SCENARIOS FOR USING THE ARPA NET AT THE INTERNATIONAL CONFERENCE ON COMPUTER COMMUNICATION.

WASHINGTON, D.C. OCTOBER 24-26, 1972
ICCC Scenario Conventions

To make browsing easier, we have chosen conventions with which to specify console sessions and attempted to use them uniformly throughout this booklet.

The scenarios are written for use from an ARPANET TIP. Each scenario begins with a series of TIP commands. These include the setting of certain modes (e.g., line-at-a-time) to suit the serving HOST. The scenarios do not include the several TIP commands used to establish terminal-dependent parameters (e.g., extra-padding after carriage returns for timing in fast terminals). Such terminal-dependent commands should be entered at the start of each console session as specified by parameter sheets supplied with each terminal.

In the scenarios, that which a user is expected to type is underlined to set it off from computer type-out, general instructions, and italicized comments. For example:

The computer asks whether it should proceed and the user responds with "yes" followed by carriage return:

**PROCEED?**

"Should I proceed?", the computer asks.

yes [CR]

"yes", the user answers (in lower case).

We have tried to help the user over common trouble spots by paying attention to whether he should type upper or lower case alphabets and by including clearly marked special characters where emphasis is warranted:

**LOGIN PLEASE**

login 1SP 1 iccc 1 SP 1 CNet ICR I

*Note the case shift at "CNet" and the spaces (SP) and carriage return (CR).*

Special characters used include:

- **CR** = Carriage return, RET, Return, CR
- **LF** = Linefeed, Newline, LF
- **ESC** = Escape, Altmode, ESC
- **SP** = Space, SP

Because of their frequent occurrence, we should state that teletype "control characters" are denoted by up-arrow followed by the specifying alphabetic. For example, control-c, written "tc", is typed by holding down the CTRL or CONTROL key on a teletype-like device while striking the "c" key.

If you have difficulty following any or all of the scenarios, please ask an ICCC Special Project person for help, rather than stew in your own juices.
### Table of Contents

Scenarios for Using the ARPANET at the ICCG

#### Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT-DMCG PDP-10</td>
<td>3</td>
</tr>
<tr>
<td>SPEAKEASY</td>
<td>7</td>
</tr>
<tr>
<td>BBN Tenex</td>
<td>11</td>
</tr>
<tr>
<td>MIT H645 Multics</td>
<td>17</td>
</tr>
<tr>
<td>SRI-ARC (NIC)</td>
<td>19</td>
</tr>
<tr>
<td>Harvard PDP-10</td>
<td>25</td>
</tr>
<tr>
<td>SAIL AP Hotline</td>
<td>27</td>
</tr>
<tr>
<td>MIT-AI PDP-10</td>
<td>29</td>
</tr>
<tr>
<td>Remote Job Service</td>
<td>33</td>
</tr>
<tr>
<td>Mathlab’s MACSYMA</td>
<td>37</td>
</tr>
<tr>
<td>BBN LIFE</td>
<td>41</td>
</tr>
<tr>
<td>UCLA-NMC Sigma-7</td>
<td>43</td>
</tr>
<tr>
<td>SCHOLAR</td>
<td>45</td>
</tr>
<tr>
<td>UCLA-CCN 360/91 TSO</td>
<td>47</td>
</tr>
<tr>
<td>BBN CHESS</td>
<td>51</td>
</tr>
<tr>
<td>MIT-DMCG MUDDLE</td>
<td>53</td>
</tr>
<tr>
<td>UCLA-NMC HELP</td>
<td>57</td>
</tr>
<tr>
<td>BBN DOCTOR</td>
<td>59</td>
</tr>
<tr>
<td>SAIL PARRY</td>
<td>61</td>
</tr>
</tbody>
</table>

#### Scenarios by (Approximate) Category

<table>
<thead>
<tr>
<th>Program by Category</th>
<th>Scenario</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language Conversational Programs</td>
<td>DOCTOR</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>BBN DOCTOR</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>SCHOLAR</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>SCHOLAR</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>PARRY</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>SAIL PARRY</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>TINNY</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>UCLA-NMC Sigma-7</td>
<td>43</td>
</tr>
<tr>
<td>Data Base Query</td>
<td>NIC</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>NETWK</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>APF</td>
<td>27</td>
</tr>
<tr>
<td>Games</td>
<td>CHESS</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>BBN CHESS</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>CHESS</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>MIT-AI PDP-10</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>LIFE</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>BBN LIFE</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>JOTTO</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>MIT-AI PDP-10</td>
<td>29</td>
</tr>
<tr>
<td>Network File Transfer</td>
<td>SMFS</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>RJS</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Remote Job Service</td>
<td>33</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>ABACUS</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>UCLA-NMC Sigma-7</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>HELP</td>
<td>43</td>
</tr>
<tr>
<td>Programming Languages</td>
<td>SPEAKEZ</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>SPEAKEASY</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>PPL</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>HARVARD PDP-10</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>FORTRAN</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>BBN Tenex</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>FORTRAN</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>UCLA-CCN 360/91 TSO</td>
<td>47</td>
</tr>
<tr>
<td>Remote Job Entry</td>
<td>RJS</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Remote Job Service</td>
<td>33</td>
</tr>
<tr>
<td>Symbolic Algebraic Manipulation</td>
<td>MACSYMA</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Mathlab’s MACSYMA</td>
<td>37</td>
</tr>
</tbody>
</table>
The MIT Project MAC Dynamic Modelling and Computer Graphics (DMCG) PDP-10 runs the ITS time-sharing system developed at the MIT Artificial Intelligence Laboratory.

ITS prefers to do its own echoing, a character at a time. Its attention getting character is control-z ("tz"). Typing DEL or RUBOUT will generally delete the last character typed on input. Control-g will generally abort commands. To suppress output, type control-s. At command level, upper and lower case alphabets are treated alike.

1. To set TIP parameters and connect to MIT-DMCG:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>@r LF</td>
<td>Reset the TIP. Terminal-dependent setup should be done here.</td>
</tr>
<tr>
<td>@e LF</td>
<td>&quot;Echo remote&quot; is preferred by DMCG ITS.</td>
</tr>
<tr>
<td>PL 70 LF</td>
<td>Cause TIP &quot;LOGGER&quot; to connect to DMCG, HOST #70.</td>
</tr>
</tbody>
</table>

```
LOGGER
T R OPEN
MIT PROJECT MAC DMCG PDP-10.
```

Various system messages appear here and can be suppressed with control-s ("^S").

2. To login, type:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>; log XXX CR</td>
<td>&quot;XXX&quot; should be your initials to avoid LOGIN conflicts. Note that &quot;;&quot; is the ITS MONITOR prompt character.</td>
</tr>
</tbody>
</table>

3. To see who is using the system:

```
; who CR
TTY UNAME JNAME CORE TOTAL IDX
T07 SYS SYS 035 035 01
D11 ------- UNSPOO 001 007 24
T13 PDL T 007 008 03
T16 ------- HACTRN 001 001 10
T17 AKB NETWRK 006 007 05
T21 PMA HACTRN 001 003 06
T23 ICCXXX HACTRN 001 001 23
DNS PJ SPLASH 004 007 07
FREE CORE 117/208
```

4. To send mail to another ICCC DMCG ITS user, type:

```
; mail XXX
```

Note that in the example, the mail is being sent to ICCC user "akk". Because ICCAKB has no file directory at DMCG, his mail is put in a common file directory (COM).

This method of sending mail allows one-line messages only.

```
USER HAS NO DIRECTORY, MAIL GOING TO COM.
```

5. To read a user's mail, type:

```
; mail XXX
```

You are requesting that all of a user's pending mail be typed on your console. This collection of mail will also be typed out when the user in question logs in next time. You might try sending mail to yourself, as above, to get mail the next time you log into DMCG ITS during the ICCC.

```
FROM ICCXXX 09/20/72 20:07:35
HELLO.
```
6. To use the DMCG ITS ARPNET NETWRK subsystem, type:

```bash
netwrk CR
\netwrk.202
\; TYPE "? CR " FOR HELP.\ Backslash ("\") is the NETWRK prompt and escape character. Type it anytime to return to the NETWRK command interpreter.
```

7. To get help from the NETWRK subsystem, type:

```
\ ? CR
```

```
TYPE "HELP CR" FOR ADDITIONAL INSTRUCTIONS.
```

```
IMPORTANT COMMANDS:

? ?? HELP SURVEY REAL.TIME.SURVEY STATUS CONNECTION. TO DISCONNECT QUIT LOGOUT RESET SOCKET.MAP HISTORY.OF SUMMARY.OF.SURVEYS ACTIVE.HOSTS BEST.SURVEY CURRENT LONGTERM TIME COMMANDS .......... DMCG has a SURVEY subsystem which performs a periodic survey of ARPANET serving HOSTs to develop statistics on their availability. A SURVEY is taken automatically every 15 minutes and the results kept in a file for later study. The NETWRK subsystem allows on-line access to the SURVEY data base on serving HOST availability. Note that the SURVEY program runs every 15 minutes, 24 hours a day, when the DMCG ITS time-sharing system is in operation.

8. To print the results of the last survey taken:
```
\ sur SP VEY
```

```
SURVEY TAKEN AT 18:03:39 on 09/19/72 --HOST-- #---STATUS------
UCLA-NMC 001 LOGGER AVAILABLE.
SRI-ARC 002 LOGGER AVAILABLE.
UCSB-75 003 LOGGER AVAILABLE.
UTAH-10 004 LOGGER AVAILABLE.
```

```
The list continues. The HOST numbers are given in octal (sorry). The various conditions reported describe the state of the HOST hardware, ARPANET Network Control Program, and TELNET server (LOGGER), all of which must be functioning to some minimum extent for "Logger available" to be reported.
```

9. To get a brief summary of the SURVEYS for about the last 24 hours, type:

```
\ sum SP MARY.OF.SURVEYS
```

```
00072 SURVEYS FROM 00:16:35 on 09/19/72 to 18:03:19 on 09/19/72 --HOST-- #---%--UP-- -RESP--
UCLA-NMC 001 097% 00.80
SRI-ARC 002 068% 01.23
UCSB-75 003 059% 00.63
```

```
The per cent gives the fraction of surveys which resulted in a "Logger available" condition for the specified serving HOST. The "resp" gives the mean number of seconds (for successful connection attempts) from the first probe to the first response for the specified HOST.
```
SPEAKEASY *** HOST #65

The statement immediately below is an example in SPEAKEASY, an interactive language for researchers that is now available to ARPA Network users on the UCLA 360/91.

\[ X = \text{MATRIX}(2,2; 1,2,4,2); 
\frac{1}{X}; \text{EIGENVALUES}(X) \]

The above is all the information necessary to calculate and display the inverse and the eigenvalues of the indicated 2 \times 2 matrix.

1. To connect to the 360/91 at UCLA, type:
   \text{\textit{str LF}} \quad \text{Reset TIP, terminal-dependent setup here.}
   \text{\textit{ot SP} o SP LF} \quad \text{"Transmit on linefeed", TSO is line-at-a-time.}
   \text{\textit{ot SP} l LF} \quad \text{"Insert linefeed", send a linefeed with each carriage-return.}
   \text{\textit{ot SP} 65 LF} \quad \text{Connect to UCLA CCN (Campus Computing Network).}

UCLA CCN 360/91 SERVER TELNET.
VERSION X.X 0D 000 1972
ENTER COMMAND OR 'HELP':

2. To connect to TSO, type:
   \text{tso CR}

WELCOME TO UCLA CCN TSO
IKMJUJA ENTER LOGON -

3. To LOGON to TSO, type:
   \text{logon SP icx CR} \quad \text{TSO echoes LOGON line. X is digit 1-9.}
   \text{LOGON icc}
   \text{ENTER PASSWORD}
   \text{iccc CR}

IKJNNNI UUU LOGON IN PROCESS AT T:TT:TT ON DD DD, 1972

READY

4. To start SPEAKEZ, type:
   \text{\textbf{! speakez CR}} \quad \text{A short pause here for SPEAKEZ startup.}

TSO-SPEAKEASY-3D T:TT AM D/DD/72

\text{\textbf{!:}} \quad \text{The prompt character "!" indicates SPEAKEASY is now active}
                               \text{and awaiting input from the user.}

Data is entered into the system line by line and may be entered in either upper or lower case. Each line is executed after a carriage return is transmitted.

5. To use SPEAKEZ, try the following interactions:
   Please wait for the prompt character "!:" to appear before entering successive lines of input.
   Output will be generated for many of the input lines indicated.
   \text{\textbf{!:}} \text{x*5 CR}
   \text{!:} \text{x*9 CR}
   \text{x*9 = 45}
   \text{!: \textbf{x*x; x**3 CR}} \quad \text{Multiple statements are separated by semicolons.}
10. To get a summary of SURVEY statistics for the "long term", type:
   \l on  GTERM sum MARY.OF.SURVEYS
10848 SURVEYS FROM 19:48:24 on 04/27/72 to 00:01:34 on 09/19/72
   --HOST-- # %-UP- %RSP-
   UCLA-HMC 001 071% 01.00
   SRI-ARC 002 058% 02.53
   UCSB-75 003 053% 00.80
   UTAH-10 004 062% 02.33

The list continues giving summary data for over 10,000 SURVEYS for about the last 6 months. Please note that this data does not account for scheduled down time, nor does it account for time that the specified HOST was up but not available to the ARPANET.

11. To get a history for a specific serving HOST, type:
   \l on  GTERM his TORY.OF HOST
You can ask for a history for any of the serving HOSTs by name (see HELP) or by number (use octal or decimal preceded by period). Note that the "response time" measure given relates to the mean time (on successful connections) from the first probe to the first response, only.

FIRST SURVEY AT 19:48:24 on 04/27/72
UNDETERMINED 00000 TIMES (000%)
HOST DISCONNECTED 03474 TIMES (032%)
NCP NOT RESPONDING 00000 TIMES (000%)
LOGGER NOT RESPONDING 01016 TIMES (009%)
LOGGER REJECTING 00000 TIMES (000%)
LOGGER AVAILABLE 06358 TIMES (058%)
AVERAGE RESPONSE TIME = 02.53
LAST SURVEY AT 00:01:34 ON 09/19/72

12. To exit from the NETWRK subsystem, type:
   \quit
   KILL

13. To logout of the DMCG system:
   ; logout
   ITS 761 CONSOLE 31 FREE

14. To disconnect from DMCG ITS, type:
   @c
   T R CLOSED
Elements of an array can be entered on a single line, with commas separating the entries:

```plaintext
> y = [1, -9.2, sqrt(2), ...]  Enter some numbers of your own.

> y                  Print out the value of Y, a vector.

> y'                Various operations on a vector.

```

6. To get information on any one of the over 200 SPEAKEZ words, use the HELP command as in the following example:

```plaintext
> help matrix       Helpful description of matrix manipulation is typed.

```

7. To experiment, try some of the following:

```
trace(a); det(a); max(a); min(a); average(a); sum(a); sumsq(a).
```

Information on any of these "words" can be obtained by typing:

```plaintext
> help word      Be sure to type the word correctly.
```

8. To terminate SPEAKEZ, type:

```plaintext
> quit
```

9. To leave TSO, type:

```plaintext
> logoff
```

10. To sever your ARPANET connection, type:

```plaintext
> gc
```

About SPEAKEASY

Attempting to converse with a modern large scale computer can be a quite difficult and frustrating experience. As a result, researchers desiring to utilize the enviable power and resources of a computer are oftentimes understandably turned off by rigid machine restrictions.
SPEAKEASY is a language for people, not machines. The ability to converse with a computer in a notation similar to that of normal mathematics, rather than some foreign language, is SPEAKEASY's forte. A powerful vocabulary of commonly used operations is at the fingertips of the user, and aids to its usage are a very significant built-in capability of the system.

SPEAKEASY is easily learned, easily used, and its ability to relieve the user of trivial tasks associated with writing conventional computer programs, makes man-machine interaction the enjoyable experience it should be.

The system was developed at Argonne National Laboratory under the direction of Dr. Stanley Cohen of the Physics Division. It has been successfully implemented at several installations around the country under OS/360 for operation on the IBM 360/370 series computers. Now a valuable resource on the ARPA Network, SPEAKEASY is accessible via the 360/91 at UCLA.

To obtain more information on SPEAKEASY:

Questions regarding SPEAKEASY on the ARPA Network should be directed to:

Lawrence McDaniel (NIC Ident=LM) or Ernest H. Forman
314 Center for Advanced Computation
University of Illinois
Urbana, Illinois 61801
(217) 333-8497
MITRE Corporation
Westgate Research Park
McLean, Virginia 22101
(703) 893-3500 X-2523

To request an account at UCLA, contact:

Mark Cirlin
Campus Computing Network
UCLA
Los Angeles, California 90074
(213) 825-7426
Tenex is a PDP-10 time-sharing system developed at Bolt Beranek and Newman of Cambridge, Massachusetts (BBN) and now used at several ARPANET sites.

The attention character in Tenex is control-c (denoted "tc"). In Tenex EXEC and most subsystems, control-a ("TA") deletes the last character typed and control-x ("TX") deletes the entire current line. In the EXEC and most subsystems, commands and filenames can be specified with the minimum number of characters assuring uniqueness, followed by ESCAPE (i.e., ALTMODE, denoted ESC; SPACE, denoted SP; or carriage return, denoted CR). Using ESCAPE will cause Tenex to complete a partially typed but uniquely specified command or filename.

In EXEC (Tenex command level), Tenex does not distinguish between upper and lower case alphabatics. Lower case input is echoed in upper case in EXEC and most subsystems. Over the ARPANET, Tenex does its own echoing, a character at a time.

1. To connect the TIP to BBN Tenex, type:
   
   \[@ \text{LF} \]

   Reset the TIP, terminal-dependent setup here.

   \[@ \text{SP} \text{69} \text{LF} \]

   Cause TIP LOGGER to connect to BBN, HOST #69.

   BBN-TENEX 1.29.6, SYSTEM-A EXEC 1.43

2. To login to Tenex, type:

   \[@ \text{login SP iccc CR} \]

   At sign ("@") is Tenex's prompt character. Login with user name "iccc".

   (PASSWORD) iccc CR

   Use the password "iccc"; it will not print.

   (ACCOUNT #) 11514 CR

   Use account number 11514.

   JOB 1 ON TTY103 2-SEP-72 16:39

3. To print a list of EXEC commands:

   \[@ ? \]

   COMMANDS ARE:

   ACCOUNT

   APPEND

   ---------

   List continues. Can be stopped with control-c ("tc").

4. To send a message to another user:

   \[@ sndmsg CR \]

   TYPE LIST OF USERS: iccc CR

   SNDMSG is self explanatory.

   TYPE MESSAGE. EDIT WITH CONTROL-A, Q, R, X END WITH CONTROL-Z. INSERT A FILE WITH CONTROL-B.

   hello, this is a test. CR

   End message with control-Z

5. To print a message:

   \[@ typ ESC E (FILE) message.tx ESC T:1 CR \]

   ESCAPE (i.e., altmode, denoted ESC) causes completion of TYPE command and filename MESSAGE.TXT;1.

   MESSAGE.TXT;1 SAT 2-SEP-72 4:42PM

   2-SEP-72 1642 ICC

   HELLO, THIS IS A TEST MESSAGE.
6. To list status of users and jobs:
   @sys CR
   UP 87:19:48: 3 JOBS
   LOAD AV 0.34 0.45 1.00
   JOB TTY USER SUBSYS
   1 103 ICCC EXEC
   9 101 TEITELMAN LISP
   12 7 TOMLINSON (PRIV)

   List continues. Can be stopped by typing control-c ("^c").

7. To find about an individual user:
   @ where SP tomlinson CR
   TTY7, JOB 12
   The specified user's terminal number and job number are returned if he is logged in to the time-sharing system.

8. To link to the user at TTY7:
   @ link SP 7 CR
   LINK FROM ICCC, TTY 103
   @;hello ray. CR
   Messages over "link" should be preceded by semi-colon.
   @;HELLO, WHO IS IT?
   Questions and comments from TTY7.
   @;this is abhay bhushan from mit, can you help me? CR
   @;OF COURSE, HOW ARE YOU ABHAY?
   @ ........
   Conversation continues.
   @;nice talking to you. bye. CR
   @ break CR
   Break the "link", please.

9. To list files in a directory:
   @ dir ESC ECTORY :hacks> CR

   <HACKS>
   CHESS.SAV;2
   CORDERMAN.LIFE;1

   Get a listing of the <HACKS> directory which contains programs to play various games.

10. To list the <ICCC> directory:
    @ dir CR

    <ICCC>
    1 .F4 ;14,13

   ...........
11. To get the text editor "TECO", type:

```
@ teco CR
```

The TECO prompt character is asterisk ("*") and TECO commands are terminated with ESCAPE (i.e., alt-mode, denoted ESC).

```
* i CR
```

"Inser" in a text buffer all type-in up to the next ESCAPE (ESC).

```
TAB type 100 CR
```

Note that TAB is typed control-i ("I") or "^H".

```
100 TAB format (' SP' hello SP iccc.' ) CR
```

```
TAB end CR
```

You type ESC or ALT-MODE which is echoed as 'S'.

```
ESC
```

```
* ht ESC
```

"Type" the "whole" text buffer.

```
TYPE 100
```

```
100 FORMAT (' HELLO iccc.' ) CR
```

You may edit any typing errors detected. See notes on using TECO at the end of this scenario.

```
* iU ESC
```

"Unload" text buffer onto a disk file.

```
OUTPUT FILE:  akb. f4 CR (NEW FILE) CR
```

You name the file and type CR twice, once to confirm.

```
* ih ESC
```

"Halt" TECO and return to EXEC.

```
@ typ ESC E (FILE) akb.f4 ESC ;1 CR
```

Type the FORTRAN program just entered using TECO

```
; |ICCC>AKB.F4;1 SAT 2-SEP-72 5:36PM	 PAGE 1
```

```
TYPE 100
```

```
100 FORMAT (' HELLO iccc.' ) CR
```

```
END
```

```
@ f40 CR
```

Start the FORTRAN compiler.

```
* akb-akb CR
```

Give the source file name AKB, AKB.F4 assumed. The compiled 'object' file will be AKB.REL.

```
MAIN. ERRORS DETECTED: 0
```

```
8K CORE USED
```

```
* tC
```

Compilation is performed and no errors are detected. You are returned to the EXEC after typing control-o.

```
@ loader CR
```

Relooclable output from compiler must now be loaded for execution.

```
* akb CR
```

You type program name to the loader and it gets its input from AKB.REL for loading.

```
* ESC
```

Typing ESCAPE causes loader to do a library search for subroutines used by your program and to exit to EXEC.

```
LOADER 2K CORE
```

```
5+4K MAX 586 WORDS FREE
```

```
EXIT.
```

```
@ save ESC (CORE FROM) 0 SP 777777 SP akb.sav;1 ESC (NEW FILE) CR
```

Save the core image generated by the loader in file AKB.SAV for future execution.

```
@ run SP akb CR
```

Run the sample FORTRAN program.

```
HELLO iccc.
```

```
CPU TIME: 0.05 ELAPSED TIME: 1.00
```

```
NO EXECUTION ERRORS DETECTED
```

```
EXIT
```

```
rC
```

The program performs as expected.
12. To delete all files we created to clean up ICCC directory:
   @ delete akb.* CR
   Delete all files whose first name is AKB.

13. To access to the ARPANET:
   @ telnet CR
   Start the TELNET (TELecommunications NETwork) subsystem.
   USER TELNET 29 MAR 72. TYPE HELP CR FOR HELP.
   "#" is the TELNET prompt character.

14. To see status of ARPANET:
   # netstatus CR
   By typing control-z ("Z") you can force a return to the
   TELNET command interpreter.
   THE FOLLOWING HOSTS ARE UP:
   UCLA-NMC
   UCLA-CCN
   UCSB-MOD75
   UTAH-10
   BBN-TENEX
   MIT-MULTICS
   MIT-DNCG
   MIT-MATHLAB
   ACTIVE CONNECTIONS:
   A list of ARPANET connections to Tenex is provided with
   their conditions. The table needs some explaining not
   included here.
   # ?
   Question mark will list TELNET commands and key words.
   To stop the long list, type control-z ("Z") and return to
   TELNET command interpreter.
   CONNECTION TO
   DISCONNECT
   "Quit" causes the TELNET subsystem to return you to the
   Tenex EXEC.

15. To see the date and time:
   @ day CR
   SATURDAY SEPTEMBER 2, 1972 17:00:20

16. To log out of Tenex:
   @ logout CR
   KILLED JOB 1 USER ICCC, ACCT 11514, TTY 103 AT 9/2/72 15:01
   USED 0:0:9 IN 0:22:10

17. To disconnect TIP from EBN Tenex, type:
   .0c LF
   T R CLOSED
   "Transmit" and "Receive" closed.
NOTES ON USING TECO:

1. Move current text pointer by the following commands:
   a) \textbf{bj} \texttt{ESC} moves pointer to beginning of buffer.
   b) \textbf{s} <\textit{STRING}> \texttt{ESC} searches for the specified \textit{STRING} and moves pointer to just after it.
   c) \textbf{nl} \texttt{ESC} moves pointer to \textit{n}th line from current line, where \textit{n} is a positive or negative integer.

2. Delete the text by the following commands:
   a) \textbf{nk} \texttt{ESC} will kill \textit{n} lines starting from the current position.
   b) \textbf{nd} \texttt{ESC} will delete \textit{n} characters from the current position.

3. Insert text by the I command, i.e., I<\textit{STRING}> ESC.

4. Example, to change ICCC to THERE in above program, the following would work:
   \textbf{bj} \texttt{ESC}
   \textbf{s}ICCC \texttt{ESC}
   \textbf{-4d} \texttt{ESC}
   \textbf{i}THERE \texttt{ESC}
   \textbf{ht} \texttt{ESC}
1. To connect to Multics, type:

   \( \texttt{r LF} \)  
   \( \texttt{t SP SP LF} \)  
   \( \texttt{t SP LF} \)  
   \( \texttt{t SP LF} \)  

   Reset the TIP, terminal-dependent setup here.

   Line-at-a-time, "transmit on linefeed".

   Insert linefeed after carriage-return.

   TIP command to connect to Multics.

   Multics 17.6b; MIT, Cambridge, Mass.

   Load = 28.5 out of 50.0 units; users = 30

2. To login to Multics, type:

   \( \texttt{enter SP NAME SP CNet CR} \)

   Note upper case "CN" and lower case "et" in CNet.

   Please use your last name for "Name".

   Message from the system.

   \( \texttt{r 1148 5.437 2+588} \)

   The ready message is printed at the end of processing
   each command. The numbers represent time of day,
   cpu time for last command, and pre-paying + page
   faults, respectively.

3. To get specific on-line help, type:

   \( \texttt{'hello from iccc CR} \)

   Statements prefixed with an apostrophe will be sent
   to a network consultant for on-line help or to a file
   for later study by a consultant.

4. To print help file for pi/l, type:

   \( \texttt{help SP pi1 CR} \)

   Number-sign ("#") deletes the previous character in an
   input line and at sign ("@") (typed "@" at a TIP) delete
   the entire line.

5. Help may be used with most commands, e.g. type:

   \( \texttt{help SP who CR} \)

6. To see who is on the system:

   \( \texttt{who CR} \)

   multics 17.6b, load 30.5/0.0; 32 users
   absentee users 2/2
   roach.sysmaint*
   network daemon.CNet
   10.sysdaemon
   backup.sysdaemon
   carey.mpm

   List continues.

   \( \texttt{r 1150 4.039 15+42} \)
6. To use the calculator program, type:

```
: ABACUS CR
002 ABACUS STARTED
CALCULATOR
DO YOU NEED INSTRUCTIONS?
YES CR
```

The HELP section offers instructions and formats for interacting with a powerful desk calculator.

```
...........
```

```
FIXED POINT?
NO CR
AUTOMATIC SUBTOTAL?
YES CR
```

```
FIRST ENTRY
400.23 CR
```

```
INVALID OP CODE
+ 400.23 CR
S 400.2300
+ 200.234 CR
S 600.4639
* 3.23 CR
S 1939.4978
- 1200.213 CR
S 739.2849
A CR
S 739.2849
+ 200.1 CR
S 939.3848
IA CR
= 739.2849
T CR
T 939.3848
FIXED POINT?
X CR
```

```We need an op code like '+'.
Note that each op code like '+' requires a space (SP).
We requested automatic subtotal.
```

```
Store contents of accumulator into area A.
```

```
Display contents of area A.
```

```
Get current total.
```

```
Exit ABACUS, return to MASTER.
```

7. To exit MASTER:

```
: X CR
JOB KILLED
LOGIN
```

8. To disconnect from TIP:

```
@e LF
T R CLOSED
```
UCLA-NMC runs an experimental system called "SEX" on their XDS Sigma-7. SEX interacts line-at-a-time and requires local echoing at the TIP. Commands should be in upper case alphabets.

1. To set TIP parameters and connect to UCLA-NMC:
   - **T**
   - **R**
   - **L**
   - **E**
   Reset current TIP parameters, terminal-dependent setup here.
   06  **T**
   06  **SP**
   06  **SP**
   06  **LF**
   TIP to "transmit on line-feed".
   01  **SP**
   01  **LF**
   "Insert line-feed" after carriage-return.
   **L**
   **R**
   **T**
   **R**
   **O**
   **P**
   **E**
   **N**
   Connect to UCLA-NMC, HOST #1.
   LOGGER
   T R OPEN

   Note, word LOGIN typed by system.

2. To login to MASTER at UCLA-NMC:
   - **L**
   - **O**
   - **G**
   - **I**
   - **N**
   - **I**
   - **G**
   - **O**
   - **N**
   - **I**
   - **N**
   LOGIN ICCC [CR]
   JOB STARTED
   Note, upper case must be used from here forward.
   "!" is the prompt from MASTER.

3. To see who is on the system:
   - **W**
   - **O**
   - **R**
   WHO [CR]
   002 WHO STARTED
   USER PORT
   SEX: 16
   FK 3
   TL 0
   ICCC 27

4. To get back to master:
   - **X**
   [CR]

5. To use the toy question answering program, TIMMY, type:
   - **T**
   - **I**
   - **M**
   - **M**
   - **Y**
   TIMMY [CR]
   002 TIMMY STARTED
   MY NAME IS TIMMY THE TERMINAL, WHAT'S YOURS?
   YOURNAME [CR]
   PLEASED TO MEET YOU, YOURNAME HAVE WE MET BEFORE?
   NO [CR]
   SORRY, BUT I HAVE A TERRIBLE MEMORY FOR NAMES. ANYWAY, MY JOB IS TO ANSWER YOUR QUESTIONS SO, ASK AWAY.
   WHEN WILL THIS COMPUTER CRASH NEXT? [CR]
   ABOUT 5 O'CLOCK.
   
   Ask any number of your own questions of TIMMY.
   GOODBY [CR]
   Exit from TIMMY.
SCHOLAR is a program to review a subject area with a student. For this example, the subject is the geography of South America. SCHOLAR will ask questions and evaluate the student's answers. It will answer questions for the student.

1. To connect to BBN-TENEX:
   \[ \text{@r} \text{L F} \]
   \[ \text{OL SP 69 LF} \]
   Reset the TIP, terminal-dependent setup here.
   \[ \text{Cause TIP "Logger" to connect to BBN Tenex where SCHOLAR will run.} \]

2. To login to BBN-TENEX:
   \[ \text:@ log SP iccc SP iccc SP 11514 CR} \]
   BBN's EXEC prompt character is at sign ("@").
   The second "iccc" is the password and will not print.

3. To start the SCHOLAR program:
   \[ \text:@ run SP} \text{warnock>scholar CR} \]
   Because SCHOLAR is still undergoing development, it is not a BBN subsystem, but rather a program kept in the directory of one of its developers, \text{WARNOCK}.

   BBN LISP-10 07-12-72...
   GOOD MORNING
   SCHOLAR runs under BBN LISP whose prompt character is backarrow ("\[\text{■} \]").

4. To start SCHOLAR dialog, type:
   \[ \text{sysin(} \text{warnock>scholar.sys)} \]
   SCHOLAR system parameters loaded into BBN LISP.
   FOR INSTRUCTIONS, PLEASE TYPE 'INSTRUCTIONS(SHORT)' OR 'INSTRUCTIONS(LONG)'
   \[ \text{(<WARNOCK>SCHOLAR>SY;9)} \]
   After (possibly) looking at instructions, start the SCHOLAR dialog.

   HELLO, MY NAME IS SCHOLAR. I WILL HELP YOU IN REVIEWING THE GEOGRAPHY OF SOUTH AMERICA. THIS IS ABC REGIONAL HIGH SCHOOL. TODAY IS 24-OCT-72.

   IF YOU HAVE CAREFULLY STUDIED YOUR INSTRUCTIONS, WE MAY BEGIN THE REVIEW NOW.

   WHEN YOU ARE READY TO START, TYPE READY --- REMEMBER TO TERMINATE EACH LINE OF INPUT WITH AN ASTERISK * FOLLOWED BY A CARRIAGE RETURN.

   * ready* CR
   Asterisk ("\[\text{\*}\]" is SCHOLAR's prompt character. You must, repeat MUST, terminate input to SCHOLAR with an asterisk ("\[\text{\*}\]" and a carriage return before it will listen to you. Use control-a ("\[\text{\^\[A]\}]" to delete characters from your input line, i.e., the standard Tenex editing characters.

   PLEASE TYPE YOUR NAME—MR., MISS, or MRS. FOLLOWED BY FIRST NAME, MIDDLE NAME OR MIDDLE INITIAL, AND LAST NAME.

   * YOURNAME* CR
   NAME OF YOUR INSTRUCTOR, PLEASE:

   * warnock* CR
7. To print the working directory:

```
pwd | cr
```

Pathname associated with your process's working directory.

8. To list segments in the working directory:

```
list | cr
```

```
Segments = 66, Records = 109.
```

```
r wa 2 test1
```
```
r wa 0 mailbox
```
```
```
List continues.
```

9. To get attention from Multics:

```
@ s | sp &lf
```

Equivalent to TTY BREAK or 2741 ATTN.

```
QUIT | cr
```

```
r 1152 .648 14+14
```

10. To send mail to specified user: In this case, Padlipsky:

```
mail | sp * sp Padlipsky | sp | compnet | cr
```

```
Hello Mike, this is a sample mail for the Multics scenario. cr
```
```
```
A line containing only a single period terminates and sends mail.
```

```
r 1156 3.673 113+52
```

11. To see if anyone has sent you mail:

```
mail | cr
```

```
No mail now.
```

```
r 1156 1.184 24+83
```

12. To logout:

```
logout | cr
```

```
Name CNet logged out 09/12/72 1203.3 edt Tue
```
```
CPU usage 46 sec
```
```
hangup
```
```
T CLOSED R CLOSED
```

You are automatically disconnected from Multics.
The SRI-ARC Online System (NLS) is a powerful system being designed to provide aids to a wide variety of general intellectual tasks; for a more complete demonstration of its capabilities see the schedule of demonstrations posted in the Ballroom. SRI-ARC provides both online and offline services to the Network as the ARPA Network Information Center (NIC) with a DEC PDP-10 computer running the BBN Tenex timesharing system.

The following characters are of importance:

CONTROL CHARACTERS

The up-arrow character ^ when followed immediately by another character means input a control character. A control character is achieved by pressing the Control, CTRL, or Shift II (depending on your terminal) key IN CONJUNCTION WITH the character specified. See the following control characters.

^C -
TO RETURN CONTROL TO THE TENEX EXECUTIVE SYSTEM TYPE ^C.

^a -
IF YOU MAKE A TYPING ERROR AT ANY POINT, type ^a to backspace one character. One character is deleted each time this code is entered.

^t -
IF YOU WANT TO CHECK TO SEE IF THE SYSTEM IS STILL THERE, type ^t. The system will respond with "RUNNING AT -" if it is executing your command. It will respond with "I/O WAIT AT -" if it is expecting input from you. No response means the system is down.

^o -
TO STOP NLS PRINTING type ^o and you will be returned to the command level.

DEL -
DEL is the DEL, Delete, or Rubout key on your terminal.

IF YOU AREN'T SURE OF WHAT YOU ARE DOING DURING A NLS COMMAND SPECIFICATION, type DEL and NLS will return to the command level. This is the Command Delete character (CD).

CR -
is the Carriage Return or Return key on your terminal. CR is used in NLS as a field delimiter and as Command Accept character (CA).

SP -
SP stands for space. Spacing on the paper is for readability only, whenever you are to explicitly type a space it says SP enclosed in a box.

? -
TO OBTAIN MORE INFORMATION ABOUT A PARTICULAR NLS COMMAND type the character "?" at any point during command specification.

ACCESSING THE SRI-ARC SYSTEM

1. To connect to SRI-ARC through the TIP type the following sequence: (NOTE: You must type the character @ before giving any command to the TIP. This is not to be confused with the TENEX prompt character "@" which is printed by the system when it is awaiting a command from the user.)

   @r [LF] 
   Reset the TIP. Terminal-dependent setup here.
   Consult the parameter card attached to your terminal for appropriate TIP commands, if any.

   @l [SP] 2 [LF] 
   Cause the TIP "Logon" to connect you to SRI-ARC, HOST #2.
2. Setting up the SRI-ARC system for your terminal. If you are at a full duplex
terminal type:
@@full CR

On initial entry, network users see only the
characters they type. Using this command enables
you to see characters echoed by the SRI-ARC system.

3. To log into the Tenex system at SRI-ARC:
@@log CR
(USER) iccc CR
(PASSWORD) iccc CR
(ACCOUNT #) 3 CR
JOB # ON TTY# DATE TIME

SCENARIO FOR THE ON-LINE RESOURCE INFORMATION RETRIEVAL SYSTEM (QI)

This scenario demonstrates the application of a simple information retrieval system to a developing
data-base of network facilities. This on-line service provides users at any ARPANET site with
three types of data:

i) Indices of computers, terminals, and programs on the ARPANET.

ii) Site-oriented data giving detailed information about that installation's software, hardware,
and service configuration, as well as staff names and phone numbers,

iii) "Help" information on the use of the data-base.

4. To use the NIC Resource Query System:
@@nic ESC (Resource Query) CR

At this point the retrieval system is initialized.
The QI prompt character is a hyphen (-).

TYPE ? IF YOU NEED HELP AT ANY POINT.

5. To list available options:
@@-

- show ?

At any point (even in the middle of a command)
the user can type a question mark to obtain
information about available options. For example,
if you type,

Instructions for use of the Resource Notebook
Data Base will be typed.

NOTE: WHILE ENTERING A COMMAND THE CHARACTER "a"
CAN BE USED TO ERASE THE LAST CHARACTER TYPED AND
THE CHARACTER DEL WILL RETURN YOU TO THE PROMPT
SYMBOL "-".

When you have seen enough of the list, type a control-o (to) to interrupt printing.
6. Site information is broken into main categories. To browse through this information the user will type, for example:

```
-show sri-arc  CR
(SRI-ARC)
```

Stanford Research Institute
Augmentation Research Center (ARC)
Network Information Center (NIC)

Choose one by typing, for example: show personnel  CR

**(FUNCTION)**
**(ADDRESS)**
**(PERSONNEL)**
**(HARDWARE)**
**(SOFTWARE)**
**(INTERESTS)**
**(DOCUMENTATION)**

Given the list of topics about that site you can pick one by typing for example:

```
-show hardware  CR
```

Information about that topic (possibly in the form of a list of secondary options) will be printed. One can directly access information about a specific topic and site by typing the site ident followed by a colon and the topic as shown in steps 9 and 10 below.

7. To display a table of all the computers available on the Network:

```
-show computers  CR
```

8. To display a table of programs available online:

```
-show programs  CR
```

9. To display the interests of a particular site:

```
-show mit-dmcq:interests  CR
```

**(INTERESTS)**

Material describing MIT-DMCQ’s interests will be typed.

Type **to** to stop printing at any point.

10. To display the personnel at a particular site:

```
-show sri-arc:personnel  CR
```

**(PERSONNEL)**

STATION AGENT...

11. To return to the EXEC:

```
-quit  CR
```
SCENARIO FOR NIC DOCUMENT LOCATOR AND BROWSING SYSTEM

This scenario demonstrates use of NLS to access and browse in selected documents online. Locator is normally used by people with some knowledge and experience in using NLS.

12. To enter the online (NLS) system at SRI-ARC:
   @nis CR
   When NLS is ready for you to type it will print its prompt character, "*".

13. To access LOCATOR:
   *load file 'nic>locator CR

14. To list documents that you can reach with Locator:
   *print branch .2 CR
   xbm CR
   xbm are codes which tell the system to print only the parts of the file you need to see now.
   The numbers and letters preceding the name of each document are NLS STATEMENT NUMBERS.

15. To see the table of contents for a specific document, use the print branch command and indicate the statement number of the document you want to see preceded by a period:
   *print branch .STATEMENTNUMBER CR
   xeb CR

16. You can use each item in the table of contents list to reach a file containing that part of the document. To load and print a particular file, type:
   *print branch .STATEMENTNUMBER SP ^ CR
   The character ^ is to be literally input in this step and does not signify a control character.
   Some terminals have a circumfleex (^) instead of up arrow (^). They do the same thing.
   The new file will print out either short text, or instructions for how to proceed.
   At the end of the printout, the system will supply the name of the new file in a special format, e.g. <nic>LOC7440.nls;8

17. To return to LOCATOR:
   *[SP & CR
   After execution of this command you will be back in LOCATOR where you were before going to the selected document. You can now continue to browse in other documents by returning to step 14 above.

18. To leave NLS and return to the TENEX EXECUTIVE for the next scenario type:
   *quit CR
A SCENARIO DEMONSTRATING THE SHARING OF A FILE STORAGE RESOURCE

This scenario demonstrates the use of extra file storage capacity at the University of California, Santa Barbara to be used by SRI-ARC for archival purposes using a system called Simple Minded File System (SMFS).

19. To view the file to be sent to UCSB:
   @copy (SP) <system>samp1e (ESC).TXT;1 tty: CR [OK] CR
   One paragraph of text -- the contents of the file -- follows.

20. To enter SMFS at SRI-ARC:
   @smfs CR
   UCSB Archival System (ver 1.0 6-SEP-72)
   Message from SMFS: The SMFS herald character is "#".

21. To copy the file to UCSB:
   @COPY
   (TO/FROM UCSB) TO
   (FILE) <system>samp1e (ESC).TXT;1 CR
   (CREATE/REPLACE) CREATE
   When the transfer is complete, SMFS will respond with its prompt character, at which point a copy of the file will exist at UCSB.
   If the message HOST NOT OPERATIONAL should appear then go to step 22.

22. To verify that a copy exists at UCSB:
   #LOCATE (FILE) (ESC) <SYSTEM>SAMPLE.TXT;1 CR
   Archived at UCSB

23. To rename that copy:
   #RENAMe (FILE) (ESC) <SYSTEM>SAMPLE.TXT;1 CR
   (NEW FILE) YOURLASTNAME.txt;1 CR

24. To verify that the file has been renamed at UCSB:
   #LOCATE (FILE) <system>samp1e (ESC).TXT;1 CR
   Not archived at UCSB
   #LOCATE (FILE) YOURLASTNAME.txt;1 CR
   Archived at UCSB

25. To return the renamed file to SRI-ARC:
   #MOVe
   (TO/ FROM UCSB) FROM
   (FILE) (ESC) YOURLASTNAME.TXT;1 CR
   Two copies of the file now exist at SRI-ARC: the original and the renamed version. The copy at UCSB has been deleted.
   #LOCATE (FILE) (ESC) YOURLASTNAME.TXT;1 CR
   Not archived at UCSB
26. To leave SMFS:
   
   `#quit CR`
   
   This is the system's prompt character.

27. To verify that a second copy of the file exists at SRI-ARC:
   
   `@copy SP YOURLASTNAME ESC .TXT;1 (TO) tty: CR [OK] CR`
   
   The text of the file follows again.

28. To delete the second copy you created at SRI-ARC:
   
   `@del SP YOURLASTNAME ESC .TXT;1 CR`

29. To leave the SRI-ARC system type:
   
   `@logout CR`
   
   TERMINATED JOB #, USER ICCC, ACCT 3, TTY 52, AT 8/25/72 1453
   USED 0:0:19 in 0:12:0

30. To disconnect from host SRI-ARC:
   
   `@c LF`
   
   T R CLOSED
The Harvard system interacts character-at-a-time and initially assumes local echoing at the TIP. The attention getting character is ETX, i.e., control-C. The prompt character is period. DEL or Rubout deletes the previous character. '0' stops printout.

1. To reset TIP parameters:
   
   @ L LF              Terminal-dependent parameters set here.
   @ i SP L LF TIP to insert LF after CR.

2. To connect to Harvard:
   
   @ L SP 9 LF
   LOGGER
   T R OPEN
   Harvard 5S0401-31X 16:54:22
   Please LOGIN or ATTACH, or type HELP for help.

3. To obtain help:
   
   .help CR
   The HELP command prints helpful documentation for various commands and programs. 'HELP *' prints a summary of all help texts available. 'HELP NAME' prints the documentation for the NAME command or program.

   .KJOB

4. To see what help exists:
   
   .help SP * CR
   attach echo help impcom kjob login logout
   .KJOB

5. To log into Harvard:
   
   . login SP 74,365 CR
   Job 10 Harvard 5S0401-31x TTY30
   password:
   iccc CR      Mask is typed for password.
   1657 DATE DAY

6. To get system status information:
   
   .systat CR
   status of harvard 5S0401-31X at TIME on DATE
   uptime 28:09:04, 86% null time = 85% idle +1% lost
   9 jobs in use out of 12. 9 logged in, 3 detached
   job who line# what size(K) state run time
   The long printout continues.
7. To use PPL:

```
.r  [SP] ppl [CR]
PPL H.47(133) 17-SEP-72
4+4 [CR]
8
20*30 [CR]
600
40+40*50 [CR]
2040
```

PPL evaluates the expression typed.

```
se"this is a string" [CR]
s[4] [CR]
```

PPL evaluates the expression typed.

```
s[4]-'a [CR]
s[4]-'t [CR]
S [CR]
```

Evaluation is from right to left.

```
that is a string [CR]
```

Print 4th element of S

```
S [CR]
S[3]-'a [CR]
S[4]-'t [CR]
S [CR]
```

Print 4th element of S

```
$complex=[rp: real, ip: real] S [CR]
```

Create constructor, selector, and predicate, below.

```
z=complex(3.2,5.6) [CR]
```

Constructor used to make data of specified type.

```
rp(z) [CR]
```

Get the "real part" of z. Selectors used to get at parts of data using definition.

```
3.2
```

```
ip(z) [CR]
```

Get the "imaginary part" of z.

```
5.6
```

```
z==real [CR]
FALSE
```

The predicate "z is real" is false.

```
z==complex [CR]
TRUE
```

The predicate "z is complex" is true.

8. To exit PPL, type control-C, i.e., ETX.

On a teletype, holding down <CRTL> key, strike C key.

9. To leave the Harvard system, kill your job:

```
.k1 [CR]
```

CONFIRM: k [CR] K will delete unprotected files.

```
job #, user [74,365] logged off tty #, 1717 DATE
runtime # min, # sec
```

If the computer asks you to CONFIRM at this point, just type a [CR] .

10. To disconnect:

```
.8c [LF]
```

26
The AP Hotline is a direct Associated Press news line carrying national and international news. The AP Hotline has been interfaced to the SAIL system at the Stanford Artificial Intelligence Laboratory. Any terminal on the ARPA Network can be turned into an AP news line by running program "HOT" at SAIL.

In addition, the APE system at SAIL processes the AP Hotline continuously, collecting its stories into an on-line database of news information. This database can be accessed via a keyword system by running the program APE at SAIL.

SAIL prefers to do its own echoing, a character at a time. Its attention getting character is control-c ("cC"). When a program is expecting input, typing one cC will cause a return to the command level. Typing two cC's will cause an unconditional return to the command level, even during program output. To delete the previously typed character on input, type DEL or RUBOUT. To delete an entire input line, type control-u ("uU"). The executive command interpreter uses period (".") as its prompt character. It has been observed that the system will type "TIMEOUT" on a few spurious occasions; typing carriage return (CR) has been observed to bring good results.

1. To set up the TIP to talk to SAIL, type the following:

```
@e [SP] r LF
@i [SP] l LF
@e [SP] 1 LF
LOGGER
T R OPEN
```

"Echo remote", SAIL prefers to echo, character by character.
"Insert linefeed" after every carriage return.
Cause TIP "Logger" to connect to SAIL, HOST #11.
TIP says you are being connected.
TIP says you are connected, both "Transmit" and "Receive".

2. After you have been connected to SAIL by the TIP, you must log in. SAIL may type out a number of messages before you can login, so be patient. Typing tc's will suppress message output after a while. A typical interaction is shown below:

```
SAIL PDP-10.
Messages of the day; they can be suppressed with tc's.
login [SP] tc cc CR
You may get a message back saying "are you sure?". If this happens, just type "yes CR ".
JOB 27 STANFORD 6.09B 9-19-72
FRIDAY 22-SEP-72 9:44
You are now logged into SAIL; the "," is the executive system prompt character.
```

3. To run the Hotline program:

```
SP hot [CR]
ASSOCIATED PRESS NEWS...
EXPLORER SATELLITE 260
CAPE KENNEDY, FLA. (AP).
A THREE-STAGE DELTA ROCKET IS POISED FOR AN ATTEMPT TONIGHT TO HURL...
The AP Hotline will type news stories on your console as they come over the AP news line. If there are no news stories coming, your terminal will sit silently, waiting. At any time, you can type tc's to return to the executive command interpreter.
```

You have returned to the executive.
4. To run the APE program:

   r  ape  

   Run APE, a program to give on-line access to a database of AP news information.

   TYPE "?" AND RETURN AT ANY TIME FOR HELP.

   KEYWORD EXPRESSION:  ?

   .................

   A brief helpful message is typed.

   KEYWORD EXPRESSION:  nixon

   12 NEWS ITEM(S) FOUND. READ WHICH ONE(S)?  

   APE will search its news data for stories which contain the word "NIXON", it will tell you how many it has found, and ask how many of them you would like to see. And so on.

5. To logout of SAIL:

   Type control-c to return to the executive; it will prompt
   with period (".").

   kjob  

   "Kill" your job to log out.

   JOB 28, IC.CC LOGGED OFF TTY 122 10:50 22 SEP-72

   .11 HOURS, CONSOLE TIME

   .08 MINUTES, CPU TIME

   .40 K AVERAGE CORE

   KJOB

6. To close the SAIL connection:

   @c  

   T R CLOSED
The MIT Artificial Intelligence Laboratory runs its own ITS time-sharing system on a PDP-10. ITS prefers to do its own echoing, even cross-country.

1. To set TIP parameters and connect to MIT-AI:
   - Reset the TIP, terminal-dependent setup here.
   - "Echo remote", TIP will not echo.
   - Press 2 while holding down the key marked "CTRL" or "CONTROL". This indicates to the system that you desire attention.

   ITS.761. DDT.460.

7. USERS
   At this point the system may type what is known as "the message of the day" which is usually of general interest to the everyday users of the system. It may be ignored, generally, without any loss of continuity.

2. To login to MIT-AI:
   - XXX should be your initials. This tells the system who you are and is necessary before you can proceed any further. Note, there is no prompt; you must type the "!"

3. To run the program JOTTO:
   - JOTTO is a word game played by two players: yourself and the program. Each player thinks up one five letter secret word. The object of the game is to guess your opponent's secret word by deducing which letters it contains. You do this by presenting your opponent with a five letter test word.

   Your opponent then tells you how many of the letters in that word match the letters in his secret word. The message about one-to-one letter matching means that if your test word was "GISST" and the program's secret word was "TEARS", the number of matching letters or "JOTS" would be one. The same is true if the test word was "TEARS" and the secret word was "GISTY". You and your opponent alternately give each other test words and number of "jots" until one of you guesses the other's secret word.

   Note: Carriage returns (CR) are not required to terminate your input. The system automatically responds to you after you type five characters to specify your word or one number to specify number of "jots".

   This particular interaction is for illustrative purposes only. JOTTO chooses its own word differently each time.

   WOULD YOU LIKE TO GO FIRST?
   YES
   YOUR TEST WORD: TEARS
   1 JOT
YOUR TEST WORD: mound
1 JOT
MY TEST WORD: DEIGN
1 JOT
YOUR TEST WORD: child
3 JOTS
MY TEST WORD: SPILL
1 JOT
YOUR TEST WORD: dilly
1 JOT
MY TEST WORD: BONUS
0 JOTS
YOUR TEST WORD: chimp
MOBY FOO, YOU WIN! SHALL I KEEP GUESSING?
YES
MY TEST WORD: LEECH
1 JOT
MY TEST WORD: MADLY
1 JOT
MY TEST WORD: ACIDS
2 JOTS
MY TEST WORD: ALIKE
3 JOTS
IS YOUR WORD KHAKI?
YES
WOULD YOU LIKE TO GO FIRST?
At this point the game starts over again. When you are tired of playing this game you may go on to the next one by typing the following:
tz
1451 .JOT 1,1
:kill CR
This message indicates that at the time you typed tz, the program was waiting for a reply to its question.
This indicates to the system that you are through playing JOTTO and are ready to do something else.

4. To run and use the program CHESS:

:chess CR
setd SP 1 CR
This tells the CHESS program to look ahead only one move. The program is capable of playing a much better game by looking ahead several moves, however, this ties up a substantial portion of the system's resources and takes on the average five minutes per move. For the purposes of this demonstration, SETD 1 is just right.

At this point you may choose either black or white. If you choose white then type:
pb CR
This tells the program to play black.
p-k4 CR
Moves are typed in standard chess notation. If you make a mistake while typing a move, simply type a RUBOUT and then start typing the move over again. The program will type out its moves as it makes them.
A typical remote job entry capability is demonstrated by the following scenario of the Remote Job Service offered between Tenexes and the UCLA 360/91. A simple FORTRAN job created on a PDP-10 at BBN is submitted via a Remote Job Service (RJS) subsystem to an IBM-360/91 at UCLA. Various checks are made before the start and during the running of the job to determine its status. The output is then retrieved from UCLA and scanned at BBN.

1. To setup the TIP and connect to BBN, type:

```
@r LF
ol SP 69 LF
logger
r open t open

BBN-TENEX 1.29.6, SYSTEM-A EXEC 1.43
```

2. To log into BBN, type:

```
@ log SP iccc SP iccc SP 11514 CR
```

The password (i.e., the second "iccc") is not echoed.

```
job 20 on tty107 8-sep-72 13:47
0 end cr
```

Suppress formfeeds for the following listings.

3. To type out sample RJE FORTRAN submission, type:

```
@ type SP fort.;1 CR
; :iccc>f0rt.;1 thu 31-aug72 4:23pm page 1
//cpw502f job
//password: ebrahimi
//fort.sysin do*
write (6,40)
format (35x,9h*heading*)
do 10 i=1,50
10 write (6,50) i
50 format (1x,12)
stop
end
```

This sample program causes the first fifty integers to be printed.

4. To start the BBN and UCLA 360/91 RJS subsystem, type:

```
@rjs cr
```

Tenex requests an ID so it can login (for you) at the UCLA 360/91.

```
NRJ0761 network remote job service ready
rjs7501 terminal netanyt has signed onto rjs
```

```
rjs6521 information alert
....
rjs6611 end of system alerts
```
This is a typical first move for the program. This means that the program used 0.4 seconds of machine time and 1.0 seconds of real time to generate its move.

At any time you may have the program type out the position by typing:

```
bd CR
```

The board will be typed out in a fashion similar to the following:

```
BR BN BB BQ BK BD BN BR
BP BP BP BP ** BP BP BP
-- ** -- ** -- **
-- ** -- ** WP ** -- **
-- ** -- ** -- **
WP WP WP -- WP WP WP
WR WN WB WQ WK WB WN WR
```

-- indicates a white square and ** indicates a black square.

The program also detects impossible or ambiguous moves and informs you of the fact. You may then proceed to type in a legal move.

At the end of the game, or if you get tired, you should type:

```
tz
```

5. To log out of the system:

```
:logout CR
```

6. To disconnect from the AI system:

```
Qc LF
```
5. To get status of jobs submitted from this terminal, type:
   /status SP jobs CR
   You type a command which is forwarded to the 360/91 requesting the status of any jobs which may have been submitted from your terminal previously.
   RJ5783I TERMINAL STATUS CHANGED
   RJ5804I TERMINAL NETANYT HAS NO JOBS ACTIVE

6. To request list of all lines active into RJS, type:
   /status SP lines CR
   Another status request is sent to the 360/91 to examine the current status of other ports into the 360/91 RJS system.
   RJ5800I TERMINAL FORESTRY ACTIVE ON LINE2
   RJ5800I TERMINAL NETANYT ACTIVE ON LINE6
   .....
   RJ5800I TERMINAL NETLL67 ACTIVE ON LINE10

7. To submit the sample job to RJS, type:
   1 END FROM fort.; CR
   You type this command to Tenex instructing it to cooperate with the 360/91 in the transfer of your job submission.
   11 SENT
   RJ5534I JOB CPW502F ACCEPTED BY RJS - 0000011 CARDS READ
   A total of eleven cards (the sample program above) were sent from Tenex to the 360/91 for submission as an RJS batch job.

8. To check status of submitted job (as above), type:
   /status SP jobs CR
   RJ5810I TERMINAL NETANYT HAS THE FOLLOWING JOBS IN RJS
   RJ5812I CPW502F XEQ 000
   Your job is in execution (XEQ).
   /status CR
   At some later time (possibly only a few tens of seconds) and possibly (but not typically) after a complete disconnection/reconnection with the 360/91, you will ask for status from the RJS system and find that your job has run and that the printable output is ready for retrieval.
   RJ5802I TERMINAL NETANYT HAS 1 XEQ JOB(S)
   .....
   RJ548I PRINT OUTPUT FOR JOB CPW502F NOW AVAILABLE, PRTY=070,
   /status SP jobs CR
   RJ5810I TERMINAL NETANYT HAS THE FOLLOWING JOBS IN RJS
   RJ5812I CPW502F PRT 070

9. To retrieve RJE output, type:
   print TO jobout CR NEW FILE CR
   You type this command to Tenex telling it to cooperate with the 360/91 to bring the output of your FORTRAN job back to Tenex for examination as file JOBOUT.
   34
During transmission of your output from the 360/91 to Tenex, you can ask for a progress report if you grow impatient.

When the transmission of your output is complete, you are notified and the number of output lines delivered is indicated.

**QUITTING**

Now that the output of your sample job has returned from the 360/91, you can QUIT using RJS and return to the Tenex system to look at the results. Because the output from RJS submissions is intended for line-printer processing, it is somewhat awkward to view results from an interactive terminal. You will now use an on-line editor (TECO) on Tenex to scan through the large output file for the desired results. Bringing such output to a line-printer connected to the TIP is possible and can be demonstrated.

**10. To scan output with on-line editor, TECO, type:**

```
@teco CR
"y ESC
INPUT FILE: jobout CR CONFIRM CR
16889 CHARS
"s "HEADING* ESC
"20t ESC
```

Search for the second occurrence of the string "HEADING*" in the output file, this marks the beginning of the output desired.

Type 20 lines of output (20 lines past the header).

**11. To logout and disconnect, type:**

```
@logout CR
```

KILLED JOB 20, USER ICCC, ACCT 1, TTY 107, AT 9/08/72 1400
USED 0:0:28 IN 0:13:41
MACSYMA (pronounced "maxima"), Project MAC's Symbolic Manipulation system, is a large computer program, written in LISP, devoted to the manipulation of algebraic expressions. MACSYMA runs under the ITS time-sharing system (originally developed at the MIT Artificial Intelligence Laboratory), on the Mathlab PDP-10 computer at MIT.

With a syntax resembling ALGOL 60, MACSYMA has capabilities for manipulating algebraic expressions involving constants, variables, and functions. The user can differentiate, integrate, take limits, solve equations, factor polynomials, expand functions in power series, plot curves, etc. A user can also manipulate lists, subscripted variables, and matrices with many of the usual operators. Only a few of the system's many capabilities are demonstrated here. This stops printout.

1. To set TIP parameters and connect to the MATHLAB PDP-10:

   9r [CR]
   9e [SP] r [LF]
   9n [SP] 198 [LF]
   LOGGER
   T R OPEN
   MIT MATHLAB PDP-10
   ITS.761. OOT.460.

   You are now talking to DDT, ITS's top-level program.
   The time-sharing system is waiting for you to log in.

2. To login, type:

   :login [SP] iccxxx [CR]

   Login as ICCXXX, XXX being your initials.
   Typing mistakes can be corrected by hitting the RUBOUT or DEL key which causes the last character typed to be deleted and echoed.

3. To return to time-sharing level from a job such as MACSYMA, type a control-z (denoted "^Z"), the ITS attention character:

   ^Z

   A control character is typed by holding down the (CTRL) key while typing the specified character, in this case a "z".

4. To get status of users, type:

   :listf [SP] tty [CR]

5. To print monitor commands:

   :? [CR]

6. To get helpful information, type:

   :help [CR]

7. To send a message concerning some bug or problem with MACSYMA, exit to the time-sharing system with control-z ("^Z") and type:

   ^Z
   :mail [SP] macsyma [SP] ... multi-line message ... [CR]

   Note that control-a ("a") ends message.
To use MACSYMA, type:

```
:macsyma [CR]
```

MACSYMA requests input by typing an input line label, like "(CI)" below.

To work with the expression \((x+1)\), you can type it in by using FORTRAN-like syntax as follows:

```
(C1) (x+1)**3
```

A MACSYMA input line is usually terminated with an at sign ("@"). To get the TIP to send out an at sign ("@"), the user must type "@" and this will be echoed as "@@".

A MACSYMA command when the user wishes display of the result to be suppressed. MACSYMA does not distinguish between upper and lower case characters. In the above case, evaluation and simplification are null operations. MACSYMA will come back with:

```
3
```

```
(D1) (X + 1)
```

Note that your expression is displayed in a two-dimensional notation comparable to that of a textbook. Your result is assigned a label, D1, which may be used in subsequent commands.

MACSYMA automatically labelled the next input line C2.

Let us use one of the over one hundred commands available in MACSYMA, a command for expanding expressions. Commands are written in functional notation, as follows:

```
(C2) expand(d1)
```

```
3 2
```

```
(D2) X + 3 X + 3 X + 1
```

One of the first things you will want to learn is how to correct your input line. There are several possible methods. You may delete the last character typed by hitting the RUBOUT or DEL key once. Doing so will cause the deleted character to be echoed. Sometimes you just wish to start all over again. To do this type "??" (i.e., two question marks), which deletes the current line. Editing is a more complex facility than you will need at first. We will not enter into it here, so you might as well retype your command, taking care to avoid errors.

Let us consider a few additional commands and facilities. To differentiate an expression, use DIFF(expr, var). Here "expr" is the expression or its name, "var" is the variable with respect to which differentiation is to be performed.

```
(C3) sin(x)*cos(x)
```

```
(D3) COS(X) SIN(X)
```

```
(C4) diff(x,x)
```

```
(D4) COS(X) - SIN(X)
```

Note the use of percent sign ("%") in C4. The symbol "%" always represents the previous expression, in this case D3.

To differentiate an expression twice, use DIFF(expr, var, 2):

```
(C5) diff(d3,x,2)
```

```
(D5) -4 COS(X) SIN(X)
```

There are a number of ways for effecting a substitution of one expression for another inside of a third. For example:

```
(C6) x**x**2
```

```
(D6) Z \times E^2
```

```
(C7) d6.z\times x**2
```

```
(D7) X^2 \times E^2
```

38
An equivalent command is:

(C8) \texttt{substitute(x**2,y,d6)}

(D8) \[ x^2 \cdot \text{eq} \]

Note the order of arguments to \texttt{substitute}: substitute the first for every occurrence of the second inside the third.

We shall now consider some more linguistic facilities available in MACSYMA. To assign an expression to a variable use:

(C9) \texttt{a:2029}

(D9) \[ 2029 \]

Thus:

(C10) \texttt{a+2029}

(D10) \[ 2029 + 2029 \]

To define a function \( F(Z) \) to be \( \text{SIN}(Z)+1 \), use "::" in typing:

(C11) \texttt{f(z)::\text{SIN}(z)**2+100}

(D11) \[ \text{SIN}(Z) := \text{SIN}^2(Z) + 1 \]

(C12) \texttt{f(x+1)::}

(D12) \[ \text{SIN}^2(X + 1) + 1 \]

Equations in MACSYMA are a particularly useful form of expression. To represent the equation \( x^2 + 2x = y^2 \), use

(C13) \texttt{x**2+2*x = y**2}

(D13) \[ x^2 + 2x = y^2 \]

One may add expressions to equations, multiply an equation by an expression, and add two equations together.

(C14) \texttt{d13+100}

(D14) \[ x^2 + 2x + 1 = y^2 + 1 \]

The left-hand-side of an equation is obtainable by the function \texttt{LHS}. \texttt{RHS} obtains the right-hand-side.

(C15) \texttt{lhs(x)::}

(D15) \[ x^2 + 2x + 1 \]

Equations are generated as intermediate results of MACSYMA's \texttt{SOLVE} command. For example:

(C16) \texttt{x**2-100}

(D16) \[ x^2 - 1 \]

(C17) \texttt{solve(x,x)}

SOLUTION

(E17) \[ x = -1 \]

(E18) \[ x = 1 \]

(D18) \[ [E17, E18] \]

The final result of \texttt{SOLVE} is a list of its intermediate solutions.
SOLVE can, among other things, obtain closed form solutions to polynomials which can be factored into linear, quadratic, cubic or quartics over the integers.

To substitute one of the solutions into the original equation you can type:

(C19) \[ d16,e17 \]
(D19) 0

Since El7 evaluates to the equation \( X = -1 \), the substitution is made into \( X^{-1} \) and the result is simplified to zero, as expected.

One sometimes wants an expression containing a sum which is unevaluated or unevaluatable. For instance:

(C20) \['sum(g(i),i,0,n)\]
(D20) \[ g(1) \]

Note the use of an undefined function \( G \). \( G \) may be given a definition or substituted for at a later time. Also note the use of the quote symbol. The effect here is to prevent an attempt to evaluate the sum. In this case, however, the quote makes little difference since we would have obtained the same result had we not quoted because the upper limit, \( N \), has not been assigned a value and the SUM cannot be carried out.

MACSYMA considers the quoted and unquoted form of a function to represent its "noun" and "verb" forms, respectively. Most functions are verbs and will be evaluated.

The trigonometric functions (e.g., SIN, COS) are nouns and normally do not evaluate, even if given numerical arguments.

Thus:

(C21) \( \sin(1) \)
(D21) \( \sin(1) \)

To evaluate trigonometric functions with numeric arguments use a NUMER specification:

(C22) \( \sin(1), \text{numer} \)
(D22) 0.84147098

You now may wish to use MACSYMA on your own. Skimming the MACSYMA manual should be helpful.

9. To log out of the system, type:

(CR) logout

Typing control-z gets you back out of MACSYMA.

10. To close network connections:

(CR) LF

T R CLOSED
LIFE is the mathematical game described in *Scientific American*, Volume 223, #4, October 1970. It was originated by the mathematician John Conway at Cambridge. It was coded by Ray Tomlinson at BBN. LIFE simulates a colony of organisms living on a 72x72 rectangular grid. Each point except for those on the edges, has 8 neighboring points: 4 horizontally and vertically, and 4 diagonally.

The rules of LIFE are:

1. **Birth**
   A new organism is created on an empty grid point if exactly 3 neighbors are adjacent to the grid point.

2. **Death**
   - An organism dies of overcrowding if it has 4 or more neighbors.
   - An organism dies of isolation if it has fewer than 2 neighbors.

Deaths and births happen simultaneously.

The program requests an initial colony pattern from the user. This is input by typing for instance:

```
  * * (CR)
  *     (CR)
  * * (CR)
```

Use asterisks, spaces, and carriage returns. The standard TENEX editing characters may be used to edit any input, i.e., control-A will delete the previous character, control-X deletes the lines, and control-R retypes the line. The pattern is terminated with an altmode (ESC).

Each successive generation will be typed out until one of three things happens:

1. The colony dies
2. A stable pattern is established
3. Any teletype key is pressed

At that point, the program requests another initial pattern.

To play LIFE, proceed as follows:

```
@r LF
@l SP 69 LF
@login SP ICCP SP ICCP SP 11514 CR
@run SP (hacks):life CR
```

Play LIFE as described above.

To stop playing LIFE, type:

```
* C
@logout CR
@c LF
```

Type control-C to return to EXEC.
To log out of BBN.
To disconnect TIP from BBN.
LET'S BEGIN OUR DISCUSSION NOW, "YOURNAME"

USE ONE OF THE FOLLOWING:
14400000
3600000
1200000
1800000

TO ANSWER THE QUESTION:
APPROX WHAT IS THE AREA OF BRAZIL?
* 14400000* [CR]
WRONG,
I'LL GIVE YOU ANOTHER CHANCE.
* 3600000* [CR]
VERY GOOD.

.................

Continue your dialog as you wish. When tired, type control-c ('"c"') to return to EXEC to logout.

.................

TC

5. To logout:
   @ logout [CR]

6. To disconnect from BBN-TENEX:
   @c [LF]
The UCLA Campus Computing Network (CCN) 360/91 offers a number of services to the ARPANET including IBM's Time-Sharing Option (TSO). TSO is an interactive programming system sitting on top of the awesome power of an IBM 360/91.

The CCN 360/91 assumes line-at-a-time ARPANET interaction. Both upper and lower case input are allowed. CANCEL or control-X ("^X") deletes the current line and Backspace or control-H ("^H") deletes the previous character on the same line.

1. To set TIP parameters and connect to CCN:

```
symbol SP symbol SP L LF  “Transmit on linefeed”, TIP sends CCN a line at a time.
symbol SP L LF  “Insert linefeed” after every carriage return.
symbol SP 65 LF  Cause TIP "Logger" to connect to CCN 360/91.
LOGGER
T OPEN R OPEN
UCLA CCN 360/91 SERVER TELNET.
VERSION 2.5 30 APR 1972
ENTER COMMAND OR 'HELP':
```

2. To get help:

```
help CR
COMMANDS AVAILABLE ARE:
SERVICE-DESCRIPTION
RJS......EBODIC REMOTE JOB SUBMITTAL SERVICE.
ARJS.....ASCII REMOTE JOB SUBMITTAL SERVICE.
TTYRJS.....ALTERNATE ASCII RJS FOR A MODEL 33 TTY.
BBBOARD.....BULLETIN BOARD NOTICES OF GENERAL INTEREST
TSO.....ACCESS TO IBM TSO TIME SHARING SYSTEM.
HELP.....PRODUCES THIS INFORMATION.
COMMANDS HAVE NO OPERANDS BUT MUST BE FOLLOWED BY
A CR/LF. ANY NONAMBIGUOUS ABBREVIATION FOR A COMMAND
IS ACCEPTABLE. FOR FURTHER INFORMATION ABOUT CCN
SERVICES, CALL (213)825-7548.
ENTER COMMAND OR 'HELP':
```

3. To get current system schedule:

```
board CR
#1036 - 1 AUG 72 - 07.28.50 - OPR
CCN HARDWARE AND SOFTWARE MAINTENANCE SCHEDULE FOR 1972-73:
(FACILITY CLOSED FROM 07:00 AM SUNDAY TO 08:00 AM MONDAY)
---------------------
ENTER COMMAND OR 'HELP':
```

4. To use TSO:

```
tso CR
WELCOME TO UCLA/CCN TSO
IKW54012A ENTER LOGON - TSO message requesting you to log in; "!" is the TSO prompt.
```
5. To login to TSO:

```
:logon SP iCC CR
```
User name "iao". If already in use, use "icz", where z is any digit from 1 to 9.

```
LOGON iCC
ENTER PASSWORD
:iccc CR
Your password is "icoo".
```

ICC LOGON IN PROGRESS AT 07:38:14 ON SEPTEMBER 15, 1972
WELCOME TO TSO. TSO IS AVAILABLE FROM 0600 TO 1400 PDST.
ENTER 'NEWS' FOR CCN NEWS
READY

6. To request help:

```
:help CR
```

7. To instruct TIP to "send synch" to get TSO's attention, equivalent to TTY BREAK or 2741 ATTN:

```
@ SP 5 LF
```

8. To get current time:

```
:time CR
```

CPU - 00:00:02 EXECUTION - 00:00:38 SESSION - 00:05:51
READY

9. To see who is on the system:

```
:users CR
```

3 USERS
USER UNIT
WDD (060)
AKB (046)
HCL (042)
READY

10. To send a message to another user:

```
:send SP 'Hello, this is a user at ICCG' SP user(wdd) CR
```

READY

11. To use edit to create a FORTRAN program:

```
:edit SP sqrtXXX SP new SP fortg CR
```

XXX should be your initials.

INPUT
```
000010: 1 SP SP SP SP SP SP format (' enter a ') CR
000020: 2 SP SP SP SP SP SP format (' the square root of a is ',f10.3) CR
000030: 3 SP SP SP SP SP SP format (f10.3) CR
000040: 100 SP SP SP write(6.1) CR
000050: SP SP SP SP SP read(5.3) a CR
```
TELENET
/ 000 (11) for sale
/ CM/LE/YE/EF

R HOT
I- APE

R PMAY

K JOB

CL

LO 198: MATHLAB

LO 69

LOG DEMO 1 JAN 12572

see p. 45

- 70 DMEC

X + time out
TRACE VARIABLES? (Y,N)
* n CR
ARE TWO TELETYPES BEING USED? (Y,N)
* n CR
DO YOU WANT THIS INTERVIEW SAVED ON A FILE? (Y,N)
* n CR
END INPUT WITH A PERIOD OR QUESTION MARK, FOLLOWED BY TWO ALTMODES.
SPELL OUT NUMBERS.
TO INDICATE SILENCE, TYPE 'S.'
WHEN FINISHED, TYPE 'BYE.'

READY:

At this point, your patient is waiting for your response.

The following is a portion of an exchange between a sane(?) programmer and his
psychotic patient:

* good SP morning. ESC ESC $$ Note: the ESC ESC is typed by the programmer,
and the system responds with 'SP'. The 'S' is the echo for ESC.

HELLO
READY:
* who are you? ESC ESC $$
WHAT DO YOU MEAN?
READY:
* what is your name? ESC ESC $$
MY NAME IS HAROLD SMITH
READY:
* how are you feeling today, harold? ESC ESC $$
ALL RIGHT I SUPPOSE
READY:
* tell me your problems. ESC ESC $$
PEOPLE GET ON MY NERVES SOMETIMES

To leave the PARRY program, you must type control-c ("1C").

4. How to logout of SAIL:
   "1C"
   To logout, first be sure you are talking to the executive
   program by typing "1C".
   "Kill" your job.
   JOB 2B, [1C,CC] LOGGED OFF TTY 122 10:50 22 SEP-72
   .11 HOURS, CONSOLE TIME
   .08 MINUTES, CPU TIME
   .40 K AVERAGE CORE
   KJOB

5. How to close the SAIL connection:
   @c LF
   T R CLOSED
SAIL PARRY

PARRY is a program which simulates a paranoid patient in a mental hospital. The program was written by Prof. Ken Colby of Stanford University. The user of this program must play psychiatrist and attempt to discover the patient's problems without antagonizing the patient or scaring him so much that he runs away.

Initially, the user is asked to select some behavior parameters for the patient to be modelled. Once this has been done, you are on your own with a psychotic (paranoid) patient sitting at the other end of your teletype.

The attention getting character is control-c ("^C"). Typing ^C will return you to the system executive. To delete the last character typed on input, type the character DEL or RUBOUT. The system's executive command interpreter prompts with period (".").

1. Setting up the TIP to talk to SAIL:

   @r SP LF       sets up remote echo
   @l SP LF       inserts Linefeed after each carriage return
   @l SP LF       initiates connection to SAIL
   LOGGER         TIP says you are being connected
   T R OPEN       TIP says you are connected

2. Logging in to SAIL:

   After you have been connected to SAIL by the TIP, you must log in. SAIL may type out a number of messages at you before you can login, so be patient. Striking control-c will stop the printing. A typical interaction is shown below.

   SAIL PDP-10.
   PLEASE LOGIN AS "NET,GUE". NOTE: NCP IS STILL BEING DEBUGGED
   ?
   .login (SP) IC,CC [CR]

   You may get a message back saying "Are you sure?" at this point. If this happens, just YES [CR].
   JOB 27 STANFORD 6.09B 9-19-72
   FRIDAY 22-SEP-72 0944

   At this point, many messages may come out. Be patient.
   ^C

   You are now logged in to SAIL; the "." is the executive system prompt character.

3. How to run the PARRY program:

   When the system types ".", you are talking to the executive system. You can now ask for the PARRY program. An example is given below.

   . r (SP) parry [CR]

   SUPPRESS NON VERBAL FEATURE? (Y,N)     End input parameters with carriage return.
   * y [CR]
   VERSION (WEAK,STRONG)
   * weak [CR]

   Continue specifying parameters of interaction.

   .
DOCTOR is a LISP program written by Joseph Weizenbaum and described in "ELIZA - A Computer Program For the Study of Natural Language Communication Between Man and Machine" in the Communications of the ACM, January 1966.

DOCTOR simulates a psychiatric interview with a Rogerian psychotherapist. The 'subject' types in some statement in natural language using normal punctuation and sentence structure. Two editing characters are provided: control-A deletes the previous character typed (repeatable back to the previous space or comma), and number sign ("#") deletes the entire line typed in. Each input statement is terminated by a period or question mark. The session is terminated by typing GOODBYE.

1. To connect to BBN TENEX:
   @r LF
   Reset the TIP, terminal-dependent setup here.
   @ (SP) 69 CR
   Connect to BBN.

2. To login to BBN TENEX:
   @ login (SP) iccc (SP) iccc (SP) 11514 CR
   Note that the password (i.e., the second "iccc") will not be echoed.

3. To run DOCTOR:
   @ run (SP) hacks>doctor (CR)
   BBN LISP-10 02-22-71 ...
   GOOD AFTERNOON.
   TELL ME YOUR PROBLEMS.
   PLEASE TERMINATE INPUT WITH A PERIOD OR A QUESTION MARK.
   * I have a big problem. The user begins as in a psychiatric interview.
   I AM NOT SURE I UNDERSTAND YOU FULLY. The DOCTOR continues the interview in a lively fashion.
   * my grandmother has a gzenplatz.
   IS IT IMPORTANT TO YOU THAT YOUR GRANDMOTHER HAS A GZORENPLATZ?
   ............
   Continue dialog as your spirit carries you.
   ............
   * goodbye.
   IT'S BEEN MY PLEASURE, THAT'S $7.15 PLEASE.
   NIL

When finished, type control-c, logout, and disconnect.

@C
@ logout CR
............
@C LF

T R CLOSED
ENTER A SERVICE NAME, X, OR ?

You can now type one of the names listed above to get information on any of those programs, or 'X' to terminate the HELP subsystem. Try typing in NETWORK (CR) or SRVYGRAPH (CR).

If you type 'X', the following happens:

x (CR)

You have returned to MASTER.

At this point, you can try some of the programs you read about in HELP, or you can logout of SEX by typing 'X' again.

x (CR)

JOB KILLED

LOGIN

If you have left a program running when you logout, you will see the following:

x (CR)

LOGOUT?

If you want to go back to MASTER, type 'locat (CR)'.

If you want to logout, type 'logout (CR)'.

logout (CR)

JOB KILLED

LOGIN

5. Closing the connection to UCLA-NMC:

Type the following:

@c (LF)

T R CLOSED

Tell TIP to close connection.

Transmit and receive connections are closed.
HELP is a subsystem at UCLA-NMC which permits a user to interrogate a database which is organized in directed graph form. Each vertex of the graph has a paragraph of information, including some information about further details which can be obtained from vertices which are reachable from the current one.

Thus, the user moves from vertex to vertex, investigating each item as his interest directs.

1. Setting up the TIP to talk to UCLA-NMC. Type the following:

   Note: LF means linefeed; CR means carriage return.

   \[ \text{Gr LF} \]
   Sets up TIP to transmit on linefeed.

   \[ \text{Or SP} 0 \text{ SP} 1 \text{ LF} \]
   Causes LF insertion after any CR.

   \[ \text{OL SP} 1 \text{ LF} \]
   Sets up connection to UCLA-NMC.

   \text{TIP} \text{ s} \text{a} \text{y} \text{s} \text{ u} \text{y} \text{e} \text{r} \text{ h} \text{a} \text{v} \text{e} \text{ t} \text{h} \text{e} \text{ LOGG} \text{E} \text{R}.

   \text{T R OPEN}

   TIP says connection is open.

2. Logging in to UCLA-NMC:

   When the connection is open, the SEX timesharing system at NMC will type 'LOGIN' at you. If it does not, type a couple of carriage returns at it.

   The following actions should get you logged in:

   \text{LOGIN} \text{ CCC} \text{ CR}

   \text{JOB STARTED}

   There may be a long delay between the 'Job Started' message and the '!' prompt character. Also, at this point, some message may be typed at you from the system. Wait for them to finish. The '!' prompt character means you are talking to the monitor called MASTER. You can instruct MASTER to start and stop programs, log you out, etc. Let's start the HELP program.

3. Using the HELP system

   To start the HELP system, type as follows:

   \text{: HELP CR}

   \text{NNN HELP STARTED}

   \text{DO YOU KNOW HOW TO USE THIS PROGRAM?}

   \text{\textbf{no CR}}

   If you say 'no', you'll be given a tutorial on the use of HELP. Eventually, you will wind up with the following prompt:

   \text{ENTER A SERVICE NAME, X, OR ?}

   At this point you should type ? to get a list of things you can get help about.

   \text{? CR}

   \text{THE FOLLOWING HELP FUNCTIONS ARE AVAILABLE: (IN ALPHABETICAL ORDER)}

   HELP...short description given here

   LOGIN...ditto

   MSG...how to use our message processor

   NETWORK...tutorials on network resources

   SRVYGRAPH...

   TELNET...

   SURVEY...

   ...some random comments...
Again we have overflow in the function "*" (multiply). Again we look at the offending arguments on the preserved runtime stack.

\[34.000000 \cdot 86833170E37\]

We now know the limits of our simple recursive definition of FACTORIAL using single precision PDP-10 arithmetic. Return to MIDDLE's top level by doing an error return (ERRET).

LISTENING-AT-LEVEL 1 PROCESS 1

\[t\]

Type control-"t" to return to the DMCG ITS MONITOR.

4. To log out of the DMCG system:

\[; \text{logout} \text{ CF}\]

\[\text{CF LF}\]

Close the TIP connection.
If the argument to FACT is zero (0?), then FACT returns the value 1, as expected.

\[
\text{ELSE} \quad \text{<FACT} < - \cdot N \text{1> }} \quad \text{ESC}
\]

If the argument to FACT is not equal to zero (ELSE), then FACT returns the product (*) of the value of \( N \) and the value of FACT applied to \( N \) minus 1. Here we balance the brackets for the product (given in prefix notation as MUDDLE's normal mode), balance the parenthesis of the second conditional (ELSE) clause, and balance the brackets for the \text{COND} and \text{DEFINE}, respectively. With the function definition complete, we type \text{ESCAPE} to get MUDDLE to process it.

**FACT**

Having evaluated our definition of FACT and entered it in its memory, MUDDLE returns the function name FACT.

\[
\text{<FACT 5> ESC}
\]

Try FACT out on a few small numbers whose FACTORIAL you know; like 5 for example, whose FACTORIAL is 120 \((5 \times 4 \times 3 \times 2 \times 1)\).

120

MUDDLE performs the specified evaluation and returns the correct value.

\[
\text{<FACT 13> ESC}
\]

Try FACT for 13 now; a more challenging computation.

6227020800

MUDDLE returns the correct answer, as you can verify with pencil and paper in a few long minutes.

\[
\text{<FACT 14> ESC}
\]

Now try 14, a slightly larger number for FACT.

*ERROR*

OVERFLOW

LISTENING-AT-LEVEL 2 PROCESS 1

MUDDLE encounters a number too large to represent as an integer in the PDP-10. The overflow condition, detected during an invocation of the function "*" (multiply), signals an error condition. Because we have made no provision for this condition ourselves, it is passed untrapped up to the user, you.

\[
\text{<ARGS <FRAME <FRAME>}} \quad \text{ESC}
\]

The environment in which the error occurred remains for user perusal at this higher ERROR level. You examine the arguments to the function "*" (multiply) which caused it to overflow. The arguments are found in a push-down-stack frame.

\[
[14 \ 6227020800]
\]

It must be that 14 times 6227020800 is too large an integer for the PDP-10 to represent.

\[
\text{<ERRET> ESC}
\]

Understanding the difficulty, you do an error return (ERRET) to back out to the top level, to try something new. The error environment, having supplied you with what you needed to know, is now discarded.

LISTENING-AT-LEVEL 1 PROCESS 1

\[
\text{<FACT 33.0> ESC}
\]

Try FACT with a floating point number.

.86833170E37

That seems to work with the precision of a 36-bit word floating point number (7.2 decimal digits).
The MIT Project MAC Dynamic Modelling and Computer Graphics (DMCG) PDP-10 runs the ITS time-sharing system developed at the MIT Artificial Intelligence Laboratory.

ITS prefers to do its own echoing, a character at a time. Its attention getting character is control-z ("tZ"). Typing DEL or RUBOUT will generally delete the last character typed on input. Control-g will generally abort commands. To suppress output, type control-s. At command level, upper and lower case alphabetics are treated alike.

1. To set TIP parameters and connect to MIT-DMCG:
   \[ \text{ED} \]
   Reset the TIP, terminal-dependent setup here.
   \[ \text{SP} \text{ r} \text{ LF} \]
   "Echo remote", DMCG ITS prefers to do its own echoing.
   \[ \text{SP} \text{ 70} \text{ LF} \]
   Cause TIP "Logger" to connect you to DMCG ITS, HOST #70.
   MIT PROJECT MAC DMCG PDP-10.
   PLEASE LOGIN WITH YOUR HOST NUMBER FOLLOWED BY YOUR INITIALS (E.G., BY TYPING "LOGIN &RMM").
   MONIT.192
   A system message of the day will appear here. It can be suppressed by typing control-s ("tS").

2. To login to MIT-DMCG:
   \[ \text{login} \text{ SP} \text{ iccXXX} \text{ CR} \]
   Login as "iccXXX" where "XXX" is your initials.
   MUDDLE is an interpreter related to the list processing language LISP. It improves on LISP. It improves on LISP in a number of ways including its general treatment of data types.

3. To invoke the MUDDLE interpreter:
   \[ \text{muddle} \text{ CR} \]
   MUDDLE 31 IN OPERATION
   MUDDLE mail is typed here.
   \[ \text{LISTENING-AT-LEVEL 1 PROCESS 1} \]

   The canonical first step in learning a language like MUDDLE is to define the function FACTORIAL, recursively. MUDDLE type-in is terminated by typing ESCAPE (ALTMODE). The following multi-line function definition is a single MUDDLE transaction which we have broken into lines for explanatory purposes. Note carefully the use of upper case (MUDDLE distinguishes upper and lower case) and the delimiting spaces in MUDDLE type-in which we have not emphasized in our usual bold way.

   \[ \text{DEFINE FACT (N) CR} \]
   Define FACT to be a function of one variable, named "N" inside of FACT. In typing its definition (to follow), use DEL or RUBOUT to delete an incorrectly typed character and control-L ("mt") to get the current input buffer typed out. Try control-L.

   \[ \text{COND CR} \]
   FACT is a simple CONDITIONAL with the following clauses.
- p-kb3 [CR] Your move (in this example) is "pawn to king bishop 3" as indicated in standard chess notation.
- B P/K2-K4 CHESS makes its answering move, "pawn from king 2 to king 4". Your turn again.

bd [CR] You request to see the board (BD).

WR WN WB WK WQ WB WN WR
WP WP ** WP WP WP WP WP
-- ** WP ** -- ** -- **
-- -- ** -- ** -- **
-- -- ** -- ** -- **
BP BP BP ** BP BP BP BP
BR BN BB BK BQ BB BN BR

- p-kn4 [CR] It is still your move (after typing out board) so you enter "pawn to king knight 4".
- B Q/K1-KR5 CHECKMATE CHESS puts you into checkmate, oops, you lose.
pq [CR] You request a summary of the game.

When finished, type control-c ("c") to get out of CHESS and return to the Tenex EXEC to log out.

4. To logout of the BBN TENEX system, type:
   @ logout [CR]

5. To disconnect, type:
   @ c [LF] T R CLOSED
CHESS is the chess-playing program developed by Richard Greenblatt at MIT. It was described in "The Greenblatt Chess Program" at the 1967 Fall Joint Computer Conference. The program is an honorary member of the United States Chess Federation and the Massachusetts Chess Association, under the name Mac Hack Six. In the April 1967 amateur tournament, the program won the class D trophy; it wins about 80% of its games against non-tournament players.

During play, the program understands moves typed in using standard chess notation, some examples of which are given below.

```
P-KN3  Pawn to king's knight 3
B*P   Bishop captures pawn
O-O   Castle kingside
QR-Q1  Queen's rook to queen 1
R/K2-Q2 Rook on king 2 to queen 2
P-R8   Promote pawn (to queen assumed)
Q*P/Q6 Queen captures pawn on queen 6.
O-O-O  Castle queenside
```

Other commands are available for control and information:

```
BD   Type out board
PW   Play white
PB   Play black
PN   Play neither
PS   Play self (both sides)
M    Make next move
U    Undo last move
DRAW Request machine to acknowledge draw
PG   Print game (history)
LIST List commands
RESET Overturn board (for bad sports)
```

1. To prepare the TIP and connect to BBN TENEX, type:
   ```
   @r LF
   @L SP 69 LF
   ```
   Reset TIP, terminal-dependent setup here.
   Cause TIP "logger" to connect you to BBN Tenex, HOST #69.

2. To login to BBN Tenex, type:
   ```
   @ login SP iccc SP iccc SP 11514 CR
   ```
   The Tenex EXEC prompt character is "@". The second "iccc" is your password and will not print. In the Tenex EXEC and most subsystems, typing control-a ("^A") will delete the last character typed on the current input line. Typing control-c will return you to the Tenex EXEC.

3. To run CHESS, type:
   ```
   @ run SP <hacks>chess CR
   ```
   Run the CHESS program out of the directory <HACKS>.
   ```
   - pb CR
   ```
   The CHESS prompt character is "-". Tell CHESS to "Play Black", giving you the first move.
16. To load and run program:
```
: gofort CR
```
ENTER A
: 56.2 CR
THE SQUARE ROOT OF A IS 7.497
ENTER A
: 64.0 CR
THE SQUARE ROOT OF A IS 8.000
ENTER A
: 5 CR
```
The program is observed to work. Get back to command level with attention character defined above.

17. To display user catalogued data sets:
```
: listcat CR
```
SQRTXXX
HELLO
READY

18. To delete a data set:
```
: delete SP sqrtXXX CR
```
READY

19. To log out of TSO:
```
: logoff CR
```
ICC LOGGED OFF TSO AT 12:59:33 ON SEPTEMBER 15, 1972

20. To log out of cem:
```
: logoff CR
```
1D054012A ENTER LOGON -

21. To disconnect from TIP:
```
: @ CF
```
T R CLOSED
EDIT
: change  SP  80  999/100/  CR  
To correct statement error in GOTO statement number 80.

LIST  CR
00010  1  FORMAT( ' ENTER A' )
00020  2  FORMAT( ' THE SQUARE ROOT OF A IS ',F10.3)
00030  3  FORMAT(F10.3)
00040  100  WRITE(6,1)
00050  READ(5,3) A
00060  B=SQRAT(A)
00070  WRITE(6,2) B
00080  GO TO 100
00090  END
END OF DATA

12. To save the text:
: save  CR  SAVED

13. To exit edit:
: end  CR  You can type "help edit" if you have problems in EDIT.
READY

14. To change the attention getting character:
: terminal  SP  input($)  CR  Makes "$" the attention getting character.
READY

15. To compile program just written in edit:
: for  SP  sortxxx  CR
BEGIN COMILATION
FORTRAN IV G LEVEL 20 MAIN DATE = 72259 12/09/21

Compilation listing here.