3  @D1          1
00000008=4E724E72

```

```

|4
00000004=4E724E72
|5
>00000000=4E724E72
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$6000,A0      |PC=00004016
pi=00004012
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00006000
A0=00006000
1 0000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000001
A1=00000000
0000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00006000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000000
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3      D4=00000000
A4=00000000
0000401A 31FC 0005 6010    MOVE.W   #$5,VALUE      D5=00000000
A5=00000000
fact:
A6=00000000
00004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 00004024 DA45      ADD.W   D5,D5
SR=0010011100000000
| 00004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC

=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint  Debugger  Expression  File  Memory  Program  Symbol  Window
Display_Source  Find_Source  Run  Interrupt  Load  Context  Pc_Reset
Step

```



```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          1                               ||
00000010=4E724E72
|2  @A0          24576
0000000C=4E724E72
|3  @D1         1
00000008=4E724E72
|4
00000004=4E724E72
|5
>00000000=4E724E72
SP-
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$$6000,A0      |PC=0000401A
pi=00004016
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00006000
A0=00006000
1 0000400A 347C 6000      MOVEA.W  #$$6000,A2      D1=00000001
A1=00000000
0000400E 303C 6000      MOVE.W   #$$6000,D0      D2=00000000
A2=00006000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000006
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3      D4=00000000
A4=00000000
0000401A 31FC 0005 6010    MOVE.W   #$$5,VALUE      D5=00000000
A5=00000000
fact:
A6=00000000
00004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 00004024 DA45      ADD.W   D5,D5
SR=0010011100000000
| 00004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC
=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint Debugger Expression File Memory Program Symbol Window
Display_Source Find_Source Run Interrupt Load Context Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1  @A1          1                               ||
00000010=4E724E72
|2  @A0          24576
0000000C=4E724E72
|3  @D1         1
00000008=4E724E72

```

```

|4
00000004=4E724E72
|5
>00000000=4E724E72
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$6000,A0      |PC=00004020
pi=0000401A
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00006000
A0=00006000
1 0000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000001
A1=00000000
0000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00006000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000006
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3     D4=00000000
A4=00000000
0000401A 31FC 0005 6010     MOVE.W   #$5,VALUE     D5=00000000
A5=00000000
fact:
A6=00000000
00004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 00004024 DA45      ADD.W   D5,D5
SR=0010011100000000
| 00004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC

=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
  Breakpoint  Debugger  Expression  File  Memory  Program  Symbol  Window
  Display_Source  Find_Source  Run  Interrupt  Load  Context  Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72
|4
00000004=4E724E72
|5
>00000000=4E724E72
SP-
=====
=====
Code 11
=====Registers=====13=
0004002 307C 6000 MOVEA.W #$6000,A0 |PC=0004024
pi=0004020
0004006 3278 6000 MOVEA.W DATA,A1 D0=0006000
A0=0006000
1 000400A 347C 6000 MOVEA.W #$6000,A2 D1=0000001
A1=0000000
000400E 303C 6000 MOVE.W #$6000,D0 D2=0000000
A2=0006000
0004012 3238 6000 MOVE.W DATA,D1 D3=0000006
A3=0000000
0004016 3628 0006 MOVE.W $6(A0),D3 D4=0000000
A4=0000000
000401A 31FC 0005 6010 MOVE.W #$5,VALUE D5=0000005
A5=0000000
fact: D6=0000000
A6=0000000
0004020 3A38 6010 MOVE.W VALUE,D5 |D7=0000000
A7=0000000
| 0004024 DA45 ADD.W D5,D5
SR=0010011100000000
| 0004026 47F8 6000 LEA DATA,A3 T S III
XNZVC
=====S
STATUS: Command 68000 MODULE: labels_2 BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint Debugger Expression File Memory Program Symbol Window
Display_Source Find_Source Run Interrupt Load Context Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72

```

```

|4
00000004=4E724E72
|5
>00000000=4E724E72
=====
=====
Code                               11
=====Registers=====13=
00004002 307C 6000      MOVEA.W  #$6000,A0      |PC=00004026
pi=00004024
00004006 3278 6000      MOVEA.W  DATA,A1      D0=00006000
A0=00006000
1 0000400A 347C 6000      MOVEA.W  #$6000,A2      D1=00000001
A1=00000000
0000400E 303C 6000      MOVE.W   #$6000,D0      D2=00000000
A2=00006000
00004012 3238 6000      MOVE.W   DATA,D1      D3=00000006
A3=00000000
00004016 3628 0006      MOVE.W   $6(A0),D3      D4=00000000
A4=00000000
0000401A 31FC 0005 6010    MOVE.W   #$5,VALUE      D5=0000000A
A5=00000000
fact:
A6=00000000
00004020 3A38 6010      MOVE.W   VALUE,D5      |D7=00000000
A7=00000000
| 00004024 DA45      ADD.W   D5,D5
SR=0010011100000000
| 00004026 47F8 6000      LEA     DATA,A3      T S III
XNZVC

=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint  Debugger  Expression  File  Memory  Program  Symbol  Window
Display_Source  Find_Source  Run  Interrupt  Load  Context  Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1                                     ||
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72
|4
00000004=4E724E72
|5                                     SP-
>00000000=4E724E72
=====
=====
Code                                     11
=====Registers=====13=
0000402A 3C33 5000      MOVE.W  ($0,A3,D5.W),D6 |PC=0000402A
pi=00004026
0000402E 31C6 6012      MOVE.W  D6,RESULT      D0=00006000
A0=00006000
1 00004032 4E72 4E72      STOP   #$4E72          D1=00000001
A1=00000000
00004036 4E72 4E72      STOP   #$4E72          D2=00000000
A2=00006000
0000403A 4E72 4E72      STOP   #$4E72          D3=00000006
A3=00006000
0000403E 4E72 4E72      STOP   #$4E72          D4=00000000
A4=00000000
00004042 4E72 4E72      STOP   #$4E72          D5=0000000A
A5=00000000
00004046 4E72 4E72      STOP   #$4E72          D6=00000000
A6=00000000
=====Journal=====
==10=|
|> Program Step
|> Program Step
| Note: Back scrolling limited : debug information unavailable
S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
Breakpoint Debugger Expression File Memory Program Symbol Window
Display_Source Find_Source Run Interrupt Load Context Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1                                     ||
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72
|4
00000004=4E724E72

```

```

|5
>00000000=4E724E72
SP-
=====
=====
Code 11
=====Registers=====13=
0000402A 3C33 5000 MOVE.W ($0,A3,D5.W),D6 |PC=0000402E
pi=0000402A
0000402E 31C6 6012 MOVE.W D6,RESULT D0=00006000
A0=00006000
1 00004032 4E72 4E72 STOP #$4E72 D1=00000001
A1=00000000
00004036 4E72 4E72 STOP #$4E72 D2=00000000
A2=00006000
0000403A 4E72 4E72 STOP #$4E72 D3=00000006
A3=00006000
0000403E 4E72 4E72 STOP #$4E72 D4=00000000
A4=00000000
00004042 4E72 4E72 STOP #$4E72 D5=0000000A
A5=00000000
00004046 4E72 4E72 STOP #$4E72 D6=00000078
A6=00000000
0000404A 4E72 4E72 STOP #$4E72 |D7=00000000
A7=00000000
| 0000404E 4E72 4E72 STOP #$4E72
SR=0010011100000000
| 00004052 4E72 4E72 STOP #$4E72 av T S III
XNZVC

=====S
STATUS: Command 68000 MODULE: labels_2 BREAK #: 0
HELP=F5 >
> Program Step
From Count Over With_Macro <return>
<start_addr [,step_count]> <return>

```

```

=====Monitor=====12=====Stack=====
==14=
|1                                     ||
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72
|4
00000004=4E724E72
|5                                     SP-
>00000000=4E724E72
=====
=====
Code                                     11
=====Registers=====13=
0000402A 3C33 5000      MOVE.W  ($0,A3,D5.W),D6 |PC=00004032
pi=0000402E
0000402E 31C6 6012      MOVE.W  D6,RESULT      D0=00006000
A0=00006000
1 00004032 4E72 4E72      STOP   #$4E72          D1=00000001
A1=00000000
00004036 4E72 4E72      STOP   #$4E72          D2=00000000
A2=00006000
0000403A 4E72 4E72      STOP   #$4E72          D3=00000006
A3=00006000
0000403E 4E72 4E72      STOP   #$4E72          D4=00000000
A4=00000000
00004042 4E72 4E72      STOP   #$4E72          D5=0000000A
A5=00000000
00004046 4E72 4E72      STOP   #$4E72          D6=00000078
A6=00000000
0000404A 4E72 4E72      STOP   #$4E72          |D7=00000000
A7=00000000
| 0000404E 4E72 4E72      STOP   #$4E72
SR=0010011100000000
| 00004052 4E72 4E72      STOP   #$4E72          av   T S III
XNZVC
=====S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Program Step
  Breakpoint  Debugger  Expression  File  Memory  Program  Symbol  Window
  Display_Source  Find_Source  Run  Interrupt  Load  Context  Pc_Reset
Step

```

```

=====Monitor=====12=====Stack=====
==14=
|1                                     ||
00000010=4E724E72
|2
0000000C=4E724E72
|3
00000008=4E724E72

```

```

|4
00000004=4E724E72
|5
>00000000=4E724E72
=====
=====
Code                               11
=====Registers=====13=
0000402A 3C33 5000      MOVE.W  ($0,A3,D5.W),D6  |PC=00004032
pi=0000402E
0000402E 31C6 6012      MOVE.W  D6,RESULT      D0=00006000
A0=00006000
1 00004032 4E72 4E72      STOP   #$4E72          D1=00000001
A1=00000000
00004036 4E72 4E72      STOP   #$4E72          D2=00000000
A2=00006000
0000403A 4E72 4E72      STOP   #$4E72          D3=00000006
A3=00006000
0000403E 4E72 4E72      STOP   #$4E72          D4=00000000
A4=00000000
00004042 4E72 4E72      STOP   #$4E72          D5=0000000A
A5=00000000
00004046 4E72 4E72      STOP   #$4E72          D6=00000078
A6=00000000
=====Journal=====
==10=|
|> Memory Display Word 6000h
| 00006000 0001 0001 0002 0006 0018 0078 02D0 13B0
.....x....
| 00006010 0005 0078 4E72 4E72 4E72 4E72 4E72 4E72
...xNrNrNrNrNrNr S
STATUS: Command          68000  MODULE: labels_2          BREAK #: 0
HELP=F5 >
> Memory Display Word 6000h
Breakpoint Debugger Expression File Memory Program Symbol Window

```