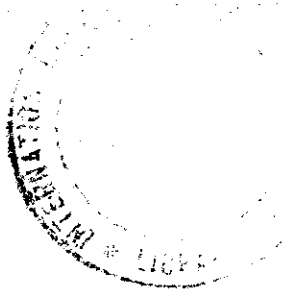

INTERNATIONAL ATOMIC ENERGY AGENCY
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COLLEGE ON MICROPROCESSORS:

TECHNOLOGY AND APPLICATIONS IN PHYSICS

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EXERCISE ON THE ASSEMBLER AND LINKER

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ICTP COLLEGE ON MICROPROCESSORS

(TRIESTE, SEPTEMBER 1981)

PRACTICAL WORK SESSIONS

GOAL: Exercise on the assembler and linker.

PROBLEM DESCRIPTION:

Write a subroutine "DSPLAY" which displays a histogram ("HIST") on a Newbury terminal. HIST will be stored somewhere in memory. The number of channels in HIST will be 29 (decimal) and the maximum count in a single channel will be 23 (dec.) Axes etc. are not required but the histogram should be centered on the screen. Since it is not known from the beginning where the main routine (or any subroutine) will store the histogram it is proposed to write DSPLAY relocatable and to reference HIST externally.

To center the histogram you must output some blanks which can be done using a monitor call. At the end of each line you must output a carriage return and a line feed. This you can also do with a monitor call. You may write a simple macro "MON" which does these monitor calls for you, so that the sequence of instructions:

```
LDAB    #25
MON     10
```

will output 25 spaces.

Since a program is not finished before it passed a test you have to write a main program which defines the histogram and fills it. Do this with the "FCB" assembler directive. The main routine then only calls DSPLAY and stops without destroying the display.

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PRACTICAL WORK SESSIONS

If you fill HIST in the way that HIST(1)=1, HIST(2)=2,...., HIST(23)=23, HIST(24)=22, HIST(25)=21....then the display on the Newbury should look like this: