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PDP-11/60 MICROPROGRAMMING TOOLS

V1.0 RELEASE NOTES

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## CONTENTS

	PAGE
1.0 INSTALLATION	5
2.0 KNOWN PROBLEMS IN THE PDP-11/60 MICROPROGRAMMING TOOLS	10
3.0 SAMPLE TOOLSGEN	11
4.0 SAMPLE SMKGEN AND SMK TEST	12
5.0 SAMPLE TOOLSTSK	13



## 1.0 INSTALLATION

The PDP-11/60 Microprogramming tools are released as collection of files in the [7,102] UFD of the release disk which has the internal volume identifier WCS116. In addition to the task images of the tools, this UFD contains the source and command files necessary for copying, compiling, linking, and running the tools. The entire installation can be accomplished by running one of two indirect command files. (Note: the command files may be printed out in alphabetical order within tool by running the TOOLSCOP indirect command file and specifying the output device as "LP:".)

To install the PDP-11/60 Microprogramming Tools.

- A. Complete generation (approximately 70 minutes on a dedicated 11/60, if listings are not requested):

Execute TOOLSGEN indirect command file to copy in entire system, assemble, build, install and (optionally) test.

- B. Quick installation (approximately 6 minutes on a dedicated 11/60):

Execute TOOLSTSK indirect command file to copy task images and other necessary files.

These indirect command files and the questions they ask are discussed below. The discussion assumes a reasonable familiarity with RSX-11M. The entire installation section should be read before beginning the installation.

Complete generation of the PDP-11/60 Microprogramming Tools using the TOOLSGEN indirect command file.

First, from a privileged UIC, invoke the indirect command file in the PDP-11/60 Microprogramming Tools release UFD, eg.

```
>ALL DKO:
>MOU DKO: WCS116
>SET /UIC=[7,102]
>@DKO:[7,102]TOOLSGEN
```

The first question asked by this file will be:

```
>*ENTER CURRENT LOCATION OF WCS FILES[S]:
```

The response should be the appropriate partial file specifications, eg.

```
DKO:[7,102]
```

The file then asks:

>\*ENTER PRIVILEGED UIC TO BUILD WCS TOOLS IN[S]:

A partial file specification for the UFD which will house the PDP-11/60 Microprogramming Tools should then be supplied. This UFD should be privileged and, to avoid name conflicts, should be empty before copying the tools to it. (Note: the PDP-11/60 Microprogramming Tools documentation assumes that the tools will be used from this UIC unless they are permanently installed). The response might be:

[7,103]

The command file then asks

>\*ARE FORTRAN 4+ SUBROUTINES INSTALLED IN SYSLIB?[Y/N]:

If the subroutines are installed in SYSLIB (only FORTRAN 4+ is used) the response is "Y". If the response is "N", it is assumed that the subroutines are in [1,1] F4POTS. (Note: the generation procedure assumes that floating point hardware is available. If floating point is not available, the indirect command files for task building (MICBLD.COMD, MICBLD.ODL, MICBLDSL.COMD, MICBLDSL.ODL, MLDBLD.COMD, MLDBLDSL.COMD, SMKBLD.COMD, SMKBLBSL.COMD) must be appropriately modified). If the subroutines are in [1,1] F4POTS, the response would be:

N

Next the command file asks:

>\*DO YOU WANT LISTINGS? [Y/N]:

If FORTRAN AND MACRO-11 source listings are desired, reply:

Y

(Some task build maps will be created even if the reply is N.)

Next the file asks:

>\*DO YOU WANT TO TEST THE INSTALLATION? [Y/N]:

If the response is

Y

the generation procedure will finish with the assembly and execution of a test microprogram. The test will execute successfully only if run on a PDP-11/60 with an installed UCS option. (WARNING: The test concludes by halting the machine and should not be made when other users might be on the system). Since the test occurs at the end of the generation procedure, it may be preferable to run it later by invoking the indirect command files SMKGEN and SMK. If the test

successfully halts the machine, execution can be resumed by holding down CNTRL. and pressing CONT at the KY11-P Programmer's Console.

To run the test later set the UIC to the one where the tools were generated and enter:

>@SMKGEN

When asked

>\*PROG[S]:

reply

SMKMIC

Also respond to

>\*ARE FORTRAN 4+ SUBROUTINES INSTALLED IN SYSLIB? [Y/N]:

as indicated for TOOLSGEN above.

Respond Y to

>LIST? [Y/N]:

if a listing of the test program is desired.

To

>BUILD? [Y/N]:

respond

N

And to

>ASSEMBLE MICROPROGRAM? [Y/N]:

Respond

Y

When the test program has been assembled it may be run by the following invocation: (WARNING, this test halts the machine).

@SMK

To resume execution hold down CNTRL. at the KY11-P Programmer's Console and press CONT. The output for the test should be as indicated in the examples.



Quick installation of the WCS Tools using TOOLSTSK.

First from a privileged UIC invoke the indirect command file in the PDP-11/60 Microprogramming Tools release UFD, eg.

```
>ALL DKO:
>MOU DKO:WCS116
>SET /UIC=[7,102]
>@DKO:[7,102]TOOLSTSK
```

The first question asked by this file will be:

```
>*ENTER CURRENT LOCATION OF WCS FILES [S];
```

The response should be the appropriate partial file specification, eg.

```
DKO: [7,102]
```

The file then asks:

```
>*ENTER PRIVILEGED UIC TO COPY WCS TOOLS [S]:
```

A partial file specification for the UFD which will house the PDP-11/60 Microprogramming Tools should then be supplied. This UFD should be privileged and, to avoid name conflicts, should be empty before copying the tools to it. (Note: The PDP-11/60 Microprogramming Tools documentation assumes that the tools will be used from this UIC unless they are permanently installed). The response might be:

```
[7,104]
```

The command file then asks:

```
>*ARE FORTRAN 4+ SUBROUTINES INSTALLED IN SYSLIB? [Y/N]:
```

For a discussion of this question see the same question in the above section on TOOLSGEN. If the subroutines are in [1,1] F4POTS, the response would be:

```
N
```

Next the file asks:

```
>*INSTALL WCS COMMON (FOR MLD)? [Y/N]:
```

the response should be:

```
Y
```

Finally the file asks:

```
>*TEST INSTALLATION? [Y/N]:
```

If the response is

Y

the procedure will finish with the assembly and execution of a test microprogram. The test will execute successfully only if run on a PDP-11/60 with an installed UCS option. WARNING: the test concludes by halting the machine and should not be made when other users might be on the system.

If the test successfully halts the machine, execution can be resumed by holding down CNTR0L and pressing CONT at the KY11-P Programmer's Console.

Once the test (@SMK) has successfully run the installation of the WCS tools is complete. It might, however, be advisable to disable the WCS as part of the RSX-11M start up command file. The WCS can be disabled by running the MSTOP program, eg.

```
RUN [7,103] MSTOP
```

This will ensure that the WCS microcode is disabled during normal running of the system, preventing possible hazards from inadvertent invocations of the operation codes reserved for WCS. Since the normal test procedures for microcode may leave the WCS enabled, this automatic disabling is important. In addition, it may be convenient to permanently install the microassembler (MIC). It would probably be better not to install the loader (MLD) and debugger (MDT) which might disrupt a shared system if run inadvertently. These programs can be easily invoked in the WCS UFD by the indirect command @MID and @MDT respectively. For more information on these indirect command files see the PDP-11/60 Microprogramming Tools manual.

## 2.0 KNOWN PROBLEMS IN THE PDP-11/60 MICROPROGRAMMING TOOLS

Several problems are known to exist within MIC, the 11/60 microassembler.

They are:

### Constraint Field Problems

A constraint field cannot be assigned on a range (X:Y) if the assembler has selected an address within that range for its next random allocation.

### Syntax

An extra "/" in the micro-instruction field name/field value pair cause the instruction to be ignored.

Only 5 bit specifications are allowed in a constraint.

### Fatal Problems

An .ENDB without label specified causes infinite loop and work-file overflow.

More than 123 characters in source line will kill the listing.

### Undetected Errors

A .CASE beyond .ENDB is not necessarily recognized as an error.

Not all .CASE statements errors are flagged.

A line of over 120 non-comment characters may cause suppression of error message for the line.

The microdebugger (MDT) has one known problem:

A micro break point number greater than 8 will not be properly interpreted.

The microloader (MLD) has no known problems.

3.0 SAMPLE TOOLSGEN

User responses are underlined.

```

>@DK0:[7,102]TOOLSGEN
>; TOOLSGEN.CMD \GENERATE WCS SOFTWARE TOOLS IN PRIVILEGED RSX-11M
>;
>; MUST BE RUN FROM PRIVILEGED UIC
>;
>TIME
13:17:31 30-SEP-77
>* ENTER CURRENT LOCATION OF WCS FILES [S]: DK0:[7,102]
>* ENTER PRIVILEGED UIC TO BUILD WCS TOOLS IN [S]: [7,103]
>* ARE FORTRAN 4+ SUBROUTINES INSTALLED IN SYSLIB? [Y/N]:N
>* DO YOU WANT LISTINGS? [Y/N]:N
>* DO YOU WANT TO TEST THE INSTALLATION? [Y/N]:Y
>SET /UIC=[7,103]      !MAKE SURE TASKS BUILD IN 'TO' UIC
>
.
.
.
>
>; SMK.CMD SMOKE TEST FOR WCS TOOLS
>;
>MID WCS=MICPAK,SMKMIC
>RUN MSTART
>RUN SMKMAC
RUNNING SMOKE TEST
FIRST TEST RAN
SECOND TEST RAN
SMK SHOULD NOW END WITH ILLEGAL INSTRUCTION TRAP
TO CONTINUE PRESS "CNTRL/CONT" AT CONSOLE
(machine halts here)
SMK TEST COMPLETED
>RUN MSTOP
>
>
>TIME
14:26:16 30-SEP-77
>@ <EOF>
>

```

4.0 SAMPLE SMKGEN AND SMK TEST

User responses are underlined

```
>@SMKGEN
>; SMKGEN.CMD \ASSEMBLE,COMPILE, AND/OR BUILD SMK
>;
>* PROG [S]: SMKMIC
>* ARE FORTRAN 4+ SUBROUTINES INSTALLED IN SYSLIB? [Y/N]:N
>* LIST? [Y/N]:Y
>* BUILD? [Y/N]:N
>* ASSEMBLE MICROPROGRAM? [Y/N]:Y
>
>
>INS MIC/TASK=...MIC
>MIC SMKMIC,SMKMIC/MX/BT=PREDEF,DISPCH,SMKMIC
>PIP SMKMIC.LST/SP
>
>
>@ <EOF>
>@SMK
>; SMK.CMD SMOKE TEST FOR WCS TOOLS
>;
>SET /MAIN=WCS:7600:200:DEV
SET -- PARTITION ALREADY EXISTS
>INS [1,1]WCS
>INS MLD/TASK=...MLD
>MLD WCS=MICPAK,SMKMIC
>RUN MSTART
>RUN SMKMAC
RUNNING SMOKE TEST
FIRST TEST RAN
SECOND TEST RAN
SMK SHOULD NOW END WITH ILLEGAL INSTRUCTION TRAP
TO CONTINUE PRESS "CNTRL/CONT" AT CONSOLE
(machine halts here)
SMK TEST COMPLETED
>RUN MSTOP
>@ <EOF>
>
```

5.0 SAMPLE TOOLSTSK

User responses are underlined.

```

>@DKO:[7,102]TOOLSTSK
>; TOOLSTSK.CMD \MOVE WCS SOFTWARE TOOLS TASKS TO PRIVELEGED RSX-11M
>;
>; MUST BE RUN FROM PRIVILEGED UIC
>;
>TIME
14:39:25 30-SEP-77
>* ENTER CURRENT LOCATION OF WCS FILES [S]: DKO:[7,102]
>* ENTER PRIVILEGED UIC TO COPY WCS TOOLS TO [S]: [7,104]
>* INSTALL WCS COMMON (FOR MLD)? [Y/N]:Y
>* TEST INSTALLATION? [Y/N]:Y
>PIP [7,104]/NV=DKO:[7,102]MIC.TSK
>PIP [7,104]/NV=DKO:[7,102]MLD.TSK
>PIP [7,104]/NV=DKO:[7,102]MSTART.TSK
>
.
.
.
>
>; WCSINS.CMD \INSTALL WCS "DRIVER" (MUST BE PRIVILEGED USER)
>;
>PIP [1,1]WCS.STB=WCS.STB
>PIP [1,1]WCS.TSK=WCS.TSK
>SET /NOMAIN=WCS
>SET /MAIN=WCS:7600:200:DEV
>INS [1,1]WCS
>REM MLD
>INS MLD/TASK=...MLD
>REM MIC
>INS MIC/TASK=...MIC
>MIC SMK,SMK=PREDEF,DISPCH,SMKMIC
>PIP SMK.LST/SP
>; SMK.CMD SMOKE TEST FOR WCS TOOLS
>;
>MLD WCS-MICPAK,SMKMIC
>RUN MSTART
>RUN SMKMAC
RUNNING SMOKE TEST
FIRST TEST RAN
SECOND TEST RAN
SMK SHOULD NOW END WITH ILLEGAL INSTRUCTION TRAP
TO CONTINUE PRESS "CNTRL/CONT" AT CONSOLE
(machine halts here)
SMK TEST COMPLETED
>RUN MSTOP
>
>TIME
14:45:25 30-SEP-77

```



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