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NAVAL RESEARCH LAB WASHINGTON DC
ARCTAN USERS/OPERATORS MANUAL. (U)
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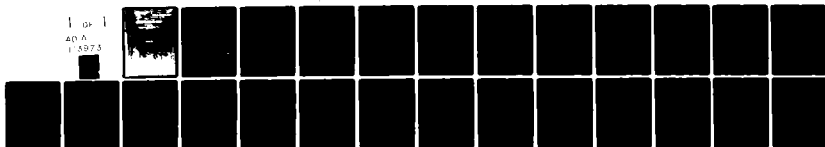
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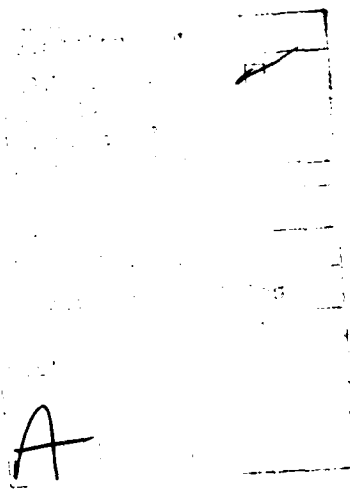
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ARCTAN USERS/OPERATORS MANUAL

I. INTRODUCTION

The Acoustic Research Center Terminal at NRL (ARCTAN) was established by DARPA to provide ARPA personnel and contractors the capability of accessing the Acoustic Research Center (ARC) at Moffett Field, California from the Washington, D.C. area. The ARCTAN facility permits local users at the Naval Research Laboratory (NRL) to access the ARC via a secure subnet of the ARPANET. During such times, the ARCTAN is a server/user host on the classified subnet of the ARPANET.

This report describes the ARCTAN system and its use. The first section gives an overview of the ARCTAN facility. The second section describes the procedures required by a user to access the ARC and use the capabilities of the ARCTAN terminal. The third section describes the procedures to be followed by an operator to put the ARCTAN on the ARPANET as a secure host and to remove it from the net.

II. ARCTAN SYSTEM DESCRIPTION

The ARCTAN is a PDP 11/40 system located in Building 43A, Room 151 of the Naval Research Laboratory in Washington, D.C. Building 43A is a secure building at NRL. Access to the building is limited. During non-working hours, the building is locked and protected by alarms sounding in a manned security area. During the day access to the area is controlled by a cypher lock. When ARCTAN is operating in a secure mode only approved users, operators, or escorted visitors are in the area. Building 43A also contains a vault which can be accessed only by members of the ARCTAN staff.

The relationship of the ARCTAN to the ARC is shown in Figure 1.

Manuscript submitted March 4, 1982.

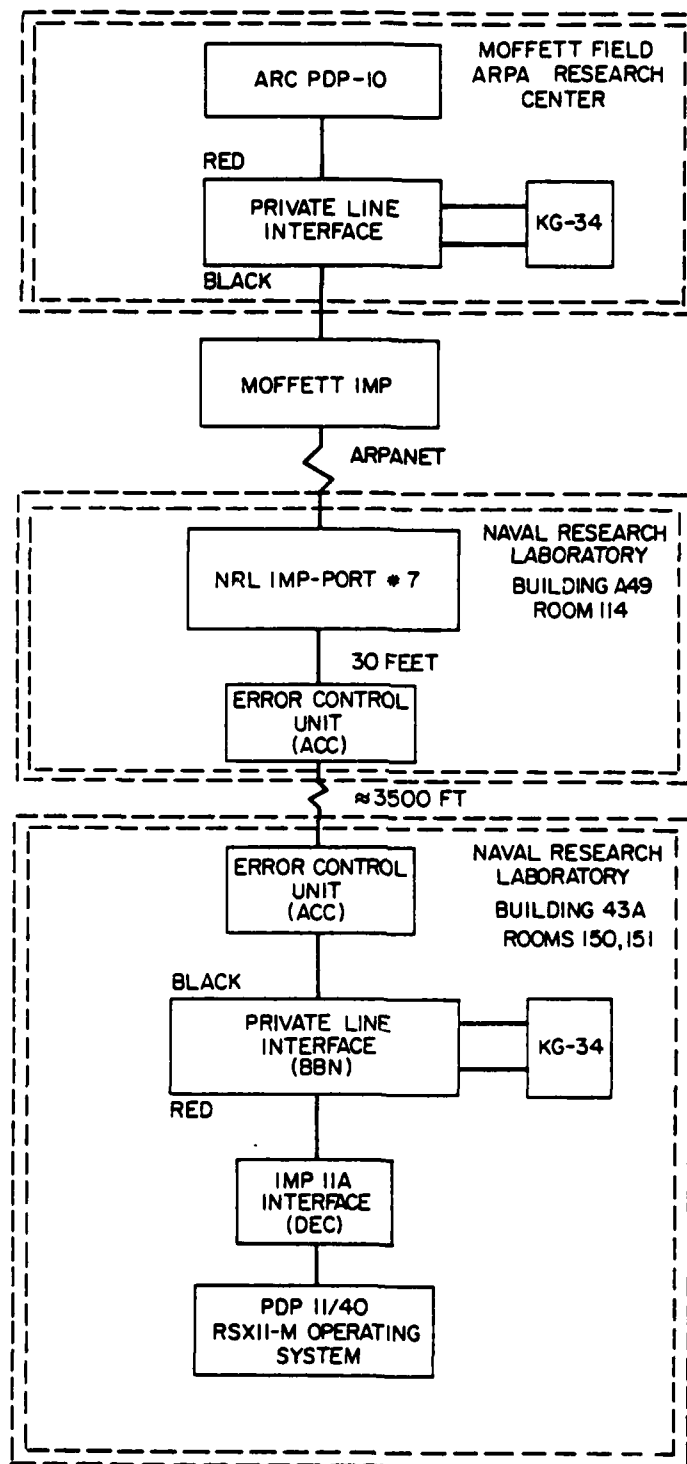


Fig. 1 - ARC-ARCTAN Connection

Since the ARPANET may transmit only unclassified information, data transferred between the ARC and ARCTAN must be encrypted before being sent over the net, and then decrypted after being delivered. The actual encoding/decoding is performed by the KG-34's. The KG-34 at NRL is in the vault. The Private Line Interface (PLI) provides the necessary controls and protocols to provide the interface between the PDP 11/40 and the KG-34, and the KG-34 and the net. The red half of the PLI appears as an Interface Message Processor (IMP) to the PDP 11/40 system while the black half appears as a host to the ARPANET. The error control units are used to ensure that the transmission between the IMP and PLI is error free. These units are required because of the long distance between the IMP and PLI.

The configuration of the PDP 11/40 ARCTAN system is shown in Figure 2. The system consists of a PDP 11/40 system with 128K of memory and the following peripherals:

- o One ASR 33 Teletype
- o Two 4006-1 Tektronix Terminals
- o One 4014-1 Tektronix Terminal
- o One RK07 28 MB Disk Drive
- o Three RK05 2.4 MB Disk Drives
- o Three 45 ips 9-track 800 BPI Tape Drives
- o One Versatec V-80 Line Printer
- o One Floating Point Systems AP-120B Array Processor
- o One IMPL1A ARPANET Interface
- o One RAMTEK 9400 Display System
- o One Time Data A/D System

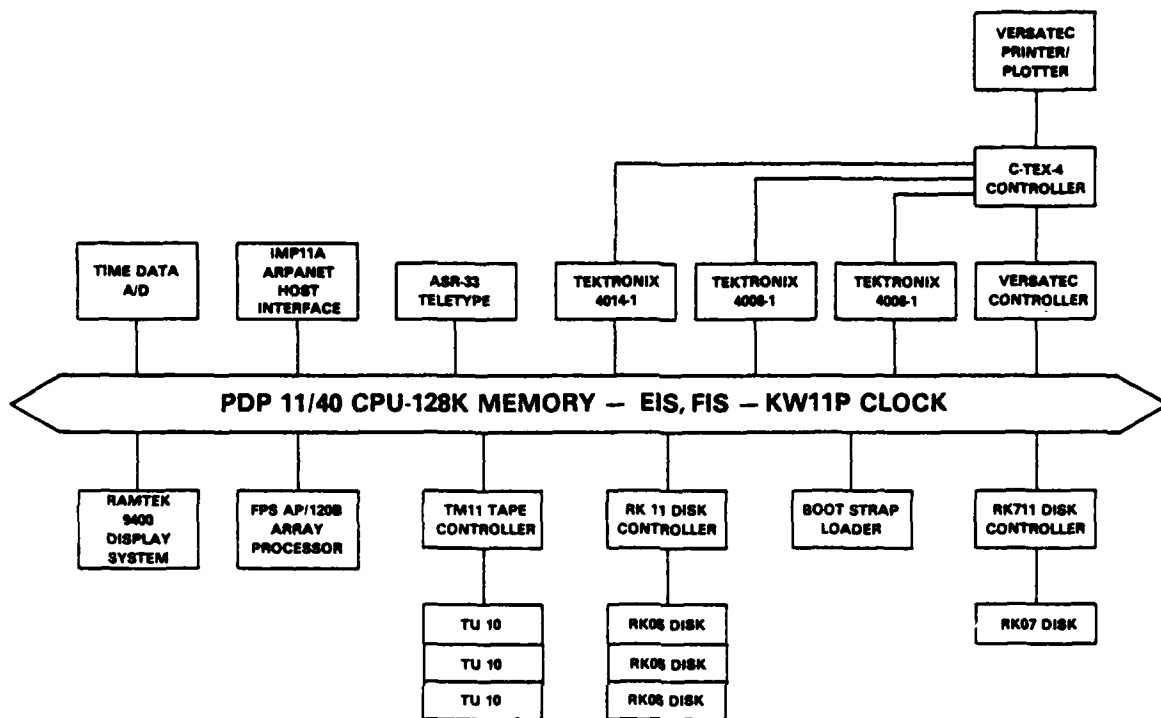


Fig. 2 — ARCTAN system configuration

The layout of this equipment is illustrated in Figure 3.

The PDP 11/40 system operates under the RSX-11M Version 3.1 operating system. RSX-11M is a multiuser, multiprogramming, real-time system developed by DEC to support a broad range of applications. RSX-11M provides the FILES-11 data management services file system for volume structuring and protection, the FCS (File Control Services) system for basic file handling, and a variety of utilities for program development. Programming under RSX-11M may be done using either MACRO-11 (the DEC assembly language) or Fortran IV.

The host ARPANET software is a modification of the SAMNET software developed by Massachusetts Computer Consultants for the Air Force. This RSX-11M based package is presently running at several Air Force and Navy sites on the ARPANET. Maintenance of the SAMNET software for the Air Force sites is provided by the SAMNET support group at Eglin Air Force Base. This group is headed by Calvin George. Currently, the SAMNET software supports server and user TELNET and server and user Files Transfer Protocol (FTP).

The ASR-33 teletype is a 110-baud terminal, which is used only as a system terminal for booting up the system. The Tektronix terminals are cathode ray tube devices and can be used either as terminals or as plotters. Plotting to the terminals is accomplished by the software package developed by the BBN Signal Processing Section for the ARC. Hard copies of the displays can be made on the Versatec line printer by use of the C-Tex-4 hard copy controller.

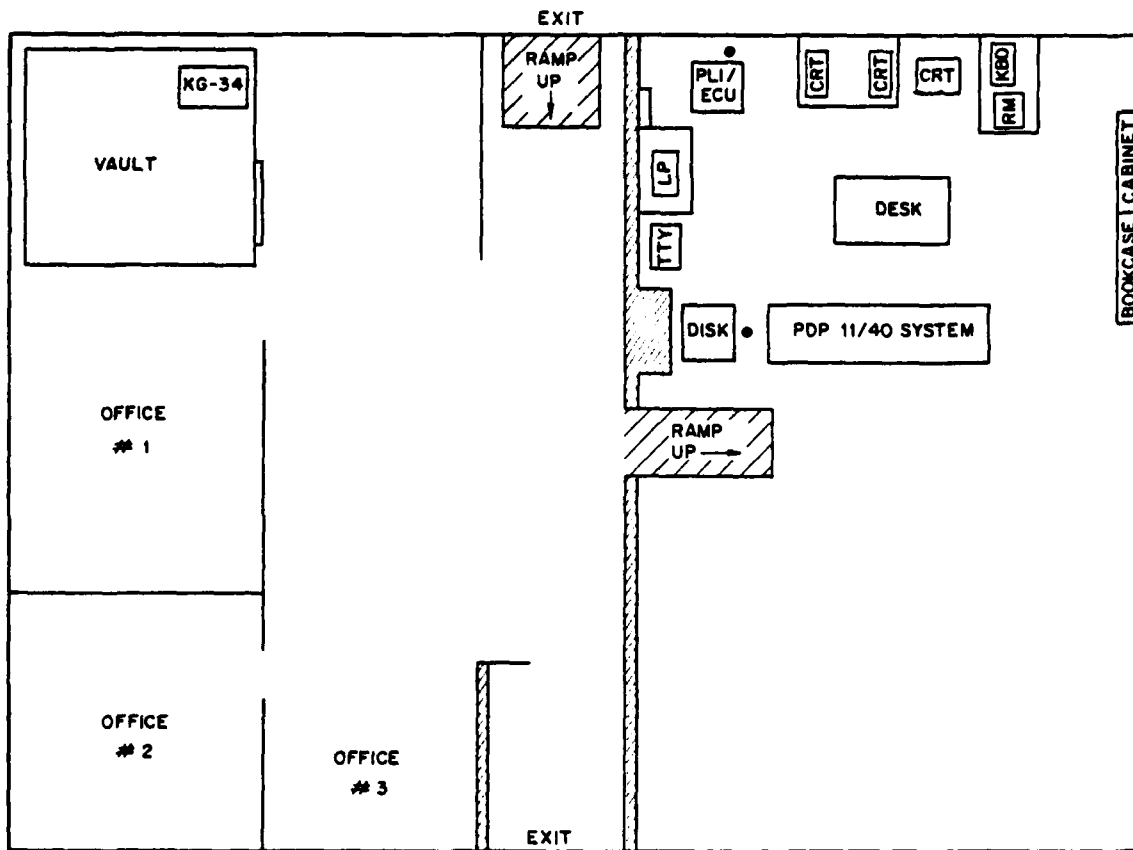


Fig. 3 — ARCTAN room layout

The 28 MB disk drive is used as the system disk. It contains the files necessary for the RSX-11M operating system, the ARPANET interface software, and all of the peripherals on the system. In addition, it can be used for program development and the short-term storage of data. The 2.4 MB disk drives are used for offline storage of programs and data and as a convenient means for transferring files to or from other PDP-11 systems.

The Versatec line printer provides both a listing and a hard copy plotting capability. The printer is capable of a speed of 1200 lines per minute and supports the standard 96 ASCII character set. Plots can be made directly on the line printer by use of the VERSAPLOT software package. This package is based on a set of Fortran callable Cal-Comp like calls. Additionally, hard copies may be made on the Versatec from the Tektronix terminal screens.

The Floating Point Systems, Inc. AP-120B Floating Point Array Processor provides the 11/40 with additional computational capability. The AP-120B performs floating point arithmetic using separate multiplier and adder units. It is capable of 6 million additions and 6 million multiplications per second. The AP 120B on the ARCTAN system has

- o 3K words of 64-bit program memory
(bi-polar RAM)
- o 64K words of 38-bit main data memory
(167 ns interleaved MOS)
- o 4.5K words of 38-bit table memory
(167 ns bi-polar ROM)

Data can be moved between the data memory of the AP-120B and the PDP-11 memory at Unibus speeds with conversion between the internal floating point representations on the fly. Software support

for the array processor includes Version 80.1 of the standard FPS math library, the RSX-11M driver, cross assemblers, linkers, simulators, and diagnostic programs.

The Ramtek 9400 display system is a raster scan display system driving a color CRT. The 9400 receives, decodes, scans, converts, and stores computer generated alphanumeric, graphic and/or image data into a dual ported refresh memory. The data in the refresh memory is displayed on a 1000-line screen. The ARCTAN system supports a 512 X 640 screen resolution with 8-bits (256 colors) per pixel. The Ramtek display system consists of

- o Display Generator
- o Processor Expansion Module with Advanced Graphics
- o 512 X 640 X 8 bit Refresh Memory
- o 19" color monitor
- o Type II generator
- o Keyboard
- o Computer interface

The Time Data A/D system provides a limited capability for converting standard 1" 14-track tapes from analog to digital form. The A/D system consists of a 12-bit Time Data A/D converter, two anti-aliasing filters, and a 1" tape recorder. It is capable of digitizing two channels of data and storing the digitized data onto magnetic tape at a rate up to 1024 samples per channel under the RSX-11M system or 4096 samples per channel in a stand-alone mode.

III. USER OPERATIONS

In order to use the ARCTAN system to access the ARC, the user must be on the roster of approved ARCTAN users maintained by the ARCTAN manager. Users accessing data from the ARC are required to have formal authorization from CNO (NOP-095). Such authorization is obtained through the ARC Security Officer with appropriate notification to the ARCTAN manager. In addition, all non-NRL personnel must forward a clearance at the SECRET level or above to the NRL Security Officer via their chain of command. All users must maintain a current clearance for access to the ARC/ARCTAN in accordance with the above procedures.

Before using the ARCTAN, users must arrange a schedule with the ARCTAN supervisor indicating the dates, duration, and hours of desired operation. Arrangements may be made by telephone (202)767-3623 or Autovon 297-3623, or by mail:

Commanding Officer
Naval Research Laboratory
Washington, D.C. 20375

Attn: Wendell L. Anderson, Code 5144

On arrival at the Laboratory, the user must obtain a visitors pass, badge, and car pass at the reception desk at the main gate, and proceed directly to Bldg. 43A. The entrance door to Building 43A is locked, but access may be gained by alerting the occupants by a buzzer on the cipher lock.

Upon admittance, the prospective user will verify with the ARCTAN manager that his name appears on the list of approved ARCTAN users and will sign the access log. He will be briefed on the ARCTAN security

procedures and then escorted by an operator to the computer room where the operator will ensure that the ARCTAN system is up and running and that connections can be made to the ARC. If the ARCTAN system is not running, the operator will bring up ARCTAN according to the procedures outlined in the operator's section.

The users first step in accessing the ARC is to log onto the ARCTAN RSX-11M system. Each approved user of the ARCTAN has a unique name and password which has been assigned by the ARCTAN manager (this is different from his name and password at the ARC) for using ARCTAN. Upon sitting down at an ARCTAN terminal, the user should type LOGIN user name and a carriage return. The terminal will then print out PASSWORD: The user should now enter his password (which will not be echoed at the terminal) and a carriage return. If the user name and password agree with one of those on the approved list, a welcome message will appear and the system will prompt with a >. If the log-in attempt is unsuccessful, an explanatory error message will be printed out and appropriate action (such as trying again) should be undertaken. Assistance from a member of the ARCTAN staff will be available if required.

A user desiring to use the ARCTAN to run programs at the ARC must use the user TELNET subsystem. The ARCTAN user TELNET operates in one of two states: command state and remote state. Characters typed on the terminal keyboard may be interpreted either as commands to TELNET or as input to the remote host. TELNET is initially in the command state for processing local commands. The remote state is entered when a connection with the remote host is successfully established.

TELNET is invoked by typing TEL and carriage return. The system will then prompt with TEL >. The user should then attempt to establish a connection to the ARC by typing CONN/N 341 and carriage return. TELNET will then try to establish, via the secure subnet of the ARPANET, a TELNET connection to the ARC. If the connection is successful, the ARC header will be printed on the terminal and the terminal will be placed in remote mode. If a time out occurs (currently after 45 seconds) before the completion of the connection, a "Host not responding message" will be printed. If the connection fails for any other reason, TELNET will print out the network device I/O error code and return the user to the command mode.

After a successful connection is made, the user is under control of the ARC PDP 10. He should first log onto the PDP 10 and run his programs at the remote PDP 10.

When the user is finished at the ARC, he should log-out of the ARC PDP 10 and return to command mode by typing the escape character (a # character). After typing the escape character, the system will prompt with TEL >. The user should now close the connection by typing DISC. The user may then exit the TELNET subsystem and return to the RSX-11M monitor by typing QUIT.

WARNING: If the user needs to transmit a # character to the ARC he must change the escape character in order to avoid mishaps.

TELNET may be operated in one of two modes - either character mode or line mode. In line mode, typed characters are buffered into a local line buffer and not transmitted until an end-of-line terminator (such as a carriage return, control Z, escape, etc.) is typed. Prior to typing the end-of-line terminator, the current line may be edited by using the normal RSX-11M terminal editing characters. In particular,

Control-U - deletes the current line

Control-R - retypes the current line

Rubout - erases the last character in the buffer.

In character mode, each character is transmitted when it is typed, and the character is printed on the screen only when it is echoed from the remote host. Line editing is performed by the remote host. In this case

Rubout - deletes the current line

Control-A - erases the last character typed

The default condition is line mode. To establish a character mode connection, the user should type EC RE < carriage return > , and then CHAR < carriage return > after receiving the TEL > prompt and before establishing a connection to the ARC.

A user desiring to transfer files between the PDP 10 disk at the ARC and a disk at ARCTAN must use the FTP system.

To use FTP, the user should log into the ARCTAN system. He should then assign the disk he requires as the system disk (by typing ASN ddu:=SY:), and set his user code to the desired UIC (by typing SET /UIC=[grp,usr]). The user should now start FTP by typing RUN FTP and a carriage return.

Upon obtaining the FTP > prompt, the user should establish a connection to the ARC as before. After a successful connection is made, the user is still under the control of the local PDP-11. To transfer a file, the user must invoke the XFER command. The format of the XFER command is

```
X  dev:filnam.ext  dev:filnam.ext
```

where dev: is null if the file is on the PDP-11 system disk and AR: if the file is on the remote host. Thus to transfer the file IN.DAT to OUT.DAT where OUT.DAT resides on the ARC PDP-10 the user would type

```
X  IN.DAT  AR:OUT.DAT
```

The default transfer parameters for FTP are ASCII data transfer. The FTP parameters may be changed by using the SET command after an FTP > prompt. In particular, the parameters listed in Table 1 may be effected.

The user may check the status of an FTP transfer by typing ST and a carriage return; he may terminate user conversation while letting an on-going transfer run to completion by typing Q and a carriage return; or he may cancel all FTP activity by typing AB and a carriage return.

Whenever FTP receives a message from the remote host, it will print a prompt of the form <aa> on the screen. When the user types a carriage return, the received message will be printed on the screen.

Table 1 — FTP parameters

<u>OPTION</u>	<u>PARAMETERS</u>
TYPE	/AN ASCII, NO EFFECTORS /AT ASCII, TELNET EFFECTORS /AC ASCII, ASA EFFECTORS /EN EBCDIC, NO EFFECTORS /ET EBCDIC, TELNET EFFECTORS /EC EBCDIC, ASA EFFECTORS /IM IMAGE /LB:N LOCAL BYTE
TRANSMISSION BYTE SIZE	/BY:N (DEFAULT N=8.)
STRUCTURE	/FS FILE STRUCTURE /RS RECORD STRUCTURE
MODE	/SM STREAM MODE /BM BLOCKED MODE
RECORD LENGTH	/RL:N RECORD LENGTH
RECORD COUNT	/RC:N

An example session is given in Appendix A. In this case, the operator has brought up the ARCTAN system and has mounted DK1 for the user. The user, whose UIC is [100,100], first accesses the ARC via FTP to transfer the file TEST.TXT from ARCTAN to the ARC, and then uses TELNET to type the ARC version of the file on his terminal to ensure the transfer was successfully completed.

IV. OPERATOR OPERATIONS

ARCTAN operators are NRL employees, designated by the ARCTAN manager, who can bring up the ARCTAN system for secure operations. As such they are familiar with the ARCTAN software and hardware, and have access to the vault and the safe in the vault. Only those persons on a roster of approved ARCTAN operators maintained by the ARC manager may bring ARCTAN up for secure operations.

The step-by-step procedure for an operator to bring up the ARCTAN system for someone trying to access the ARC is given in Table 2.

If the attempt to connect to the ARC in step 13 "times out", the operator should ensure that the ARCTAN can connect to itself using the ARPANET. This can be accomplished by running the indirect command file LSN.CMD on the teletype and then trying to connect to host 1 via TELNET. After this test has been completed the operator should abort the task LSN. If a connection can be made to ARCTAN, the operator should contact the ARC to determine its status.

Table 2 — Operator procedures

1. Remove all trash from computer room and clean off all desk and table tops.
2. Turn the PDP 11/40 system on and push the HALT switch on the control panel down.
3. Remove all disk packs from the disk drives (RK05 and RK07) and place them in the disk pack cabinet.
4. Remove all magnetic tapes from the tape transports.
5. Ensure that the cable from the IMP11A is connected to the red half of the PLI.
6. Ensure that the cable from the black half of the PLI is connected to the ECU.
7. Install the proper keys in the KG-34 unit and turn the power switch for the KG-34 on.
8. Provide power to the PLI by turning circuit breaker 10 on.
9. Obtain the ARCTAN system disk from the vault, place it in the RK07 disk drive, and load the drive.
10. Place the octal address 173006 into the switch register, push the load address switch down, move the HALT switch to enable, and push start.
11. Push down address switches 1 and 2.
12. The system will now boot up, type a few lines, and ask for the time and date. Enter the current time and date and hit carriage return.
13. A few more messages should appear on the terminal, including one of the form

*** IMP ALIVE

or

*** IMP DEAD

If the IMP DEAD message appears, an error in the IMP11A-PLI-IMP connection is indicated.

14. Test the connection to the ARC by running TELNET and connecting to 341.
15. Logout the ASR-33 terminal. The system is now ready for the ARCTAN user.

After going through all of the procedures for bringing up the secure system, the operator should inform the user that the system is available. He should get from the vault any of the users classified materials that he requires and be available to answer general questions.

When the user has finished using the ARCTAN system, the operator should follow the PURGE procedure in Table 3 to cleanse the system.

Table 3 -- Purge procedures

1. Remove any disk packs from the RK05 disk drives, properly label them, and store them in the vault.
2. Remove any magnetic tapes from units 0, 1, and 2, properly label them, and store them in the vault.
3. Turn circuit breaker 9 off (this turns the power to the PLI off and purges it).
4. Turn off the power on the PDP 11/40 CPU.
5. Remove the cover from the top of the IMP11A, remove the cable, and insert the turnaround card in this slot.
6. Turn the power back on the PDP 11/40 and reboot the system.
7. As a privileged user, type RUN \$ABB and carriage return on the teletype. The prompt ABB> will be typed. Type [1,2] PURGE.OBJ and a carriage return. The message HERE IT GOES! will appear and the CPU will halt at 23032.
8. Remove the system disk from the RK07 drive and load each of the disk drives with a scratch disk pack.
9. Load each magnetic tape drive with a scratch tape.
10. Push the page button on each of the Tektronix terminals.
11. Push the continue switch on the PDP 11/40 CPU.
12. The PURGE program will run for about 15 minutes, halting at location 120416.
13. Replace the teletype ribbon.
14. Dispose of all trash generated by use of the burn bag in the vault.

The PURGE procedure is now complete.

APPENDIX A - EXAMPLE SESSION

After booting up the system, the following will appear on the ASR-33 terminal:

RSX11M V3.1 BL22 124K MAPPED

> RED DMO:=-SYO:
> RED DMO:=-LBO:
> MOU DMO:ARCTAN
> @[1,2]STARTUP

PLEASE ENTER TIME AND DATE (HR:MN DD-MMM-YY)[S]: 9:10 3/24/81

> TIM 3/24/81 9:10
> ACS SY:/BLKS=1024
> RUN \$MTCOR
> MOU AR: /ACP=NEWNCP
> ...--IMP ALIVE (these two lines may
RUN ... LSA be overwritten)
JCT
@ <EOF>

LOGO

JOB 1 LOGGED OFF AT 0-9:10:23 24-MAR-81

The system has now been booted up. The user should now proceed to use one of the Tektronix terminals to access the ARC. An example session is shown below. <CR> indicates that a carriage return is typed at this point.

LOGIN WLAAMA <CR>

PASSWORD <CR> (password not echoed)

JOB 1 USER [1,3] LOGGED ON TT1 AT 09:11:47 24-MAR-81

> SET /UIC= [1,2]

> FTP <CR>

RSX-11M USER FTP V14.0

FTP> CONN 341 <CR>

FTP> <CO> <CR>

MOFFETT.ARC FTP SERVER 1.44.00-AT TUE 24-MAR-81

09:36 PST

FTP> LOGIN ANDERSON <CR>

dhdhgojy PASSWORD <CR> (enter password)

ACCT: ARCUSER <CR>

FTP> <MSG> <CR>

LOGIN COMPLETED.

FTP> X TEST.TXT AR:TEST.TXT <CR>

FTP> <RC> <SN> <OK> <CR>

SENDING [3./33] TEST.TXT

COMPLETED 160 BITS

FTP>Q <CR>

> TEL <CR>

RSX11M-V3.1 -- USER TELNET-V15.1 24-MAR-81 09:12 TYPE ? <CR> FOR HELP

TEL CONN/N 341 <CR>

CONNECTION COMPLETED

ARC-KA TENEX 1.34.46, ARC EXC 1.53.96

THERE ARE 11+3 JOBS AND THE LOAD AVERAGE IS 3.47

@ LOGIN ANDERSON <CR>

(PASSWORD)

dg\$dg\$gh <CR> (type in password)

THANK YOU...

(ACCOUNT) ARCUSER <CR>

JOB 16 ON TTY37 24-MAR-81 47:35

PREVIOUS LOGIN: 12-MAR-81 12:21

@ TYPE TEST.TXT <CR>

; <ANDERSON> TEST.TXT: | TUE 24-Mar-81 9:13 Page 1

THIS IS A TEST

L

@

@ LOGO <CR>

LOGOUT JOB 13, USER ANDERSON, ARC USER, TT437,

AT 3/24/81 0746

USED 0:0:25 IN 0:6:17

#

TEL> QUIT <CR>

DISCONNECTED #000341

APPENDIX B - REFERENCE MANUALS

1. Digital Equipment Corporation, RSX11M V3.0, System Reference Manuals, Volumes 1A, 1B, and 1C.
2. Digital Equipment Corporation, RSX11M V3.0, System Procedures Manuals, Volumes 2A and 2B.
3. Digital Equipment Corporation, RSX11 Fortran IV Manuals.
4. Bolt, Beranek and Newman, Inc., TENEX Executive Manual.
5. Bolt, Beranek and Newman, Inc., TENEX JSYS Manual.
6. Digital Equipment Corporation, DECSYSTEM 10 Users Handbook.
7. Floating Point System Inc., FPS API20-B Manuals.
8. Digital Equipment Corporation, DECSYSTEM 10 Language Handbooks.
9. RAMTEK, RM-9400 Series Graphic Display System Software Reference Manual.
10. SRI International, Acoustic Research Center System Capabilities Handbook.
11. Massachusetts Computer Associates, Inc. AFSCNET Technical Documentation, Volume I & II.
12. Department of the Air Force, Using the AFSC Scientific and Management Network (SAMNET).

APPENDIX C - ACRONYMS

ACC	Associated Computer Consultants
AFSCNET	Air Force Systems Command NETWORK
ARC	Acoustics Research Center
ARCTAN	Acoustics Research Center Terminal at Naval Research Laboratory
ARPANET	Advanced Research Projects Agency NETWORK
BBN	Bolt, Beranek, and Newman
DEC	Digital Equipment Corporation
FPS	Floating Point Systems
FTP	Files Transfer Protocol
IMP	Interface Message Processor
MCA	Massachusetts Computer Associates
PLI	Private Line Interface
SAMNET	Scientific And Management NETWORK
SRI	Stanford Research Institute
TELNET	TERminal NETWORK

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