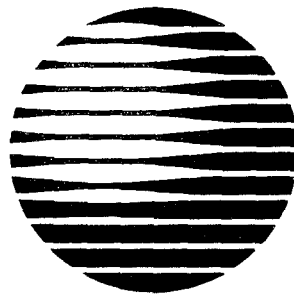


AT&T 3B2 MODEL 300 COMPUTER OPERATIONS, MAINTENANCE and SYSTEM ADMINISTRATION T662

(Student Guide)



AT&T

SERVICES DIVISION EDUCATION

May 1985

WELCOME TO THE TRAINING CENTER

This course is designed to give you practical, hands-on experience on the AT&T 3B2 Model 300 Computer.

The objective of this course is to present the fundamentals of the operation, maintenance, and system administration of a 3B2 Model 300 Computer. Listed below is the contents of Course CT3601:

AT&T 3B2 Model 300 Computer
Operations, Maintenance, and System Administration

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This customer training course features one 3B2 Computer per trainee. When performing some of the work assignments, the class will be divided into three teams. Each team will normally consist of two people. Teams will be formed when working with various 3B2 Computer devices.

The intention of this hands-on training is to teach the skills required for operation, maintenance, and system administration of the 3B2 computer. Opportunities will arise to examine the supplementary documentation available in the classroom. You should use these opportunities to enhance your subject matter background.

If you are not certain of what you are doing, ask your instructor for assistance. You are encouraged to ask questions! Again, this is your opportunity to work with the 3B2 Computer and use correct procedures in a training environment. This training opportunity will help you avoid problems in an in-service situation. By following the correct procedures, you will develop good work habits. To protect against electrostatic discharge (see following pages), do not forget to use the wrist strap, which is grounded, when handling circuit packs.

Finally, you will have an opportunity at the end of this class to critique the course and your instructor(s). Be honest and complete in filling out this critique. Your feedback will be greatly appreciated.

3B2 COMPUTER COURSE EVALUATION

Course # _____ Class # _____
Class Dates _____ Instructor _____

Please complete the following questions. Answer each question by stating your reactions to this workshop.

1. How did you feel about this workshop?

Very Dissatisfied	Somewhat Dissatisfied	Neutral	Quite Satisfied	Very Satisfied

2. Please comment on why you feel this way.

3. What were the weaknesses of this workshop?

4. What were the strong points of this workshop?

5. Can you see applications for this workshop in your job?

6. What ideas do you have to improve this workshop (if any)?

7. How would you rate this training facility?

8. Would you recommend this workshop to your peers?

9. Please use the other side of this paper for any other comments you wish to make concerning this workshop or training facility. We thank you for your input and your time.

ELECTROSTATIC DISCHARGE

General Information:

When electrons are at rest on a surface, such as your body, that form of energy is called static electricity. When these electrons are released from one surface to another, this is called electrostatic discharge (ESD).

While it takes a minimum voltage level of 3,500 volts for a person to feel ESD, it takes only 100-300 volts of ESD to cause circuit pack failure. Since ESD voltage contains little or no current, employee safety is not a problem.

Most ESD damage occurs during the handling of circuit packs. Devices damaged by ESD may escape detection during testing, since they may continue to operate in an apparently normal fashion for some time prior to failure.

ESD can be created by such common occurrences as combing your hair, walking across the floor, or drinking from a styrofoam cup. In fact, all synthetic materials have the capability of generating large amounts of static electricity onto your body. Unless you use static preventive measures, this static is released from your body to the electronic components you handle.

Therefore, the following procedures must be used.

Handling Circuit Packs:

- Do not handle circuit packs unless properly grounded.
- Do not hand a circuit pack to an ungrounded person.
- Do not let circuit packs come into direct contact with possible sources of static charges, such as clothing and common plastics.
- Do not touch the leads of the circuit pack - handle by the outside edges.

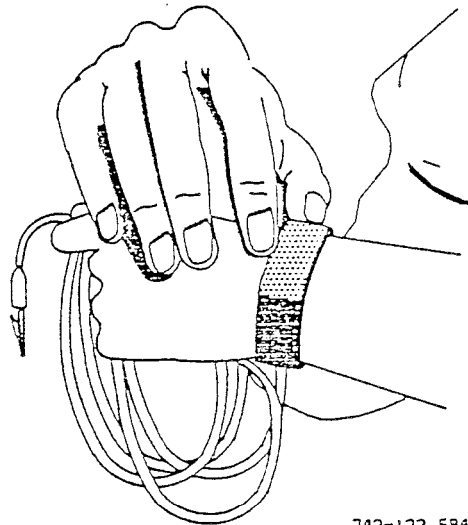
- Do not attach gum labels, scotch tape, etc. to circuit packs.
- Do not clean circuit pack gold fingers with any material unless it has been approved for this purpose.
- Do not permit common plastics in work areas.
- Do not use plastic solder suckers.

Packaging and Storing Circuit Packs:

- Follow the circuit pack handling procedures when packaging.
- Package circuit packs in their antistatic bags only.
- Place circuit packs in approved carrying cases or cartons.
- Do not remove circuit packs from their protective packaging until needed.

Grounding:

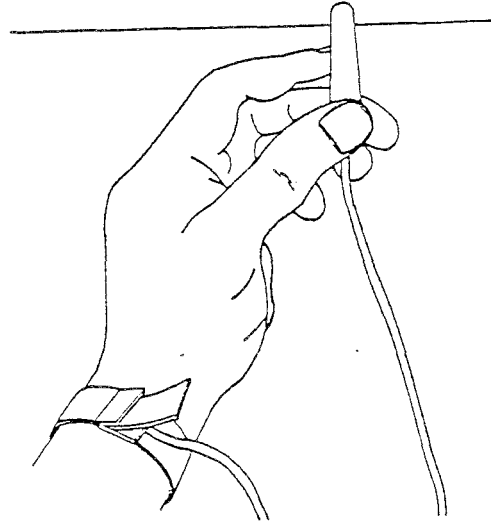
- Do not handle circuit packs unless you are properly grounded by using a wrist strap.
- Attach the strap end of the wrist strap securely to the bare skin of your wrist.



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- Do not wear the wrist strap over clothing - wrist straps are not effective when worn over clothing.

- Attach the clip end of the wrist strap to a bare metal portion of the equipment frame. (You may have to attach it to a designated grounding point on some systems.)



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- Continue to wear the strap until all work activity on the system has been performed.
- Check wrist straps for continuity monthly with a standard volt ohmmeter.

CAUTION

As integrated circuitry becomes more sophisticated, it also tends to become more sensitive. Thus, the potential for ESD damage increases.

Electrostatic discharge (ESD) occurs when a person becomes charged and discharges to an integrated circuit on a circuit pack.

Several precautions to follow when working with circuit packs are:

1. ALWAYS touch grounded (exposed) metal before handling a circuit pack in any way, i.e., storing, inserting, removing.
2. Handle a circuit pack only by the faceplate or latch and by its top and bottom outermost edges. NEVER touch the components, leads, or connector pins.
3. Keep ALL food wrappers (plastic or paper) and styrofoam containers away from all circuit packs.
4. Ship circuit packs only in the shipping materials in which they were originally packed. (Many circuit packs are now packaged in antistatic bags at the factory.)
5. Observe warning labels on bags and cartons. DO NOT remove circuit packs from the bags or cartons until ready to insert in a frame.
6. Put removed circuit pack immediately into an antistatic bag before packaging for shipment.
7. Keep adhesive tape (scotch or masking) away from sensitive devices.
8. DO NOT remove printed circuit boards or any packs from a system with the power on.
9. Maintain relative humidity above the 20% level.

Refer to BSP 032-173-301, Issue 7, March 1981, regarding circuit pack handling, paying particular attention to Sections 4.03 and 7.31 through 7.37.

AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE AND SYSTEM ADMINISTRATION
3B2 SYSTEM DESCRIPTION

CAUTIONS

This work assignment is written for 3B2 Model 300 Computer Release 1.1.

REFERENCE DOCUMENTATION

305-400 3B2/300 Owner/Operator Manual
305-316 3B2/300 Updates
307-100 UNIX System V User Guide
305-406 User Reference Manual

MATERIALS REQUIRED

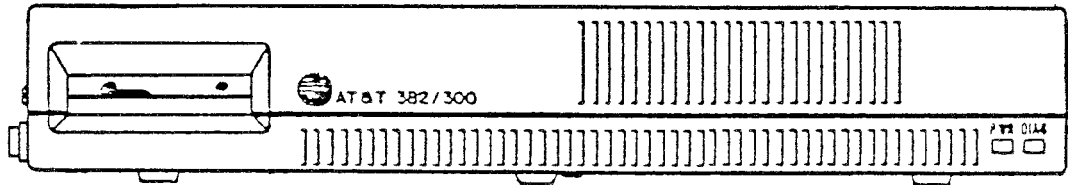
None

OBJECTIVES

On completion of this work assignment you will be able to:

- Describe a 3B2 Model 300 Computer
- Identify 3B2 package material
- Identify major hardware components
- Describe the 3B2 Model 300 features
- Identify 3B2 computer applications

Introduction to 3B2 Model 300 Computer



Introduction to 3B2 Model 300 Computer

The AT&T 3B2 Model 300 Computer is a multiuser, desktop 32-bit supermicro that uses the WE32000 Processor and using the UNIX Operating System as the basis of its software architecture. It is capable of supporting a wide range of configurations and usage options and is compatible with an office environment. Special attention to the user interface makes it a computer that can be used by both the casual user and the expert.

There are many hardware and software options available for the 3B2/300 Computer. They will be discussed in detail later in the course. This work assignment will be confined to the basic 3B2/300 shown on the opposite page. Let's discuss the material that comes with the basic AT&T 3B2 Model 300 Computer package.

3B2 PACKAGE MATERIAL

- o Basic 3B2 Model 300 Computer
- o 3B2 Core UNIX Package
- o Floppy Key
- o Standard Utilities Package

3B2 PACKAGE MATERIAL

The 3B2 Model 300 Computer can be ordered in various solution packages. A solution package contains the basic 3B2/300 and a wide range of optional items to meet the customers needs. However, regardless of the configuration ordered every 3B2/300 should have a basic package.

The example on the opposite page summarizes part of the the 3B2 Package Material and an explanation of the items is given below.

- o Basic 3B2 Model 300 Computer
The basic computer with no optional equipage.
- o 3B2 Core UNIX Package
Five floppies that contain a backup of everything that is on hard disk. These floppies are labeled Essential Utilities.
- o Floppy Key
A floppy disk for storing the systems firmware password.
- o Standard Utilities Package
Eight floppies that contain additional UNIX system utilities that are not part of the hard disk memory. These floppies are labeled:
 - System Administration Utilities
 - Directory and File Management Utilities
 - Security Administration Utilities
 - User Environment Utilities
 - Editing Utilities
 - Terminal Information Utilities
 - Help Utilities

These utilities will be discussed in detail later in the course.

3B2 PACKAGE MATERIAL

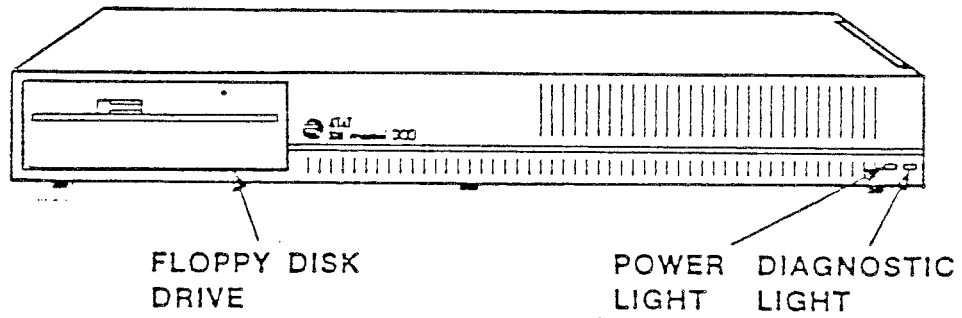
- o Basic 3B2 Model 300 Computer
- o 3B2 Core UNIX Package
- o Floppy Key
- o Standard Utilities Package
- >o Owner/Operator Manual
- >o UNIX System V User Guide
- >o UNIX System V User Reference Manual
- >o Updates
- >o AC Power Cord
- >o Two Cables, one 7 foot, one 14 foot
- >o Two Male Connectors
- >o Warranty Card and Maintenance Agreement

3B2 PACKAGE MATERIAL (continued)

- o Owner/Operator Manual
This manual tells you how to setup and to begin operating your 3B2 Computer.
- o UNIX System V User Guide
This is a guide to using the UNIX Operating System.
- o UNIX System V Reference Manual
Contains reference pages for the utilities.
- o Updates-3B2/300 Owner/Operator Manual
Contains technical notes on the 3B2 computer.
- o AC Power Cord
To connect AC power to the 3B2 computer.
- o Two Cables, 7 Foot and 14 Foot Length
Used to connect devices to the 3B2 computer.
- o Two Male Connectors
Needed to attach terminals and printers.
- o Warranty Card and Maintenance Agreement
A card to register the computer with AT&T and provide repair information.

LOOKING IT OVER

FRONT VIEW



LOOKING IT OVER - FRONT VIEW

The example on the opposite page shows the front view of the 3B2 Model 300 computer.

Diagnostic Light

On the lower right hand side is a red light labeled "Diagnostic". The Diagnostic light goes on and off to show changes in the state of the 3B2 Computer.

For example, the light is on during diagnostics, but off when the system is running in the normal operating environment.

Power Light

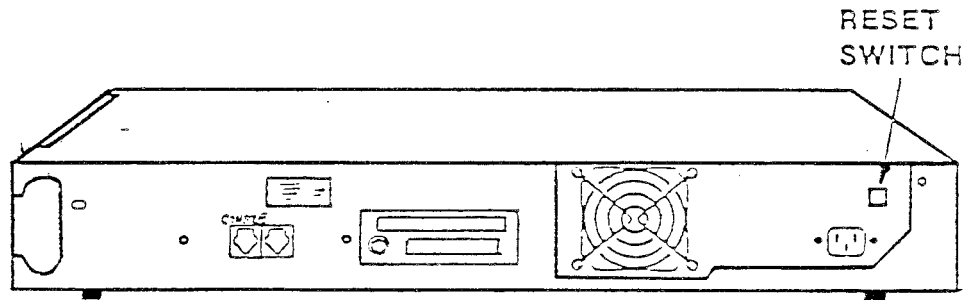
Located next to the Diagnostic light is a green light labeled "Power". Whenever the power is on, the Power light is on or blinking.

Floppy Disk Drive

The other obvious thing on the front of the cabinet is the floppy disk drive. This drive takes standard 5-1/4 inch floppy disks which are inserted horizontally.

LOOKING IT OVER

REAR VIEW



LOOKING IT OVER - REAR VIEW

The example on the opposite page shows the rear view of the 3B2 Model 300 Computer. There are several components on the rear of the computer. They are defined below:

Reset Switch

In the upper right hand corner is a square, spring loaded switch labeled "RESET". This switch is designed for the maintenance personnel for use in troubleshooting the computer.

For example, if the 3B2 Computer had a failure and could not be returned to firmware, for the purpose of running diagnostics, using the normal message format, then the reset button could be pushed to return the computer to a state that firmware could be accessed.

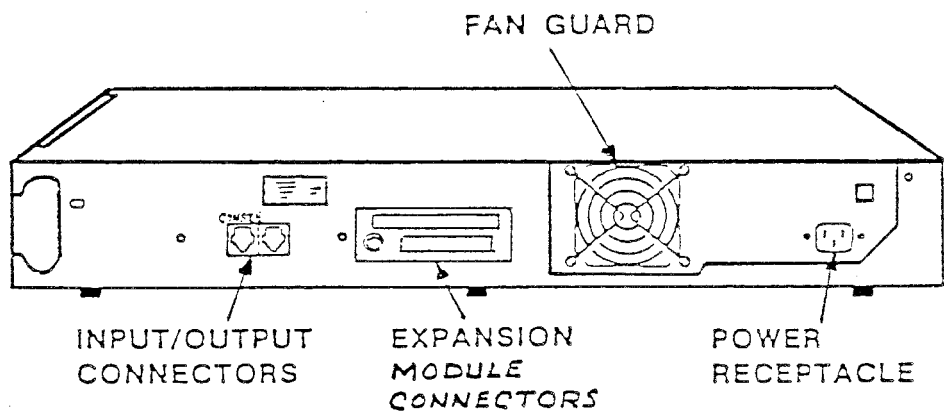
When the reset switch is pushed the following message should then be displayed on the system console:

SYSTEM FAILURE: CONSULT YOUR SYSTEM ADMINISTRATION UTILITIES GUIDE

At this point the firmware mode can be accessed using the firmware password.

LOOKING IT OVER

REAR VIEW



LOOKING IT OVER - REAR VIEW

Power Receptacle

The power receptacle is for plugging in the AC power via the 7' cord provided with the computer. The power outlet should be 115v~ or 220-240 v~ at 50/60 Hertz.

Fan Guard

The area behind the fan guard should always be free from obstructions so that proper cooling is maintained.

Expansion Module Connectors

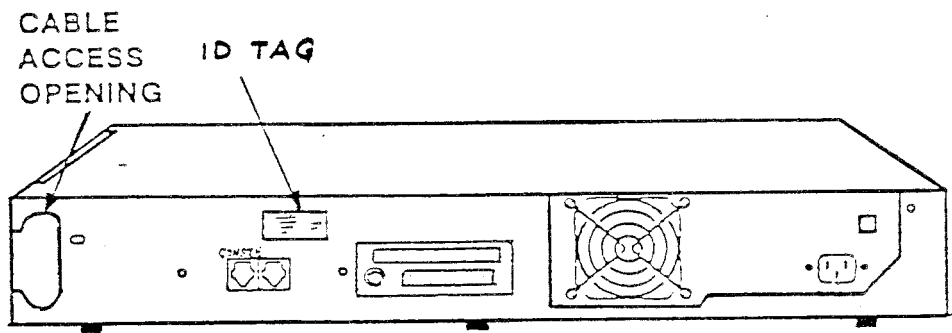
The expansion module connectors in the middle are for connecting the optional AT&T XM. They provide connections for expanded hard disk control and soft powerdown.

Input/Output Connectors

The input/output connectors are for connecting serial devices, such as, terminals and printers. One connector is labeled CONSOLE, and the other connector is not labeled. The CONSOLE connector is dedicated for the console terminal. The other connector is called the contty port, and is user defined. These connectors require the standard 8-pin modular connector and cable provided with the computer.

LOOKING IT OVER

REAR VIEW



LOOKING IT OVER - REAR VIEW

ID Tag

The ID tag gives important information about the 3B2 Computer. Contained on this tag is the model number, code, serial number and an FCC statement.

For example, the code is an equipment drawing number that contains a group number that will help the user identify how the 3B2 Computer is equipped without removing the cover. ED-4C492-30 G1 indicates the 3B2 Model 300 is equipped with a 10 megabyte hard disk, a G2 would indicate the computer is equipped with a 30 megabyte hard disk.

Cable Access Opening

The last item on the rear view is the cable access opening. Cables for external devices, such as, terminals, printers, expansion module, that connect to the optional feature cards inside the 3B2 Computer cabinet are routed thru this opening.

LOOKING IT OVER
RIGHT AND LEFT SIDE

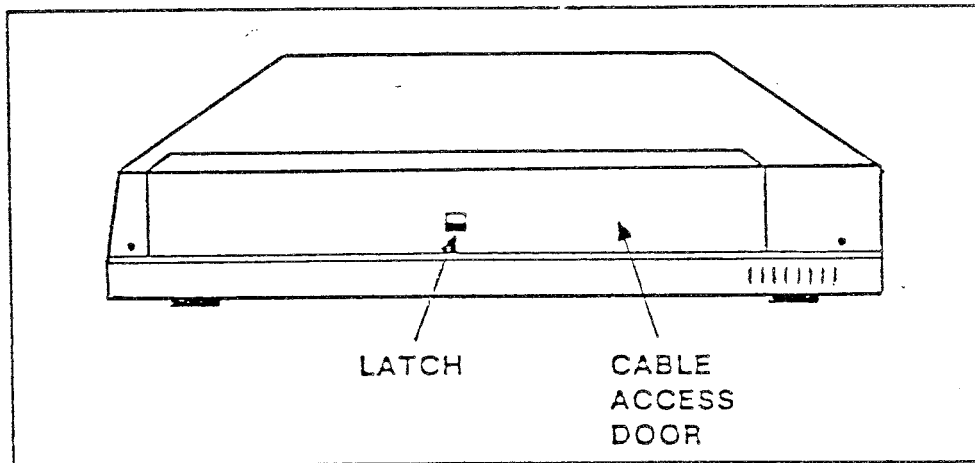


FIGURE A RIGHT SIDE

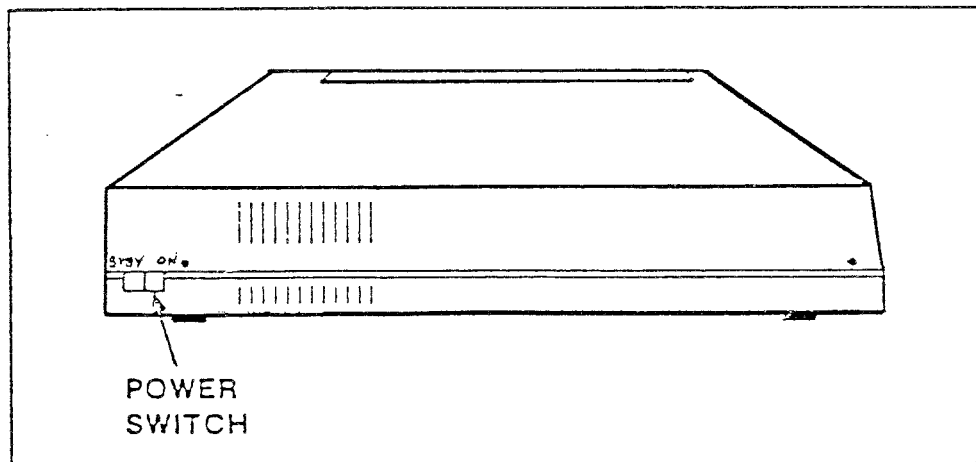


FIGURE B LEFT SIDE

LOOKING IT OVER - RIGHT AND LEFT SIDE

Right Side

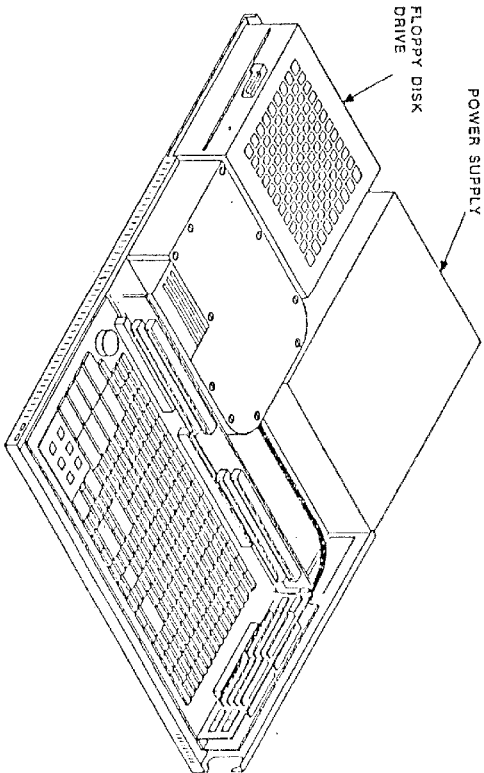
The right side of the 3B2/300 is shown in figure A on the opposite page. The cable access door takes up most of the right side. This where you connect additional devices and optional feature cards. The door can be opened by simply releasing the latch and lifting the door up and out.

Left Side

The left side of the 3B2/300 is shown in figure B on the opposite page. On the left side toward the rear is the power switch. It is a rocker switch with three positions: ON, neutral, and STANDBY position. As soon as you release it, the switch returns to the neutral position.

In some of the early models of the 3B2/300 the power switch was labeled ON and OFF, but the operation of the switch remains the same.

MAJOR HARDWARE COMPONENTS



MAJOR HARDWARE COMPONENTS

The example on the opposite page shows the six major hardware components that make up the 3B2 Model 300 Computer. The components are described below:

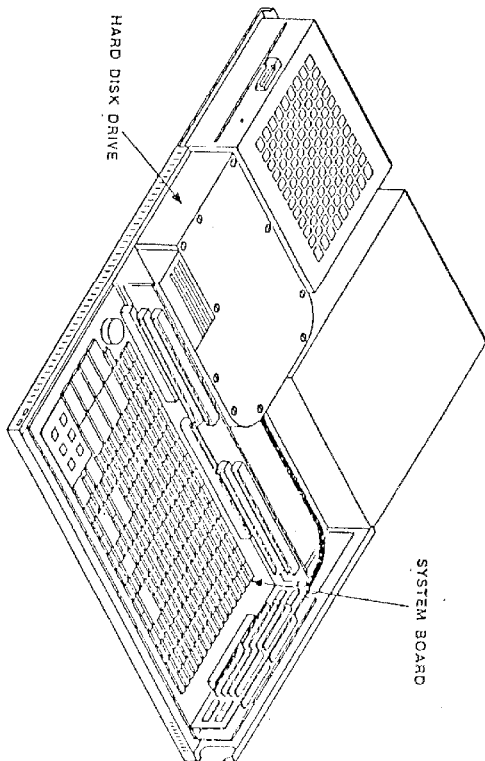
Power Supply

The power supply provides the voltages required internally by the 3B2 Computer. It operates from a standard 110 volts, 60 Hz AC outlet and is protected by overload shutdown circuitry to safeguard the computer from damage due to accidental short circuits or overvoltage conditions.

Floppy Disk Drive

Reading and writing of the floppy disks is done by the floppy disk drive. The floppy disk drive used in the 3B2 Computer is a microprocessor-controlled, 5-1/4 inch drive. The floppy disk drive is capable of reading and writing in single-density or double-density format. The standard 5-1/4 inch floppy disks used in these drives are capable of storing 720 kilobytes of data.

MAJOR HARDWARE COMPONENTS



MAJOR HARDWARE COMPONENTS

Hard Disk Drive

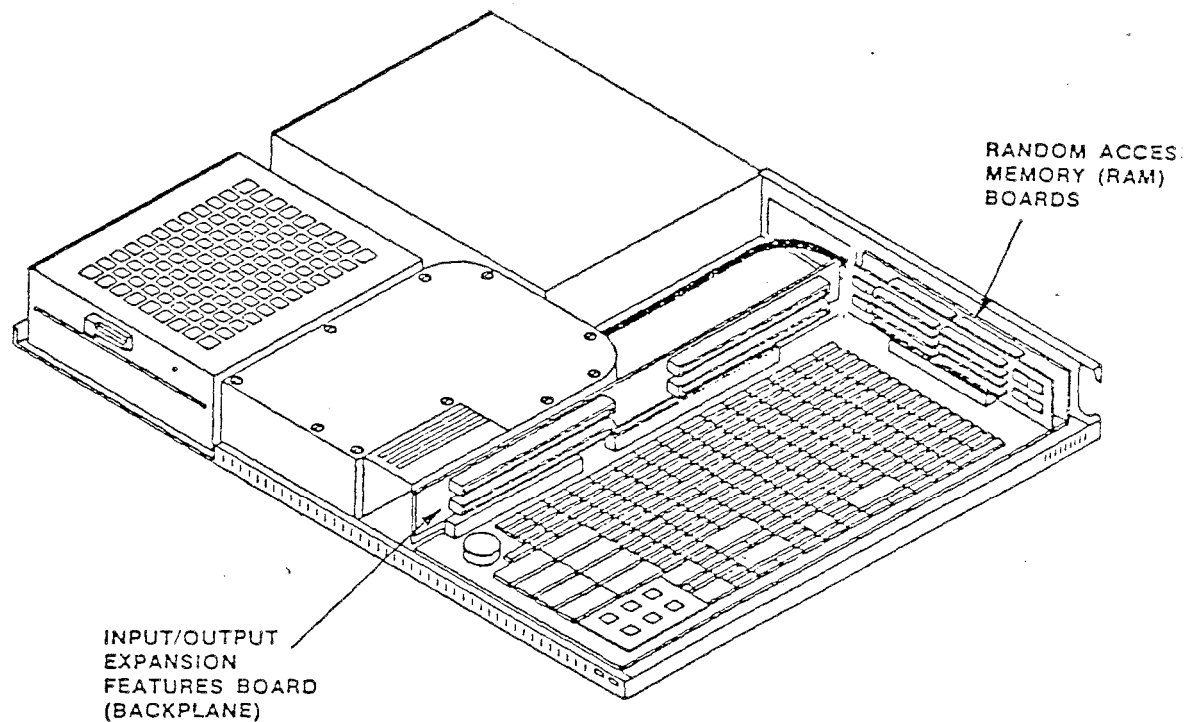
The hard disk drive is a 5-1/4 inch Winchester drive. This disk is used to store large amounts of data that readily accessible to the microprocessor. Since hard disks are very susceptible to minute particles in the air, they are normally enclosed in a sealed environment. The media is not removable as in the case with the floppy disk drive. Depending on the 3B2/300 package ordered, hard disks can be 10,30,72 megabyte capacity.

System Board

The system board contains all the components needed to have a functioning processor. The system board will be covered in detail later in the course but some of the major components are:

- WE32000 Central Processing Unit (CPU) with a memory management unit (MMU).
- Programmable read only memory (PROM)
- Controllers for the hard disk, floppy disk, and input/output ports.
- Connectors for the Random Access Memory boards and backplane board.

MAJOR HARDWARE COMPONENTS



MAJOR HARDWARE COMPONENTS

Random Access Memory (RAM) Boards

The random access memory for the 3B2/300 Computer can be 1/2, 1, or 2, megabytes of capacity. The boards come in two sizes 1/4 megabyte, or 1 megabyte. They cannot be mixed!

For example, if the 3B2/300 has 1/2 megabyte of memory, then it will have two 1/4 megabyte cards plugged into the two available slots on the system board.

RAM expansion will also be covered in detail later in the course.

Input/Output Expansion Features Board

The Input/Output Expansion Features Board is commonly referred to as the I/O Backplane board. It plugs into the system board and provides four slots for optional feature cards for the 3B2/300 computer.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
 - Small Footprint
 - Vertical or Horizontal
 - Sturdy
 - Quiet
 - Wide Temperature Range
 - No Special Power

3B2 MODEL 300 FEATURES.

Designed For The Office Environment

The 3B2 Model 300 Computer was designed for the office environment. It has a small footprint, 3.6 inches high, 22 inches wide, and 17 inches deep, which fits nicely on a desk top. The 3B2 Computer can be positioned either vertically or horizontally. When positioned horizontally, the cabinet can support an external load of 60 pounds. The computer weighs 30 pounds, which makes it very portable. The computer also runs very quietly, less than 48 decibels.

The 3B2 Computer does not require a special operating environment. It can operate in a temperature range of 40 - 100 degrees fahrenheit. The humidity can be 20 - 80% range.

The 3B2 Computer does not have special power requirements. Its power consumption is less than 200 watts maximum configuration. AC voltage is 115 or 220 - 240 V~ at a frequency of 50/60 Hz.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
 - Powerful
 - Two Standard Serial Ports
 - Four Feature Card Slots
 - 18 Users
 - Network Caapabilities

3B2 MODEL 300 FEATURES

Multi-User System

The 3B2 Model 300 Computer is a powerful multi-user machine. It's compact size is deceiving. While the 3B2 works nicely as a stand alone computer using the standard console port, it is designed for the multi-user environment.

Two serial, asynchronous, full duplex RS-232-C ports that are compatible with a variety of peripherals are included with the basic system configuration. The maximum baud rate is 9600 baud. In addition to the two standard serial ports, other serial and parallel ports can be added to the 3B2 Computer via feature cards. The feature cards plug into the I/O Backplane Board that connects directly to the System Board. The backplane board can hold up to four feature cards.

All of the feature cards will be covered in detail later in the course. But the I/O Expansion Board will provide four serial and one parallel port per board. If the system had the maximum of four I/O Expansion Boards installed it would have a total of 18 serial and 4 parallel ports available.

This multi-user system also has many networking capabilities, which allows the users to access information available on other computers on the network.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
 - WE32000 32-Bit Microprocessor
 - Nonvolatile Memory
 - 32K Read Only Memory
 - Battery Backup

3B2 MODEL 300 FEATURES

Leading-Edge Technology

The 3B2 Computer is on the leading-edge of technology with many advanced features, such as:

- WE32000 32-Bit Microprocessor
- Nonvolatile Memory
- 32K Read Only Memory
- Battery Backup

WE32000 32-Bit Microprocessor

The Central Processing Unit (CPU) of the 3B2 Computer is AT&T's powerful WE32000 Processor. The WE32000 Processor is a full 32 bit CPU that efficiently supports operating system environments. Features of the WE32000 Processor include: an extensive and powerful instruction set, 8, 16, 32-bit operations. An advanced Memory Management Unit (MMU) which provides memory management and address protection.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
 - WE32000 32-Bit Microprocessor
 - Nonvolatile Memory
 - 32K Read Only Memory
 - Battery Backup

3B2 MODEL 300 FEATURES

Nonvolatile Memory

Nonvolatile Random Access Memory (NVRAM) is also included in the 3B2 Computer. System configuration parameters, such as terminal baud rates, are stored in memory. With NVRAM the user does not have to supply system configuration information each time the system is powered up.

32K Read Only Memory

The 3B2 Computer contains 32 kilobytes of read only memory. This memory is used for self-test sanity checks, auto configurations, and system initialization.

Battery Backup

A 3.9-volt lithium battery provides power to the time of day clock, all backplane connector slots, and the NVRAM. This feature helps to retain some nonvolatile storage during periods when external power is removed.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
- o EXPANDABLE SYSTEM
 - Future Requirements
 - Larger Disks
 - Input/Output Capacity
 - Memory Expansion
 - Tape Backup
 - Software

3B2 MODEL 300 FEATURES

Expandable System

The 3B2 Model 300 Computer is designed to meet the customers needs now and in the future. The hardware and software can be expanded to increase the machine capacity and capabilities.

The 3B2 Computer's hard disk storage can be increased to 102 megabytes. Main memory and input/output capacity, as discussed earlier, can be increased. Cartridge tape backup and an additional floppy disk drive maybe also be added to the system. The 3B2 Computer can handle a variety of terminals, printers, modems, and networking options.

The system capabilities can be increased through upgrades to the UNIX Operating System and the addition of optional utility packages. There are a number of application packages, workbenches, and programming languages available for the 3B2 Computer.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT"
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
- o EXPANDABLE SYSTEM
- o FRIENDLY USER INTERFACE
 - Simple Administration
 - One Button Control
 - Boots To Multi-User
 - Self-Configuring
 - Self-Diagnosing
 - Soft Powerdown

3B2 MODEL 300 FEATURES

Friendly User Interface

The 3B2 Computer has been designed to be simple to use. A feature of the 3B2 Computer is a set of interactive, menu-driven procedures known as "Simple Administration" which are particularly helpful to inexperienced computer users. These procedures allow inexperienced users to handle administrative functions that have traditionally been performed only by "super-users".

Besides the Simple Administration Menu there are several other features of the 3B2 Computer that make it user friendly. Some of those features are:

- One button to power on and off
- Boots directly to multi-user mode
- Self-configuring, self-diagnosing
- Software controlled powerdown

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
- o EXPANDABLE SYSTEM
- o FRIENDLY USER INTERFACE
- o UNIX SYSTEM V
 - Advanced Features
 - Other Software Features

3B2 MODEL 300 FEATURES

UNIX System V

The operating system is a crucial element of a supermicro. It controls the hardware and keeps track of where information is stored. The 3B2 Computer is controlled by the UNIX Operating System. The UNIX Operating System offers advanced features that once were found only on large computer systems.

Other software features:

- Automatic diagnostics and execution of the operating system on power up.
- Automatic power shutdown to protect the 3B2 Computer from too much heat or voltage.
- Automatic reconfiguration of the operating system to reflect a change in the hardware or software.
- Capability to dynamically partition and format floppy disks.
- File and record locking.
- Job control and bad block handling of the hard disk.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
- o EXPANDABLE SYSTEM
- o FRIENDLY USER INTERFACE
- o UNIX SYSTEM V
- o FIRMWARE
 - Special Instructions
 - Automatic or Interactive
 - Diagnostics
 - Initialization
 - Configuration

3B2 MODEL 300 FEATURES

Firmware

Another feature of the 3B2 Computer is firmware. Firmware is a set of special software instructions. It is special software because it is stored in read-only memory instead of on disk. In some instances, such as turning power on and off, firmware instructions are executed automatically. In other instances, such as running diagnostics, the 3B2 Computer must be placed in an interactive firmware operating mode. Whether automatic or interactive, firmware gives you additional operating and administrating convenience. Some benefits of firmware are:

- Diagnostics - demand, interactive, and normal diagnostics can run from the firmware mode.
- Initialization - checks sanity during power up sequence.
- Determines the system configuration for use by the self-configuration software.

3B2 MODEL 300 FEATURES

- o DESIGNED FOR THE OFFICE ENVIRONMENT
- o MULTI-USER SYSTEM
- o LEADING-EDGE TECHNOLOGY
- o EXPANDABLE SYSTEM
- o FRIENDLY USER INTERFACE
- o UNIX SYSTEM V
- o FIRMWARE
- o VARIETY OF APPLICATIONS
 - Flexibility
 - Price/Performance
 - Small Business Professional
 - Large Scale Processing

3B2 MODEL 300 FEATURES

Variety of Applications

Modularity and flexibility allow the tailoring of configurations to meet both general and specific application needs in an attractive range of price/performance possibilities. Based on its high performance per cost ratio, its physical characteristics, and its range of supported peripherals, the 3B2 Computer has applications in a wide range of markets.

The 3B2 Computer meets a wide variety of business needs. For the small business professional, the 3B2 Computer can automate many office management and financial functions common to all businesses, as well as specialized requirements peculiar to each profession. For businesses with complex and large scale processing needs, the 3B2 Computer can serve as the hub of a small stand-alone network or as a local processor within a larger office system. No matter how large or small the business computing needs may be, there is a place for the AT&T 3B2 Model 300 Computer.

NOTES

APPLICATION

1. What size hard disks are available for the 3B2 Computer?
10 30 70
2. What size memory options are available?
2 1 2
3. What is the maximum number of serial ports available on the 3B2 Model 300 Computer?
18
4. What is the maximum number of parallel ports available?
4
5. What are the six major hardware components in the 3B2 Computer?
HD FD ME PS DMA DI
6. What is NVRAM the acronym for?
NONVOLATILE RANDOM ACCESS MEMORY
7. What maintains the time-of-day clock while the 3B2 Computer is powered off?
BATTERIES
8. The 3B2 Computer automatically reconfigures the operating system to reflect hardware and software changes.
TRUE or FALSE?
9. Firmware is the operating system of the 3B2 Computer.
FALSE
10. Without removing the computer cover identify whether your 3B2 Computer is equipped with a 10 or 30 mega-byte hard disk drive. 6102

HARDWARE OPTIONS

NOTES

Reference: Chapter 2 Owner/Operator Manual

- 10-30-72 megabyte hard disk drive
- Expanded input/output capability (max. - 4 boards)
- Ram expansion (½-1-2 mbyte)
- Terminals
 - 5410
 - 5420
 - 5425
 - 5620 (DMD)
- Printers
 - DQP-10
 - LQP-40
 - 455
 - 470
 - 475
 - 5310
 - 5320
- Modem
 - Penril (autodial)
- 3BNET feature
- Vertical stand
- AT&T/XM
 - Tape drive
 - 30 or 72 megabyte hard disk
 - Floppy disk

SOFTWARE OPTIONS

NOTES

Reference: Chapter 2 Owner/Operator Manual

Normal Software

- Essential utilities (5-core UNIX floppies)
- Standard utilities
 - Directory and file management
 - Editing
 - Help
 - Security administration
 - System administration
 - Terminal information (2-diskettes)
 - User environment

Workbenches

- DWD
- IWB
- WWB

Program Languages

- Basic
- C
- Fortran
- Pascal

Optional Utilities

- 3BNET
- Demon
- Basic networking
- Line printer spooler
- Graphics
- Spell
- Terminal filters
- IPC
- Driver development
- SCCS
- Performance measurement
- Software generation
- Extended software generation

Applications

- Basic Interpreter
- RM/Cobol
- dBase II
- Bacs
- Microsoft word
- Multiplan
- Ingres
- Handle writer/speller
- CMCS
- Gift registry

DOCUMENTATION

NOTES

Reference: Chapter 2 Owner/Operator Manual

Standard Documents

- 305-400 Owner/Operator Manual
- 305-316 Updates
- 305-406 User Reference Manual
- 307-100 User Guide
- 305-422 System administration
- 305-418 Directory and file management
- 305-416 Security administration
- 305-424 Terminal information
- 305-426 User environment
- 305-414 Editing
- 305-420 Help

Documentation catalog DC-484

Documentation guide 305-315

Note: Order by select code, CIC - Indianapolis, 1-800-432-6600

GETTING STARTED

NOTES

Reference: Chapter 2 Owner/Operator Manual

- Terminal setup
 - 9600 baud
 - Full duplex
 - No parity
- Turn-on power
- System will autoboot to multiuser mode
- Pound sign (#) is standard prompt for console

ELAPSED TIME (SECONDS)	ACTION	POWER LIGHT	DIAGNOSTIC LIGHT	MESSAGES	SYSTEM CONDITION
<0	-	OFF	OFF	-	POWER OFF
0+	DEPRESS POWER SWITCH	ON	ON	-	POWER ON; DISK SPIN-UP BEGINS
3	-	ON (BLINKING)	ON	SELF-CHECK	SANITY TESTS BEGIN
35	-	ON (STEADY)	OFF	-	DISK IS UP TO SPEED; SANITY TESTS COMPLETED
40	-	ON	ON	DIAGNOSTICS	DIAGNOSTICS BEGIN
45	-	ON	OFF	DIAGNOSTICS PASSED	LOADING OF UNIX SYSTEM BEGINS
80	-	ON	OFF	-	UNIX SYSTEM LOADED
	-	ON	OFF	SYSTEM IS COMING UP; PLEASE WAIT. SYSTEM IS READY.	SYSTEM IS BEING INITIALIZED
90	-	ON	OFF	CONSOLE LOGIN:	SYSTEM IS READY

Power-Up Sequence

INIT SYSTEM AND SHUTDOWN OPTION

NOTES

Reference: Chapter 2 Update Manual, Appendix C of System Administration Utility
Guide

Initialization states

- 0 = Power off
- 1, S, s = Single-user
- 2 = Multiuser
- 3, 4 = User defined
- 5 = Firmware
- 6 = Reboot

shutdown -y -ix -g0 (default = 60 seconds)

AT&T 3B2 MODEL 300 COMPUTER
OPERATION, MAINTENANCE AND SYSTEM ADMINISTRATION
USING FLOPPY DISKS

CAUTIONS

Do not handle the floppy disks provided with the course material until this work assignment is completed.

REFERENCE DOCUMENTATION

305-400 3B2/300 Owner/Operator Manual

MATERIALS REQUIRED

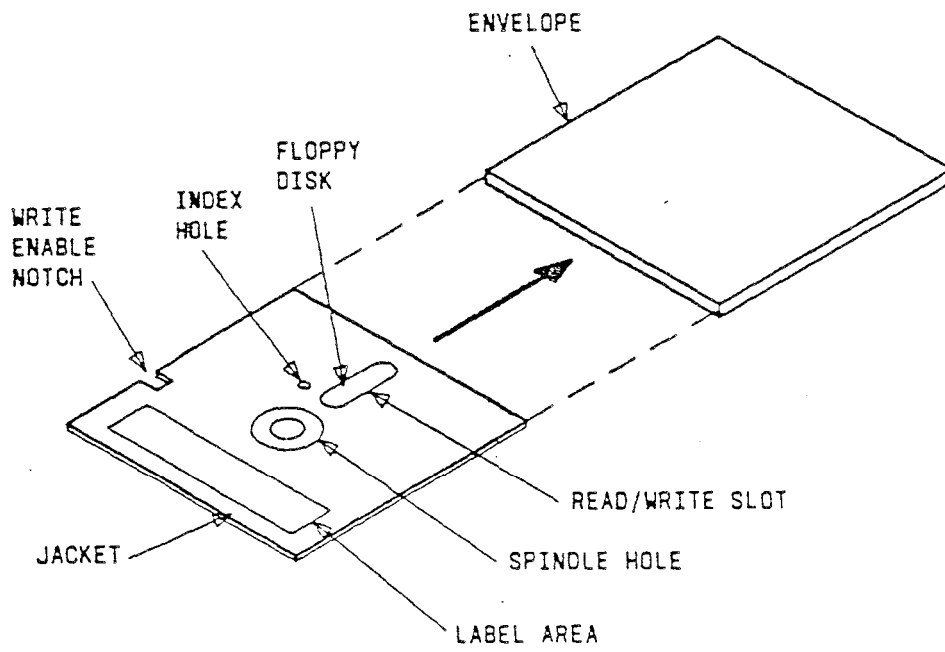
NONE

OBJECTIVES

At the end of this work assignment you will be able to:

- Identify a floppy disk
- List the precautions associated with floppy disks
- Insert and remove floppy disks from the drive

USING FLOPPY DISKS



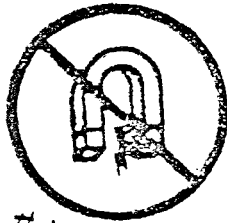
USING FLOPPY DISKS

You should have received several floppy disks with your 3B2 Computer. These are 5.25-inch diameter disks coated with magnetic material to store data. Some of your floppies have the Essential Utilities, while others have the Standard Utilities stored on them.

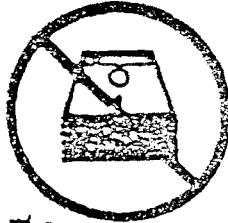
Each floppy disk is permanently enclosed in a jacket. You can either write information onto or read information from a floppy disk. The ability to write on a disk is controlled by the write-enable notch (Refer to the figure). If this notch is uncovered the disk drive CAN write information onto the disk. If the notch is covered, the disk drive CANNOT write on the disk. This is referred to as being "write protected". The floppy disks you receive with your 3B2 Computer can be "write protected".

Write protect is important to know because you will probably have certain disks that contain programs or information that you do not want destroyed or altered. To protect these disks from being accidentally erased or written over, always keep the write enable notch covered. Cover the notch with an opaque self-adhesive tab. These tabs are normally supplied with the floppy disks. If some later date you want to write on the disk again, you can remove the tab.

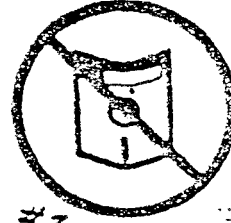
FLOPPY DISKS - PRECAUTIONS



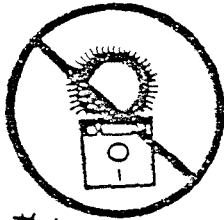
#1



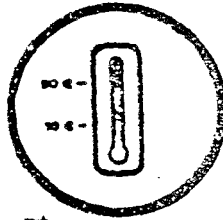
#2



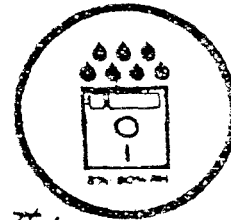
#3



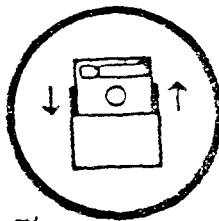
#4



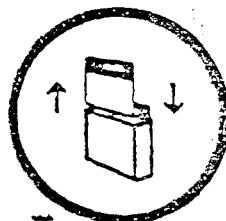
#5



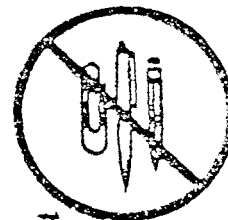
#6



#7



#8



#9

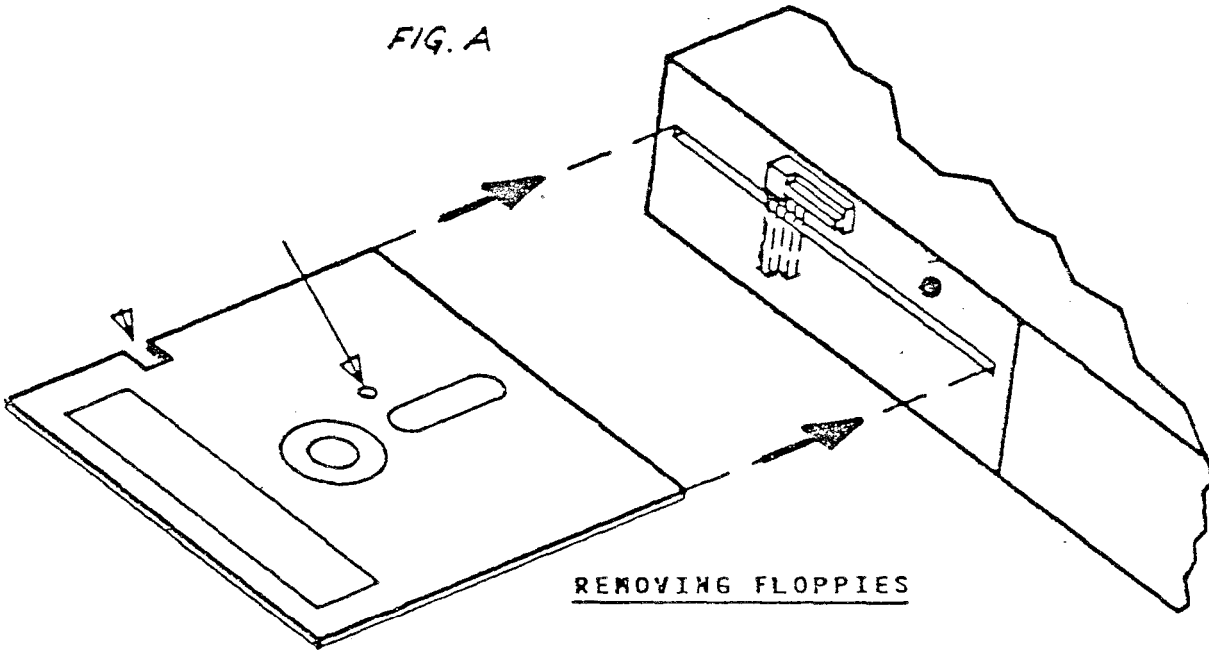
FLOPPY DISKS - PRECAUTIONS

When handling floppy disks:

1. Never expose disks to magnets or devices that generate electromagnetic fields. Even putting a telephone receiver down on a disk would be enough to destroy the disk. Keep your disks isolated from electronic devices.
2. Never touch the recording media through the read/write slot or index hole. The disk inside the envelope is sensitive to fingerprints. Only the disk envelope should be touched.
3. Do not bend. Like a warped record, it won't play correctly unless its surface is perfectly flat.
4. Direct sunlight quickly deteriorate the recording media.
5. Temperature extremes quickly deteriorate the recording surface. Make sure your disks are at room temperature before you use them.
6. The last is excessive moisture. In this category is included soft drinks, coffee, etc. Be careful not to spill drinks while floppies are laying on a desk or table.
7. Keep floppy disks in their protective envelopes when you are not using them.
8. Store in a upright position, and never leave in the disk drive.
9. Fill out the labels before you place them on the jacket. If you must write on a label that is on the floppy disk, use a felt tip pen. A pencil or ball point pen can damage the recording surface.

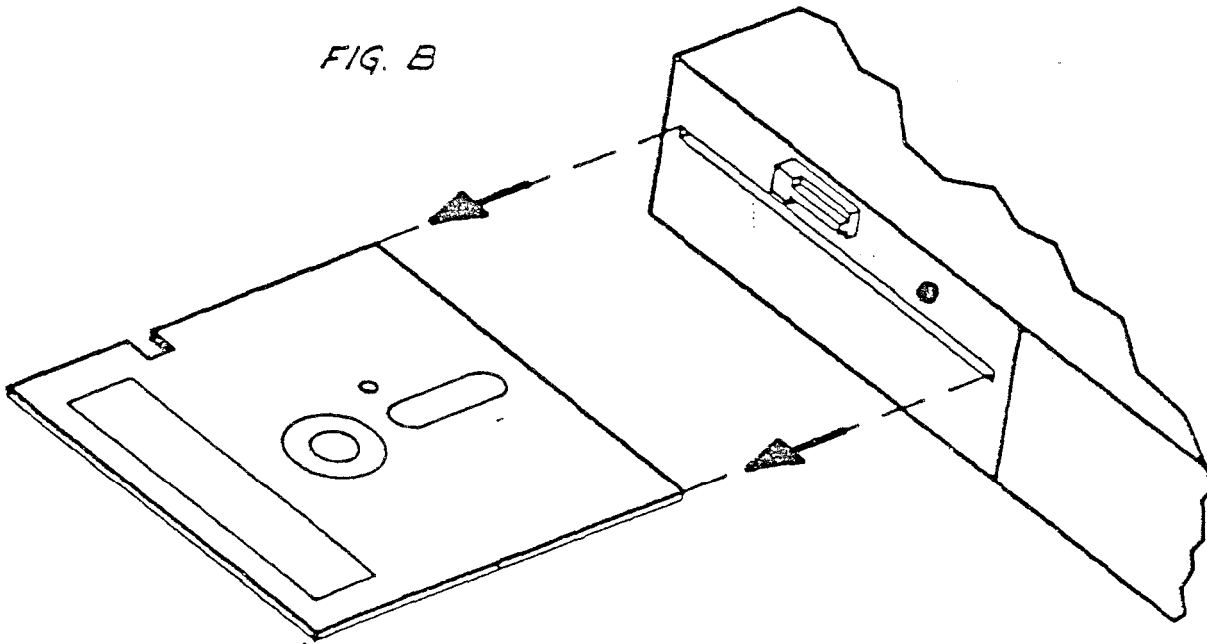
INSERTING FLOPPIES

FIG. A



REMOVING FLOPPIES

FIG. B



INSERTING FLOPPIES

Figure A shows you how to insert a floppy disk into a floppy drive.

1. Turn the 3B2 Computer ON.
2. Verify the floppy drive LED indicator is off.
3. Verify the latch is UP.
4. Gently insert the floppy into the slot - DO NOT FORCE.
5. Turn the latch DOWN.

REMOVING FLOPPIES

Figure B shows you how to remove a floppy disk from a floppy disk drive.

1. Verify the 3B2 Computer is ON.
2. Verify the floppy drive LED indicator is off.

Caution: Never remove a floppy disk while the floppy disk drive LED is on. You can damage the disk or destroy the information stored on it.

3. Turn the latch UP.
4. Gently remove the floppy disk from the slot and store in its protective envelope.

Now that we have reviewed the care and handling of floppy disks, examine one of the many floppies provided with the course material.

3B2 OPERATION WORK ASSIGNMENT

This work assignment is designed to have the student accomplish three very important functions of a 3B2 Computer maintainer, system administrator, or knowledgeable user.

1. Referring to the 3B2 Owner/Operator Manual, Chapter 4, Figure 4-1, on Page 4-5, perform the power-up sequence.

NOTE: If your 3B2 is already powered up use the following command to power off, then follow the power-up sequence. `shutdown -y -i0 -g0`

2. Take the system down to firmware and reload the systems Essential Utilities (#1-5). Essential Utilities are the 3B2 Computer UNIX Operating System (Core UNIX).

NOTE: Complete the FULL RESTORE procedure. This procedure along with the Partial Restore procedure are reproduced on the pages following this work assignment. The procedure was taken from the System Administration Utilities Guide (305-422), Chapter 3, starting on Page 3-52.

3. Run a file system check on the 3B2 Computer root file system..
`/etc/fsck /dev/dsk/c1d0s0`

↳ shutdown

Ø # init q

or

shutdown -y -10 -g0

↳ shutdown & reboot

init 5

or

shutdown -y -15 -g0 [CR]

WCS

UNIX [CR]

and init [CR] of [CR] [CR]

ROOT [CR]

sys action install pkg. [CR]

Full Restore Procedure

The following steps are for a FULL restoral of the system. A full restoral erases everything on the integral hard disk and then loads the core system files. These files include the Essential Utilities.

1. Take the system to the firmware mode (run-level 5).
2. Insert the first 3B2 Core System floppy disk into the integral floppy disk drive.
3. Boot the operating system (unix) from the integral floppy disk (0).
4. Select the Full Restore (option number 1).
5. Follow the displayed instructions to remove and insert the 3B2 Core System floppy disks. When the last 3B2 Core System floppy disk has be loaded, the system will restart from the hard disk.
6. When the system is ready, either follow the displayed instructions to do the Simple Administration setup procedure, or rebuild the various system files from backup using your own procedure.

Run Levels

0	Power down	ca	→	WTF	#
1	Single User				
2	MULTI USER				
3 + 4	USER defined				
5	firmware				
6	REBOOT				

Partial Restore Procedure

The "user" files are not affected by a partial restoral. Certain system files are overwritten. For example, the terminal configuration and password file must be rebuilt to support your previous system configuration. The adm, root, and sys crontab files are overwritten. The at.allow and cron.allow files are overwritten. A partial restoral replaces (overwrites) the core system files on the hard disk with those originally distributed. These files include the Essential Utilities. Depending on the reason for doing the partial restore, certain system files should be saved to make the job of restoring the system configuration easier. The following steps are for a PARTIAL restoral of the system.

1. If possible, save the following system files by copying them to another name.

```
cd /etc
cp passwd opasswd
cp inittab oinittab
cp system osystem
cd /etc/master.d
cp kernel okernel
cd /usr/lib/cron
cp at.allow oat.allow
cp cron.allow ocron.allow
cd /usr/spool/cron/crontabs
cp adm oadm
cp root oroot
cp sys osys
```

2. Change directory to root (/), and take the system to the firmware mode (run-level 5).
3. Insert the first 382 Core System floppy disk into the integral floppy disk drive.
4. Execute (boot) the operating system (unix) from the integral floppy disk (0).

Partial Restore Procedure

5. Select the Partial Restore (option number 2).
6. Follow the displayed instructions to remove and insert the 3B2 Core System floppy disks. When the last 3B2 Core System floppy disk has been loaded, the system will restart from the hard disk.
7. When the system is ready, either follow the displayed instructions to do the Simple Administration setup procedure, or rebuild the various system files from backup using your own procedure.
8. Recover the applicable system files from the copies and reconfigure the system as necessary. Refer to the "SYSTEM RECONFIGURATION" discussion in this chapter to reconfigure the system.

3B2 INITIALIZATION WORK ASSIGNMENT

1. You have just made some changes to the UNIX operating system. In order to set the kernel to recognize the changes the machine should be re-booted. What init level will do this? 6
2. You suspect a problem with your 3B2 Computer and you want to run diagnostics. What init level will allow you to access the diagnostic monitor program? 5
3. You will learn that it is not good to make changes to the operating system while in the multiuser state. What are the three init levels that represent a single user state? 1 5 5
4. What init level represents a multiuser state? 2
5. What init states are user defined? 3 4
6. What init states represents a power off state? 0

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE, AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 3.0
SIMPLE ADMINISTRATION MODULE
OVERVIEW

SIMPLE ADMINISTRATION MODULE
OVERVIEW

CAUTIONS

None

REFERENCE DOCUMENTS

305-400 Owner/Operator Manual
305-442 System Administration Manual

MATERIAL REQUIRED

3B2 computer and terminal

OBJECTIVES

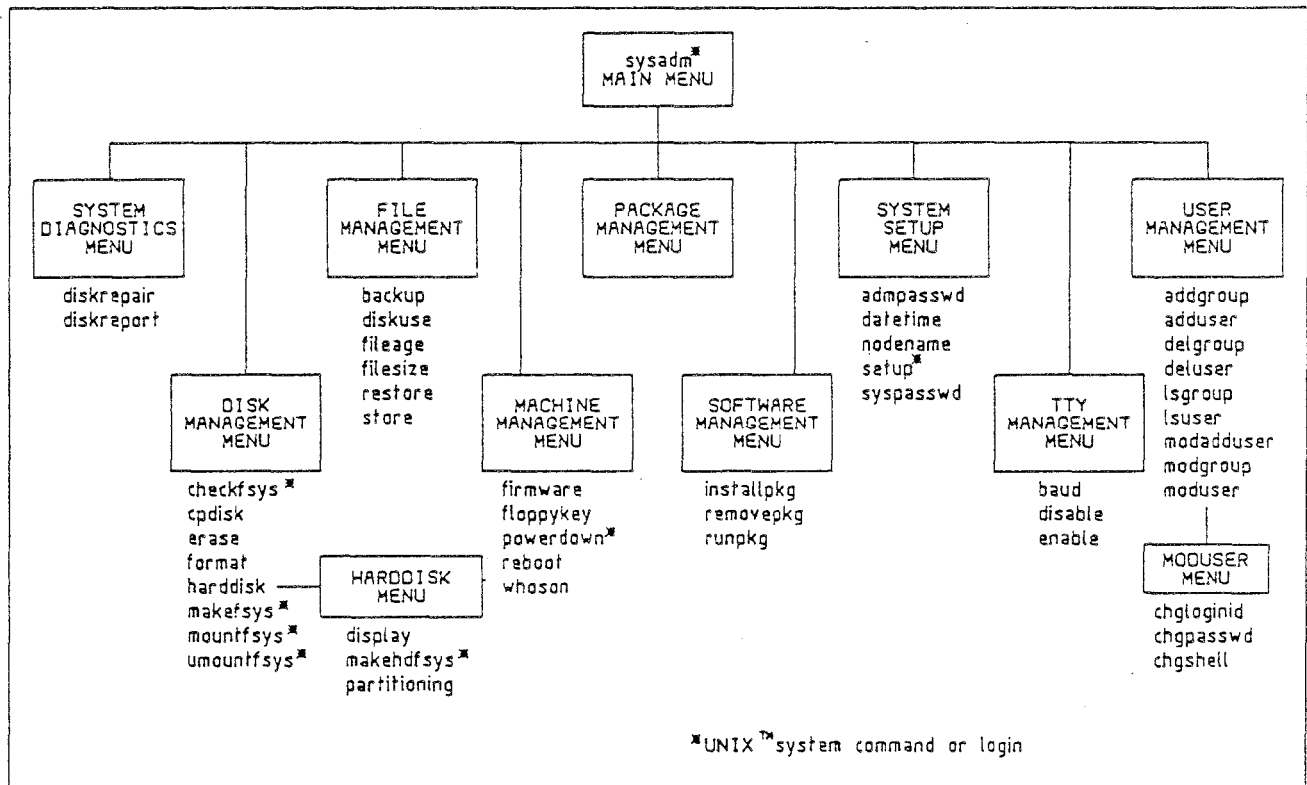
On completion of this work assignment, you will have an understanding of Simple Administration, including the nine System Administration menus.

SEQUENCE

On completion of Application 7, the objectives for this work assignment will have been met.

Application 8 is optional and will be assigned by the instructor if time permits.

SIMPLE ADMINISTRATION



3B2 COMPUTER SIMPLE SYSTEM ADMINISTRATION

As an owner of a 3B2 computer, there are some administrative tasks that you, or someone you designate, will have to perform on the computer. These tasks include adding or removing users, adding or removing software utilities and applications, and copying information from hard disk to floppy disks.

Traditionally, the UNIX* system has required very knowledgeable persons who are given special privileges to do these administrative tasks. These persons are commonly referred to as "super-users". However, the 3B2 computer provides a set of special procedures that allows a normal user, with little experience, to do the job of system administration. This set of procedures is referred to as **Simple Administration**.

Simple Administration consists of a special set of interactive commands. When a Simple Administration command is entered, the 3B2 computer displays a sequence of menus and questions. As you make your response to the menus and questions, the system performs the administrative function.

The figure on the opposite page depicts the structure of the Simple Administration menus and identifies the subcommands in each menu. In addition, this figure identifies those subcommands that also exist outside of Simple Administration as shell commands or logins. To control access to certain administrative tasks, these commands or logins can be optionally password protected. Passwords can be assigned by using the `admpasswd` subcommand located in the system setup menu.

*Trademark of AT&T Bell Laboratories

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

SYSTEM ADMINISTRATION MENUS

The Simple Administration procedures can be accessed directly or via menus. Menus are one technique used to simplify the performance of tasks on the computer. A menu is a listing of options or routines from which you may make a selection, usually by entering a number or a letter. Entering a number or letter may take you directly to the procedure that you want to run or it may give you another list of options to choose from. You may have to go through several menus in this manner, but eventually you will get to the procedure you want to run.

Using menus eliminates the need to have a great deal of knowledge about many different commands. All you have to know is what you want to do.

The top-level menu for Simple Administration is called system administration. It is accessed by entering the `sysadm` command. Enter `sysadm` on your 3B2 computer. The response should be the same as shown on the opposite page. The system administration menu identifies a number of other menus.

The menu you select depends on the task you want to perform. Within Simple Administration (under the `sysadm` command), tasks are performed through a subset of commands called subcommands. Each menu contains a set of subcommands to help manage a portion of the computer. A brief summary of each menu and a brief description of each subcommand are presented on the following pages.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

SYSTEM DIAGNOSTICS MENU

The systems diagnostics menu contains subcommands that enable you to get a report on built-in disk errors and provides advice on how to repair these errors.

WARNING: The repair of disk errors should only be performed by qualified service personnel.

diskrepair This subcommand provides advice on how to attempt repairs on built-in disk errors. The advice includes how to bring the system down, what repair program to use, and how to restore the system.

diskreport This subcommand provides a report on built-in disk errors. You are given the choice of either summary or full reports. A summary report provides enough information to determine if the repair should be attempted; a full report provides detailed information for the troubleshooting expert.

NOTES

APPLICATION 1

1. You suspect there may be some irregularities on the hard disk. Which subcommand would you use to report on built-in disk errors?

fsck

2. Access the diskreport function. What two options are available for reporting disk errors?

full
summary

3. What is the status of your disk report?

no errors found

4. Which subcommand would you use to obtain the procedure to repair the disk?

fsck

5. In order for the disk repair procedure to be used, the 3B2 computer must be in the

single user state.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
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5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

FMT Flop -v /dev kdrkate

dd if=

dd - duplicate
and create

dd if=

DISK MANAGEMENT MENU

The disk management menu contains subcommands for doing things such as formatting and copying floppy disks and using floppy disks as mountable file systems.

- checkfsys** The `checkfsys` subcommand checks a file system on a floppy disk for errors. If there are errors, `checkfsys` attempts to repair them.
- cpdisk** This subcommand copies the contents of a floppy disk into the machine and then allows you to make copies of it. These copies are identical to the original in every way. The copies are made by first reading the original floppy disk entirely into the machine and then writing it out onto duplicate disks. The procedure will fail if there is not enough space in the root file system to hold the original floppy disk data.
- erase** This procedure erases a floppy disk by overwriting it with null bytes. You can erase individual files or all the files on the floppy disk. The main purpose is to remove data that you don't want anyone to ever see. Be careful when you start erasing files because the process is not reversible.
- format** Before you can write programs and data on a floppy disk, certain things need to be done to the disk before it can store information. The process is called formatting. The `format` subcommand is used to prepare (format) floppy disks and get them ready to use.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
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4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

DISK MANAGEMENT MENU (CONT.)

harddisk The subcommands in this menu provide functions for using an additional hard disk. You can partition the hard disk with default partitioning, create hard disk file systems, and display the current disk partitioning.

Subcommands of **harddisk** are:

display The **display** subcommand allows you to display the hard disk partitioning. This will inform you of current disk partitioning information.

makehdfs If you have an additional hard disk linked to your system, the **makehdfs** subcommand can be used to construct the file systems on it. The file systems are constructed according to user responses and information obtained from the hard disk. Note that you must partition the hard disk before constructing the file systems. The procedures are repeated for the next eligible partitions until the disk is completed.

partitioning The **partitioning** subcommand configures an additional hard disk. By using this subcommand, you can partition the hard disk according to default partitioning.

Additional disk management menu commands are:

makefsys This subcommand creates a new file system on a floppy disk that can then store data you do not wish to keep on hard disk. When "mounted", the file system has all the properties of a file kept on the hard disk except it is smaller.

mountfsys The **mountfsys** subcommand mounts a file system found on floppy disk, making it available to the user. The file system is unmounted with the **unmountfsys** subcommand. The floppy disk must not be removed while the file system is still mounted.

unmountfsys This subcommand unmounts a file system on floppy disk so that you can remove the floppy disk. The floppy disk must not be removed while the file system is still mounted.

NOTES

APPLICATION 2

1. Which subcommand is irreversible once it is started?

FORMAT

2. Which command is used to prepare the floppy disk for service?

DISKCOPY

3. Obtain floppy disks from your instructor and prepare them for service. Follow the subcommands and the instructions from the menu system. If there are any problems, consult your instructor before proceeding.

4. Which command would you use to gain information on the current hard disk partitioning?

FDISK

5. Execute the subcommand from question 4 and list the partitions shown.

6. What is the sector start and sector size of partition 2?

1 _____

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
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9	usermgmt	user management menu

FILE MANAGEMENT MENU

The file management menu contains subcommands to allow you to copy data from hard disk to floppy disks and vice versa.

backup The **backup** subcommand saves copies of files from hard disk file systems to floppy disks. There are two kinds of backups:

COMPLETE Copies all files; useful in case of serious file system damage.

INCREMENTAL Copies files changed since last backup.

The normal use is to do a complete backup of each file system and then periodically do incremental backups. It is recommended that you keep two cycles (one set of complete backups and several incrementals to each cycle). Files backed up with **backup** are restored using **restore**.

diskuse The **diskuse** subcommand lets you know what percentage of the hard disk is currently occupied by files. It outputs a list organized by file system names.

fileage The **fileage** subcommand prints the names of all files older than the date you specify.

filesize The **filesize** subcommand prints the names of the largest files in a specific directory. If you do not specify how many large files to list, ten files will be listed.

restore This subcommand restores files from "backup" and "store" media to built-in disk. The **restore** subcommand copies files from floppy disks that were made using **backup** and **store** back onto the hard disk. You can restore individual files or the entire contents of a disk or tape, and you can restore from both "incremental" and "complete" media. You can also list the names of files stored on the disk or tape.

store This subcommand copies files and directories from the hard disk to floppy disks. Typically, these will be files that you want to archive or restrict access to. You can store single files and directories of files. Use the **restore** subcommand to put stored files back on the hard disk and to list the files stored.

NOTES

APPLICATION 3

1. Your 3B2 computer is brand new. Should you make a backup?
YES
2. What type of backup will your first backup be?
COMPLETE
3. Perform a COMPLETE backup of your machine.
4. "Tough Luck Jones" comes to you with a sad tale. It seems he inadvertently wiped out his entire directory and all directories under his login directory. Can you help this pathetic soul? YES If so, how?
RESTORE
5. Which command will allow you to see the files you have on your backups?
RESTORE
6. A hard disk went bad on computer 3. No one had ever made backups. What can be done to save the files on this disk?
NO DATA
7. If you made incremental backups and complete backups weekly, what is the highest number of the disk you would have to load for recovery (based on one diskette per backup)?

8. Using one of the previously formatted disks, archive several files of your choice. Which subcommand did you use?
STORE

Restore the files and list them.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
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5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

MCJ²

NEW KEY

UNIX

MACHINE MANAGEMENT MENU

The machine management menu covers tasks such as changing operating states, turning off the computer, and making a floppy key.

- firmware** Stop all running programs and then enter the firmware mode. This procedure will stop all running programs, close all open files, write out information to disk (such as directory information), and then enter the firmware mode. In the firmware mode, you can perform machine diagnostics and other special functions not available through standard UNIX system commands.
- floppykey** Create a floppy key removable disk. The floppy key removable disk allows you to enter the firmware mode if you have previously changed the firmware password and forget what it is. Thus, the floppy key is just that -- a key to your system, and should be protected as such.
- powerdown** Stop running programs and then turn off your machine. The **powerdown** subcommand will stop all running programs, close any open files, write out information to disk (such as directory information), and then turn the machine power off.
- reboot** Stop all running programs and then reboot the machine. The **reboot** subcommand will stop all running programs, close any open files, write out information to disk (such as directory information), and then reboot the machine. This can be used to get out of some types of system trouble, such as when a process cannot be killed.
- whoson** This subcommand prints a list of users who are currently logged on to the system.

NOTES

APPLICATION 4

1. Using the diskette labeled "floppy key", create a floppy key disk. Refer any questions to your instructor.
2. After creating the "floppy key", reboot the UNIX operating system from the hard disk and continue with the work assignment.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

PACKAGE MANAGEMENT MENU

Subcommands from the package management menu help you in using optional utilities or hardware options. This menu will be empty until you install a utility or an option that is supported by Simple Administration. Once you have installed a supported utility or option, a corresponding entry will appear in the package management menu. The entry (a menu) contains the subcommands or lists the files you will use for the installed utilities or options. The following entry will appear under the package management menu when you install the Basic Networking Utilities:

1 uucpmgmt basic networking utilities menu

Note that not all of the utilities or options are supported by Simple Administration. The respective guide or manual indicates whether a utility or option is supported. If supported, the corresponding subcommands or files are described in the guide or manual.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

SOFTWARE MANAGEMENT MENU

The software management menu contains subcommands that allow you to install new software, remove software, and run software directly from a floppy disk.

installpkg This subcommand copies software packages from floppy disks on to hard disk. If necessary, **installpkg** performs additional tasks to enable you to run the software.

removepkg This subcommand is used to remove software packages from the hard disk that were installed using the **installpkg** subcommand. When you execute this subcommand, it shows you a list of the currently installed optional software packages. The floppy disk used to install the software package is needed to remove it.

runpkg This subcommand allows you to run software from a floppy disk without installing it on the hard disk. The **runpkg** subcommand takes a file off the floppy disk and executes it. This subcommand is useful if you do not use the software often or if you do not have enough room on the hard disk to load the software package.

NOTE: Not all software packages have the ability to run this way. See the instructions that come with the software package to find out if programs can be run directly from the floppy disk.

NOTES

APPLICATION 5

1. Select the `installpkg` subcommand and install the following standard utilities:
 - Directory and File Management
 - System Administration
 - Terminal Information (two diskettes - use teletype only)
 - Editing
 - User Environment
2. Now select the `removepkg` subcommand and verify that all the above utilities have been installed.
3. Quit the software management menu and continue with the work assignment.

If you have any questions, ask your instructor.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

SYSTEM SETUP MENU

The system setup menu contains subcommands that tell the computer what its environment looks like (for example, what time zone it is in, what peripheral devices are attached to it, etc.).

admpasswd This subcommand lets you assign or make changes to passwords for administrative commands and logins such as **setup** and **sysadm**.

datetime This subcommand enables you to have the computer report all times in your local time zone. The **datetime** subcommand tells the computer the date, time, time zone, and whether you observe Daylight Savings Time (DST). A feature of **datetime** is to make automatic changes for Daylight Savings Time. If you observe DST, the computer will automatically start to observe it in the spring and return to Standard Time during the fall.

nodename This subcommand allows you to change the node name of your 3B2 computer. The node name is used by various communications networks to identify your computer. Unless you are familiar with relating node names to a network, refer to the 3B2 Computer System Administration Utilities Guide for further information.

setup This subcommand is used to set up your computer the first time you use it. The **setup** subcommand allows you to define the first login, add other logins, assign passwords to logins, and set the time zone to your location.

syspasswd Assign system passwords. The **syspasswd** subcommand lets you set system passwords normally reserved for the very knowledgeable user. For this reason, this procedure may assign these passwords, but may not change or clear them. Once set, they may only be changed by the specific login or the root login. Therefore, set them with care!!!

NOTES

APPLICATION 6

At this time you will use the `setup` subcommand to add a login for yourself. Do not install passwords on these machines, as they are used on other shifts. You are encouraged to experiment with the `datetime` and `nodename` subcommands. Also, verify the name of your computer.

`compx` = the number of your 3B2 computer.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

TTY MANAGEMENT MENU

The `tty` management menu allows you to change the characteristics of a port-connected device (terminal, printer, or modem).

- baud** This subcommand allows you to change the baud rate of a TTY line. The subcommand presents a list of changeable TTY lines and a list of baud rates to choose from. When the change is made, the conditions of the TTY line before and after the change are shown. Changing baud rates also causes a `getty` to be enabled (respawned) for the TTY line.
- disable** This subcommand allows you to disable (turn off) any changeable TTY line. In this status, the computer disables `getty` and will not respond with a login prompt. This effectively blocks a terminal connected to this port from use. However, a printer can operate under the "off" status.
- enable** This subcommand allows you to enable (respawn) any changeable TTY line. When enabled, the `getty` for a TTY line is respawned and logins are permitted. A terminal will operate under the "respawn" status.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

USER MANAGEMENT MENU

The user management menu helps you administer to the users of your computer. In this menu, you can add and delete users, add and delete user groups, and modify a user group or a user's login.

- addgroup** This subcommand adds a new group name or ID to the computer. Group names and IDs are used to identify groups of users who desire common access to a set of files and directories.
- addusr** This subcommand enables you to add other users to the 3B2 computer. Adding a user consists of assigning a login, a user ID, a login path name, and a password. You can enter more than one user at a time. Once this procedure is finished, the new login name is available.
- delgroup** The **delgroup** subcommand allows you to remove groups from the computer. The deleted group is no longer identified by name. However, files may still be identified with the group ID number.
- delusr** This subcommand allows you to remove users from the computer. All information pertaining to a person, such as their login ID and all other data they have stored on disk, is removed. After this subcommand has been executed, the person who was removed will no longer have access to the computer.
- lsgroup** This subcommand lists all the groups that have been entered into the computer with the **addgroup** subcommand. This list is updated automatically by **addgroup** and **delgroup**.
- lsuser** This subcommand lists all the users that have been entered into the computer with the **adduser** subcommand. This list is updated automatically by **adduser** and **deluser**.

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostics menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
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9	usermgmt	user management menu

USER MANAGEMENT MENU (CONT.)

- modadduser** The `modadduser` subcommand allows you to change some of the defaults used when `adduser` creates a new login. Changing the defaults does not effect any existing logins, only the ones added after modifying `adduser`.
- modgroup** The purpose of this subcommand is to allow you to change all the information about a group that you entered when you ran `addgroup` to set up new groups.
- moduser** This is a menu of subcommands used to modify the various aspects of a user's login.
- chgloginid** This procedure allows you to change a user's login ID. You cannot change the login IDs of the administrative and system logins.
- chgpasswd** This subcommand allows you to remove or change a user's password. You cannot change the administrative and system logins. To do that, see the system setup menu (`addpasswd` subcommand).
- chgshell** This subcommand allows you to change the command run when a user logs in. You cannot change the login shell of the administrative and system logins.

NOTES

GROUP

Special

130

QUEST

QUEST

APPLICATION 7

1. Add a new group to your system and call it special. When the system prompts you for a group ID number, take the default. If you are logged in as root, what commands would you use to accomplish the task?

2. Add a user to the group you have just made.

3. Use the appropriate command to list the group and member. Is the group added to the list? _____ Is the member added to the list? _____

4. Because the member was not listed with the group, a modification to the `etc/group` file must be made using the text editor. Access the text editor, using the example below to add your member ID to the special group:

```
$ ed /etc/group
/special
s/$/xxx      (xxx=user ID)
w
q
$
```

5. Now that you have modified the `/etc/group` file, go back to `sysadm-lsgroup` and verify the change.
6. Was the member added? _____ If not, check with your instructor!

NOTES

7. The "ZZZ Corporation" has hired you to set up their new 3B2 computer. The users will be in two groups. Group 100 will be finance and group 101 will be personnel. The members of the groups are as follows:

Joe L. Smith	Finance
Jerry J. Wells	Personnel
T. R. Jackson	Personnel
Jon L. Lewis	Finance
P. I. Magnum	Personnel

You will not have to give passwords to the users; the users will pick them later. As soon as you complete your work, the machine will be shipped to the location where it will be used, Honolulu, Hawaii. Set up the machine for the ZZZ Corporation.

8. Use the `datetime` subcommand to go back to the local time.

On completion of Application 7, the objectives for this work assignment have been met. Application 8 (on the next page) is optional and will be assigned by the instructor if time permits.

*ed FILE called group
to run the program*

CT3601 (SG)

44

WA 3.0

NOTES

APPLICATION 8

1. Using one of the spare diskettes, make a file system, using the system administration menu.
2. Answer the following questions about the file system you created.
Label _____
File system name _____
Number of files _____
3. If you receive a "Floppy Access Error" while attempting to make a file system on a diskette, what is the probable cause of the error?

4. Using one of the spare diskettes, make a copy of the Security Utilities diskette.
5. Install the Basic Networking Utility and verify that it is listed under packagemgmt.

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE, AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 4.0
UNIX™ SYSTEM SKILLS

UNIX* SYSTEM SKILLS

CAUTION

When inserting and removing diskettes from the floppy disk drive, follow the procedures outline in the 3B2 Computer Owner/Operator Manual.

REFERENCE DOCUMENTS

307-100 UNIX System V User's Guide

305-400 3B2/300 Computer Owner/Operator Manual

MATERIALS REQUIRED

- 3B2 computer and terminal
- Three diskettes labeled:
 - IWB #1
 - IWB #2
 - UNIX Skills

OBJECTIVE

The objective of this work assignment is to give the student an opportunity to review the basic UNIX operating system and have a better understanding of basic commands.

SEQUENCE

On completion of the courseware on diskette, the objective of this work assignment will have been met.

The application on page 15 is optional and will be assigned by the instructor if time permits.

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UNIX SYSTEM SKILLS

- Introduction to the Instructional Workbench™ software

- File system hierarchy

- Files

- Permissions

- Shell command file and variables

UNIX SYSTEM SKILLS

Because this course requires an understanding of the basic UNIX system commands and concepts, an on-line training package has been developed that gives you an opportunity to review your UNIX system skills. There are three floppy disks that, when installed, give you access to the UNIX SYSTEM SKILLS package for the 3B2 computer. The two floppy disks labeled "IWB" contain the Instructional Workbench software, which will control delivery to your terminal screen of the training contained on the third floppy disk, labeled "UNIX Skills".

The example on the opposite page shows the five major topics covered under the UNIX SYSTEM SKILLS package. Not only will you be able to select from one of these five major topics, but you will be able to view all lessons in the order listed. There is also a section to select from keywords used in this work assignment.

GETTING STARTED

Console Login: ejw
Password: (If assigned)
\$ skills

```
*****  
Welcome to the UNIX SKILLS Package for 382 Model 300..  
*****
```

PLEASE ENTER THE NUMBER OF WHAT YOU WOULD LIKE TO DO, THEN PRESS
RETURN:

- 1) Learn about how this courseware works by viewing the
"INTRODUCTION TO THE INSTRUCTIONAL WORKBENCH SOFTWARE"
- 2) view "THE FILE SYSTEM HIERARCHY"
- 3) view the "FILES" lesson
- 4) view the "PERMISSIONS" lesson
- 5) view the "SHELL COMMAND FILES AND VARIABLES" lesson
- 6) initiate a KEYWORD SEARCH
- 7) view all the lessons (1 through 5) in sequence
- q) quit for now...

YOUR CHOICE (1-7,q) >

GETTING STARTED

To get started in the courseware you must first install the three floppy disks provided. Installation of the courseware is accomplished by using the `sysadm installpkg` command. The install procedure is the same as the procedure covered in the System Administration work assignment. After installing the three diskettes, log off the system, using a "control-d". The "control-d" will return you to the console Login:.

The example of the opposite page shows the procedure for getting started in the courseware after the package has been installed. Log in to the system, using the login name you created on the previous work assignment. When you wish to access the training type `skills` at the standard UNIX system prompt (the dollar sign). You will then see the UNIX SYSTEM SKILLS training menu, as shown on the opposite page.

The remaining pages of this work assignment explain the seven available options and outline the courseware. The options are explained on page 7 and the courseware is outlined on pages 8 through 13.

You may now log in and start the UNIX SYSTEM SKILLS package.

NOTES

OPTIONS

There are seven options to select from once the courseware has been accessed. The seven options are listed below, with a brief explanation of each.

Select option 1 before you view any of the lessons. This introduction will familiarize you with the Instructor Workbench software options so that you may move through the training in a way that is most efficient for you.

Select option 2, 3, 4, or 5 to view a single lesson at a time. Whenever you finish a lesson, you will see the main menu again.

Select option 6 to "zero in" on particular displays by doing a keyword search. Keyword searching can also be done from within any of the lessons, as described in the introduction (option 1).

Select option 7 for a comprehensive UNIX SYSTEM SKILLS module. It consists of the same material you would view if you selected options 2, 3, 4, and 5 in order. The difference is that with option 7, Instructor Workbench software will build a file (called a "history file") in the home directory of the login name you use. This history file will keep track of your place in the course so that you may quit at any time and be repositioned where you left off whenever you select item 7 from the menu again.

UNIX SKILLS OUTLINE

- I. Introduction to IWB
 - A. Using the IWB Options
 - B. Moving Through the Courseware
 - C. Moving Through the Courseware, Cont'd
- II. The 3B2 UNIX Environment
 - A. Introduction
 - B. What You'll Learn in These Lessons
 - C. The File System Hierarchy
 - 1. Files and Directories
 - 2. The Home Directory
 - 3. More on Path Names
 - 4. Common UNIX File/Directory Commands
 - 5. The 'cd' Command
 - 6. More about the 'cd' Command
 - 7. Quick Check (Changing Directories)
 - 8. The 'mkdir' and 'rmdir' Commands
 - 9. Examining Directories
 - 10. List in Long Format -- the 'ls -l' Command
 - D. Files
 - 1. Text Editing with 'ed' -- Lesson 1
 - a. Introduction to the 'ed' Editor
 - b. What is the Editor's Buffer?
 - c. The Function of the Editor's Buffer
 - d. How to Work with the Editor's Buffer

- e. Invoking the 'ed' Editor
 - f. Quitting the Editor -- the 'q' and 'Q' Commands
 - g. Using the 'Q' (Quit) Editor Command
 - h. Still More on Quitting the Editor.
 - i. Quick Check (Quitting the Editor)
 - j. Buffer Lines
 - k. Quick Check (The Editor's Buffer)
 - l. Displaying the Entire Buffer Contents
 - m. Displaying a Range of Buffer Lines
 - n. Buffer Contents -- Some Examples
 - o. Using the ';' in Displaying a Range of Lines
 - p. Relative Line Addressing and the Current Line
 - q. More on Symbols Used in Relative Line Addressing
 - r. Creating Relative Line Addresses
 - s. Default Values in Relative Line Addresses
 - t. Accumulating + and - Signs in Relative Addresses
 - u. Accumulating + and - Signs in Relative Addresses
2. Test Editing with 'ed' -- Lesson 2
- a. Adding Text to the Editor's Buffer
 - b. The 'a' (append) Command
 - c. The 'i' (insert) Command/Terminating Input
 - d. Quick Check (Appending Text)
 - e. Quick Check (Appending Text)
 - f. Quick Check (Text Insertion)
 - g. The 'd' (delete) Command
 - h. Quick Check (Deleting Text)

- i. Quick Check (Deleting Text)
 - j. Quick Check (Changing Text; Display 1 of 3)
 - k. Quick Check (Changing Text, Display 2 of 3)
 - l. Quick Check (Changing Text, Display 3 of 3)
 - m. Introduction to the 'm' (move) Command
 - n. Example of Moving a Single Line
 - o. Quick Check (Moving Text)
 - p. More on the 'm' Command
 - q. Introduction to the 't' (Transfer) Command
 - r. Example of the 't' Command
 - s. Quick Check (Copying Text)
 - t. Using 't' to Duplicate a Range of Lines
 - u. Quick Check (The 'm' and 't' Commands)
 - v. Introduction to Context Searching
 - w. Uses for Context Searching
 - x. Successive Context Searches
 - y. Examples of Successive Context Searching
 - z. Quick Check (Context Searches)
 - aa. Obtaining Line Numbers/Backwards Searching
 - bb. More on Backwards Context Searching
 - cc. Quick Check (Context Searches)
3. Text Editing with 'ed' -- Lesson 3
- a. Editing Text Within A Line
 - b. Format of the 's' (Substitute) Command
 - c. Quick Check (Substitution)
 - d. First Occurrence of a String

- e. Quick Check (Substitution)
 - f. Specifying Addresses to the 's' Command
 - g. Quick Check (Substitution)
 - h. The 's' Command with a Null Search String
 - i. Removing Part of a Line/No Match
 - j. Quick Check (Substitution, Display 1 of 2)
 - k. Quick Check (Substitution, Display 2 of 2)
 - l. The Current Line After an 's' Command
 - m. Quick Check (Substitution)
 - n. The / (slash) as a Delimiter
 - o. Quick Check (Substitution)
 - p. Substituting for All Occurrences on a Line
 - q. Quick Check (Substitution)
 - r. Special Characters in an 's' Command
 - s. Using '%' in an 's' Command
 - t. When '%' and '&' Have Special Meaning
 - u. Escaping the Special Meanings of '&' and '%'
 - v. Using Special Characters More Than Once
 - w. Quick Check ('&' and '%', Display 1 of 3)
 - x. Quick Check ('&' and '%', Display 2 of 3)
 - y. Quick Check ('&' and '%', Display 3 of 3)
4. Text Editing with 'ed' -- Lesson 4
- a. The 'g' (global) and 'v' Commands
 - b. Examples of the 'g' and 'v' Commands
 - c. Quick Check (Global Commands)
 - d. When to Use 'g' and 'v' Commands

- e. 'g' (global) With Other Editor Commands
 - f. Quick Check (Global Commands)
 - g. The 'u' (undo) Command
 - h. Example of the 'u' (undo) Command
 - i. Quick Check (The Undo Command)
- 5. Removing, Copying, and Moving Files
 - 6. The 'cat' and 'pr' Commands
 - 7. The 'pg' Command
 - 8. The 'tail' Command
 - 9. Redirecting Output with '>'
 - 10. More on Output Redirection
 - 11. Input Redirection
 - 12. More on I/O Redirection
 - 13. Quick Check (Output Redirection)
 - 14. File Name Substitution
 - 15. File Name Substitution, Cont'd
 - 16. Examples of File Name Substitution
 - 17. Pattern Matching Via 'grep'
 - 18. Metacharacters and 'grep'
- E. Permissions...
- 1. Introduction to Permissions
 - 2. On Files
 - 3. On Files (Cont'd)
 - 4. Quick Check (Permissions)
 - 5. On Directories
 - 6. How to Change Permissions

7. How to Change Permissions (Cont'd)
 8. Using the 'chmod' Command
 9. Another Way to Use 'chmod'
 10. Quick Check (Permissions and the 'chmod' Command)
- F. Command Summaries
- G. Shell Command Files and Variables
1. Shell Command Files
 2. Shell Variables
 3. More On Shell Command Files
 4. Your .profile
 5. Quick Check (Your .profile)
 6. The PATH Variable
 7. Other Environment Variables
- H. End of Module 1

NOTES

APPLICATION

On completion of the courseware on diskette, the objective of this work assignment will have been met. The application on this page is optional and will be assigned by the instructor if time permits.

Use the UNIX System V User's Guide to answer the following questions.

1. Using `vi`, what keyboard function allows you to leave the append mode and return to the command mode?

2. What chapter covers the UNIX system capabilities?

3. What is the function of the `pg` command?

4. A full path name is sometimes called a _____.

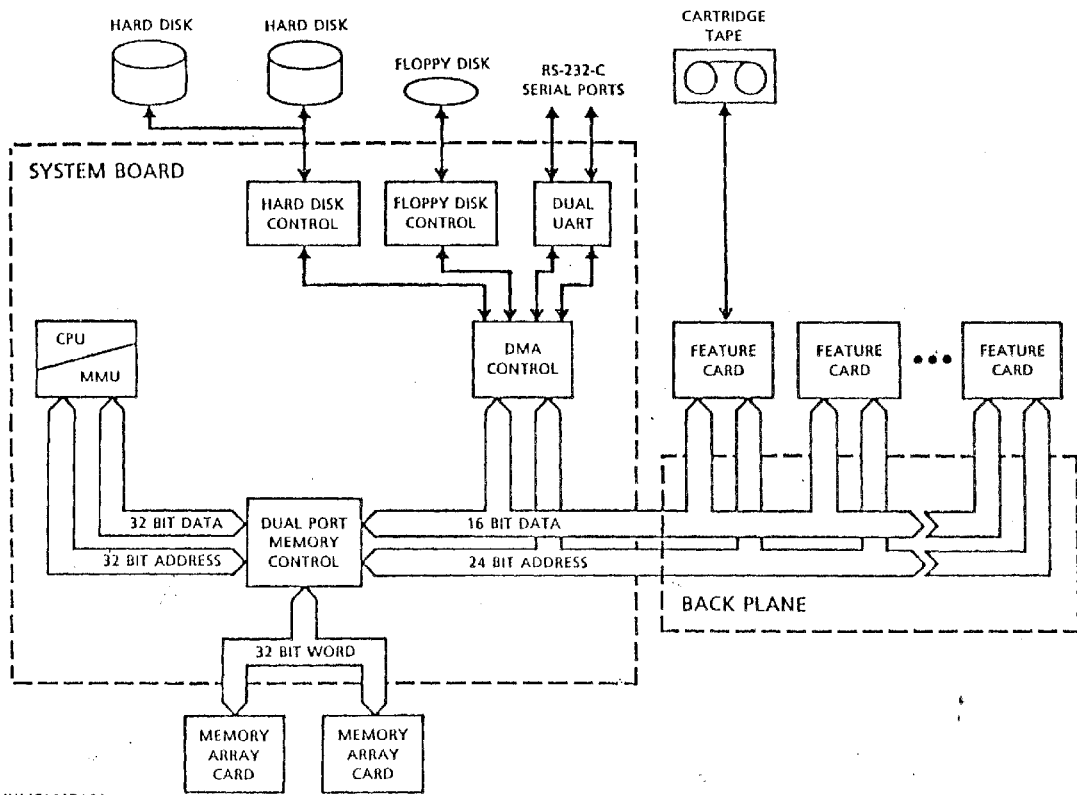
5. What special character in shell places commands in the background and frees up the terminal?

6. What phone number would you call to order UNIX system documents from the AT&T Technologies Customer Information Center?

7. Define the term "delimiter".

8. To make full use of the file system, you must understand its organization of _____ and _____.

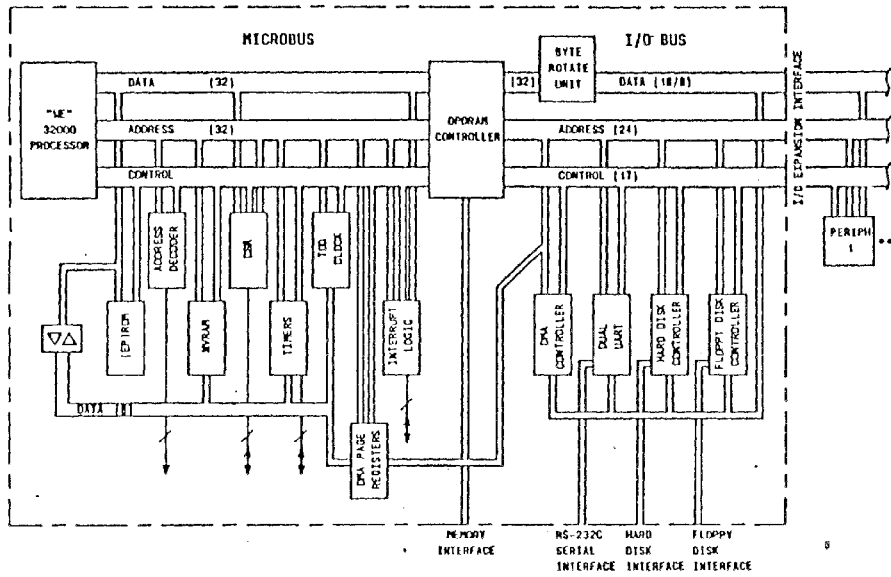
AT&T 3B2 COMPUTER ARCHITECTURE



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System Board Block Diagram

DIAGNOSTIC
NOTES

Reference: Chapter 3 System Administration Manual
305-494 Off-line Diagnostics Manual

Normal

Demand

Interactive

ATP = All tests passed

Diagnostic monitor

Dgmon > dgn'

Dgmon > dgn sbd ph=1-8 ucl rep=10 (soak)

sbd ports (0-3) ni ctc

(L)ist

(h)elp

(s)how

(q)uit

TROUBLE LOCATING

NOTES

References: Chapter 5 Owner/Operator Manual

Appendix D System Administration Manual

305-493 Error Message Manual

305-491 Crash Analysis Guide

Components

- System Board
- Power unit
- Hard disk
- Floppy disk
- Memory boards
- I/O backplane
- Feature cards
- External devices
- AT&T/XM

Equipment

- Replacement parts
- Ports looparounds
- Spare 3BNET transceiver and terminators
- Formatted floppy
- Diagnostic floppy
- Software (core UNIX)
- devtools

Error Messages

- Firmware
- Diagnostic failures
- Boot errors
- Autopump errors
- UNIX system errors
 - Notice
 - Warning
 - Panic

Other

- Software release
- Firmware version
- Partitioning
- Forgotten passwords
 - Root
 - Firmware

Power supply pinouts

Connector A	
Pin #	Description
1	Reset switch
2	Reset switch
3	+12v
4	-12v
5	12v Return
6	Soft Power (PWRDN 0)
7	Soft Power (PWRON 1)
8 through 11	Return
12 through 15	+5v

Connectors B and C	
Pin #	Description
1	+12v
2 & 3	Return
4	+5v

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE, AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 6.0
SYSTEM SECURITY

Issue 1
December 1984

SYSTEM SECURITY

CAUTIONS

After application of this work assignment, remove all personal passwords and return the computer to the original state.

REFERENCE DOCUMENTATION

305-316 3B2/300 Updates
305-400 3B2/300 Owner/Operator Manual
305-406 User Reference Manual
307-100 UNIX System V User Guide

MATERIAL REQUIRED

AT&T 3B2 Computer and terminal

OBJECTIVES

At the end of this lesson, you will be able to:

- Select and change a password.
- Encode and install password aging data to the password file.
- Modify file permissions using the chmod command.
- Define and install unmask in the .profile file.

INTRODUCTION

LOGIN

PASSWORD

PASSWORD AGING

CHMOD

UMASK

INTRODUCTION

Recently, there has been much interest in the security aspects of operating systems and software. At issue is the ability to prevent undesired disclosure of information, destruction of information, and harm to the operation of the system. This work assignment discusses the degree of security in the UNIX* system and offers a number of methods for its improvement.

The work assignment begins with a discussion of logins (where else would you begin?) followed by some thoughts about passwords.

While on the subject of passwords, we will discuss the methods for selecting and changing a password. Since this work assignment is about security, we will talk about password aging.

Another aspect of system security is permissions. (Remember the chmod command?) We will spend some time reviewing permissions as viewed by system security.

The last subject to be discussed will be umask - what it means and how it is used.

An application at the end of the work assignment will give you experience in establishing system security.

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LOGIN

- Lowercase letters and numbers
- System recognizes seven characters
- No embedded blanks

LOGIN

To log in successfully on the UNIX system, you must type in a valid user or login name, followed by the correct password.

The login is a unique string of lowercase letters and/or numbers used to identify the user to the system. The login name can vary in length, but the system truncates (drops) after the seventh character. Login names cannot have embedded blanks.

In response to KS4IREL: Please login: you would type kent (return).

The login name is echoed (printed) on the terminal. At this point during the login, the system will accept any valid composition. The system response to an invalid login is identical to that for a valid user name. After all, it would be bad security for the system to inform the interloper when an invalid login name has been entered.

PASSWORD

- Means of security
- Must be at least four characters
- Can be upper and lowercase letters and numbers
- First eight characters are significant

PASSWORD

Since the password is used as an additional means of security, it is not echoed (printed) on the screen. It must consist of a minimum of four characters, if upper and lowercase letters and numbers are used, or six characters, if exclusively upper or lowercase are used. A password should contain one nonnumeric character. If more than four (or six) characters are used, only the first eight characters of the password are significant.

For example, again trying to log in to KS4IREL:

KS4IREL: Please Login: kent (return)

Password: (some secret word) (return)

If the combination of login and password are correct, the system will allow you access. If they are not, you may receive a less hospitable greeting!

Login incorrect

Login: (correct login) (return)

Password: (correct password for LOGIN) (return)

Passwords are, of course, only one component of overall system security, but they are an essential component.

Once there is a lapse in password security, your password should be changed.

Passwords can only be changed by their owners, if password aging is not used, or by the system administrator in either situation.

CHANGING PASSWORD

\$ passwd (return)

Changing password for (your login name) (return)

Old password: (enter your current password) (return)

New password: (enter your new password) (return)

Re-enter new password: (enter your new password) (return)

\$

CHANGING PASSWORD

To change your password, use the procedure on Page 8.

The entries for **New password:** and **Re-enter new password:** must be identical. If they do not match, the system responds with:

They don't match; try again.

New password: (re-enter your new password)

If the entries match, the system responds with the shell prompt (\$), and the system login password file (etc/passwd) is updated to reflect the new password.

You should change your password periodically, especially after you have allowed another user access to your files.

Your system administrator is very concerned about password security, and, as a reminder for you to change your password, may implement password aging. This subject will be discussed on the next few pages.

Exercise

At your terminal, change your password using the procedure shown above. If there are any questions, consult your instructor.

PASSWORD AGING

WEEK-USE TRANSLATION TABLE

Weeks Valid	Use	Weeks Valid	Use	Weeks Valid	Use
0	.	22	K	44	g
1	/	23	L	45	h
2	0	24	M	46	i
3	1	25	N	47	j
4	2	26	O	48	k
5	3	27	P	49	l
6	4	28	Q	50	m
7	5	29	R	51	n
8	6	30	S	52	o
9	7	31	T	53	p
10	8	32	U	54	q
11	9	33	V	55	r
12	A	34	W	56	s
13	B	35	X	57	t
14	C	36	Y	58	u
15	D	37	Z	59	v
16	E	38	a	60	w
17	F	39	b	61	x
18	G	40	c	62	y
19	H	41	d	63	z
20	I	42	e		
21	J	43	f		

PASSWORD AGING

Previously, we said you should change your password occasionally if for no reason other than security. In addition to changing your password at random, there is a UNIX system feature that allows the system administrator to encourage you to change your password by making it impossible for you to log in if you do not. Here is how it works.

First, you and your system administrator decide how often your password should be changed. There are two parts to this decision:

1. The maximum number of weeks the password is valid.
2. The minimum number of weeks before a password can be changed.

For example, your system administrator and you agree the maximum number of weeks a password will be valid is four weeks and a minimum of two weeks must elapse before it can be changed again.

The second part involves translating your decision into information that the UNIX system can use.

The maximum and minimum number of weeks need to be translated to other characters representing your decision. The table on the opposite page lists the translations. It consists of six columns alternately designated **weeks valid** and **use**. The **weeks valid** columns are numbered 0 through 63. These numbers represent weeks. The **use** columns list the characters corresponding to weeks valid numbers or weeks. This cryptic usage of numbers and letters allow for more than 52 characters (weeks) of coding.

For example, assume that you want your password to be valid for a maximum of four weeks and a minimum of two weeks. Referring to the table, the four in the weeks valid column is translated to a two and the two to a zero. These numbers are combined (20) to form the password aging code and will be appended to the password file, which is discussed on the next few pages.

20

PASSWORD AGING

```

teach:QjawNioGlfgi9111:Lead Instructor:/usr1/teach:
rock:eih355DZvBTGc912:200:public S. Stallone:/usr1/rock:
cindy:XfgY18BaabKsk913:200:public C. Johnston:/usr1/cindy:
kent:jn9rXJgioiFTE909:200:public K. Stanley:/usr1/kent

```

	ENCRYPTED		USER	GRP	ACCOUNTING	LOGIN
LOGIN	PASSWORD	AGING	ID	ID	INFORMATION	DIRECTORY



```

kent:jn9rXJgioiFTE,20909:200:public K. Stanley:/usr1/kent

```

PASSWORD AGING (CONT.)

Now we know how to encode password aging data, but where does it go?

There is a file called `passwd` located in directory `/etc` that contains information about system users, including their encrypted passwords. A portion of the file is shown on the opposite page.

In a previous lesson we said each entry in the password file contained seven fields, separated by semicolons. To review they are:

1. Login name
2. Encrypted password
3. User ID number
4. Group ID number
5. Accounting information
6. Login directory
7. Program to use as shell (not shown in the figure)

Of specific interest at this time is the encrypted password field. This is the field where we will install the encoded password aging data. Note that the password file can be read by anybody but only the system administrator can change it.

The encoded password aging data is appended to the encrypted password field using the editor. A comma is used to separate the encrypted password from the encoded password data. The second entry for `kent` shows the encoded password aging data, `(20)`, included as part of the password file.

PASSWORD AGING

KS41REL: Please login: kent (return)

Password: (some secret word) (return)

Your password has expired. Choose a new one

Old password: (some old secret word) (return)

New password: (some new secret word) (return)

Re-enter new password: (some new secret word) (return)

PASSWORD AGING (CONT.)

Now, let us discuss what to do when your password ages (expires).

You attempt to login to the 3B computer:

KS4IREL: Please login: kent (return)

Password: (some secret word) (return)

Your password has expired. Choose a new one

Old password: (some old secret word) (return)

New password: (some new secret word) (return)

Re-enter new password: (some new secret word) (return)

All things being equal, you should get:

KS4IREL: Please login: kent (return)

Password: (some new secret password) (return)

Previously, we said you can not change your password until the minimum number of weeks has elapsed. If you attempt a change before the minimum number of weeks, for example, two, has elapsed, the system informs you:

Sorry: < 2 weeks since last change

NOTE: The < character means "less than." Your system administrator can help you change your password, if it is necessary.

Another method to help maintain the security of your files is to control permissions. This subject will be discussed next.

RELATIONSHIP OF OCTAL VALUES TO ACCESS PERMISSIONS

Octal Value	Access Permission
7	rwX
6	rw-
5	r-x
4	r--
3	-wX
2	-w-
1	--x
0	---

READ, WRITE, AND EXECUTE PERMISSIONS

Security of directories and files are controlled in part by three permission (mode) bits. We will discuss the exact use of these bits in a moment. The three permission bits are designated:

- **Read** - When this bit is set, permission is granted for the directory or file to be read. This bit is designated **r**. It is the leftmost bit of the three bit group.
- **Write** - When this bit is set, permission is granted for the directory or file to be written. This bit is designated **w**. It is the center bit of the three bit group.
- **Execute** - When this bit is set, permission is granted for a directory to be searched or a file to be executed. This bit is designated **x**. It is the rightmost bit of the three bit group.

These bits are combined, forming an octal number with a value of from zero to seven. The figure on the opposite page shows the various combinations of the three bits.

For example, a seven translates to read, write, and execute permission; a six translates to read and write permission.

TYPICAL OCTAL READ, WRITE AND EXECUTE PERMISSIONS

OCTAL EXPRESSION	PERMISSIONS	Settings	Description
777	rwxrwxrwx		Read, write, execute for owner. Read, write, execute for group. Read, write, execute for other.
755	rwxr-xr-x		Read, write, execute for owner. Read, execute for group. Read, execute for other.
700	rwx-----		Read, write, execute for owner.
644	rw-r--r--		Read, write for owner. Read for group. Read for other.
600	rw-----		Read, write for owner.
111	--x--x--x		Execute for owner. Execute for group. Execute for other.

READ, WRITE, AND EXECUTE PERMISSIONS (CONT.)

Security of directories and files are controlled by these permissions for the owner, group, and other categories as follows:

- The owner-access permissions apply for the user whose user identification matches the owner of the directory or file.
- The group-access permissions apply for all users whose group identification matches the group name of the directory or file.
- The other access permissions apply for all users whose user identification and associated group identification do not match the owner or group names of the directory or file.

The figure on the opposite page is a summary of the typical octal expressions identifying owner, group, and other permissions.

OWNER	GROUP	OTHER
rwX	rwX	rwX

As shown above, the leftmost octal number is the owner, center number is the group, and the rightmost number is the other read, write, and execute permissions. An octal expression 600 translates to owner read and write permissions; the group and others are denied access. You will need to become familiar with these types of octal expressions to change the permissions for directories and files using the chmod command. The next few pages give examples for the use of the chmod command.

chmod - CHANGE MODE (PERMISSIONS) OF FILE OR DIRECTORY

Before

\$ ls -l (return)

total 3

```
-rw-rw---- 1 kent public 190 Oct 25 13:51 file1
drwx----- 2 kent public  32 Oct 25 13:51 house
-rw-rw---- 1 kent public  31 Oct 24 14:24 letter
```

After

\$ chmod 775 house (return)

\$ ls -l (return)

total 3

```
-rw-rw---- 1 kent public 190 Oct 25 13:51 file1
drwxrwxr-x 2 kent public  32 Oct 25 13:51 house
-rw-rw---- 1 kent public  31 Oct 24 14:24 letter
$
```

chmod - CHANGE MODE (PERMISSIONS) OF FILE OR DIRECTORY

The chmod command is used to change the owner group, and other access permissions of files and directories. The access permissions of directories and files can only be changed by the owner of system administrator. The access permissions of directories and files are displayed as part of a long listing of the contents of a directory (`ls -l` command).

Command Format

The general format of the chmod command is as follows:

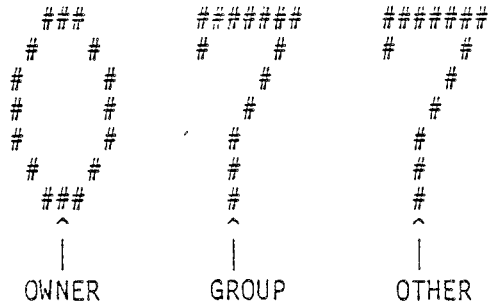
```
chmod mode name(s)
```

For the most common forms of the command, the mode argument identifies the octal expression for the owner, group, and other read (r), write (w), and execute (x) permissions.

The figure on Page 20 shows the command line entries and system responses used in changing the access permissions of a directory names `house`. In the example, the `ls -l` command is used to display the contents of the current directory before and after changing the access permissions. The access permissions of `house` are initially set to provide the owner read (r), write (w), and execute (x) permission. The group and other access permissions are denied (---). The access permissions of `house` are changed to add group (rwx) and other (r-x) access permissions.

NOTE: Observe that the leftmost bit indicates whether the entry is a directory (in which case the bit is a d, as it is in `house`) or a file.

umask - SET USER FILE - CREATION MODE MASK



```
# umask 077 (return)
# ed kent (return)
?kent
a
some important stuff
.
w
21
q
# ls -l kent
-rw----- 1 kent public 21 Nov 7 11:07 kent
```

\$ ed .profile
a
STTY erase ^ah^ echo
UMASK 077
w
q
\$. .profile

umask - SET USER FILE - CREATION MODE MASK

The `umask` command is used to set your user file-creation mask automatically. The file-creation mask determines what owner, group, and other access permissions are denied when either a directory or file is created.

Executing the `umask` command without an argument reports the current octal value of the file-creation mask. For example:

```
umask (return)
0000
```

The initial octal value of the file creation mask is 0000. This means that directories are created with owner, group, and other read, write, and execute permissions; files are created with owner, group, and other read and write permissions. Refer to the figure on the opposite page. If you want different permissions established when you create a file or directory, you must execute the `umask` command with the appropriate octal number argument. Remember, after a directory or file has been created, these permissions can be changed as required via the `chmod` command.

Command Format

The general format of the `umask` command is as follows.

```
umask (three digit octal number argument)
```

The three-digit octal number argument identifies the access permissions that are denied. Reading the octal number from left to right, the first digit applies to the owner, the second digit applies to the group, and the last digit applies to the other access permissions. Within each of these categories, the octal digit identifies read, write, and execute permissions (in that order). For example, an octal 5 defines read and execute permission; an octal 4 defines read and write permission.

The command line entries and system responses (refer to Page 22) show how to set the file creation mask to deny certain access permissions. The effect of setting a particular file creation mask is shown by creating a file and then displaying the access permissions.

umask IN THE .profile FILE

```
TERM=5410132
export TERM
PS1=" PAIN### "
PS2="more data please "
echo " GIVE-ME A BREAK "
banner HANG-TOUGH
mesg y
date
time
umask 077
#
PATH=$PATH:$HOME/bin:/bin:/usr/bin:/usr/lib
stty echoe
echo $PATH
```


umask IN THE .profile FILE

Up to this point we have discussed the use of the chmod, password aging, and umask commands. Using the umask command after you login or at the time you create a file is, at best, cumbersome. The preferred method is to include the umask command in your .profile file.

To quickly review profiles, you remember that the UNIX system has a profile file that resides in the /etc directory. This is the UNIX system profile. This system profile is executed at login and establishes the system characteristics (sometimes called environment) for all users. UNIX system users can create a file in their home directory called .profile. The .profile aids in controlling the system characteristics at login. If your home directory contains a .profile, this file is executed at login after the system profile execution.

Typically, the .profile contains commands that can alter the system characteristics. Part of a .profile is shown on Page 24. Of specific interest is umask 077.

When the .profile is executed, the umask value, in this case 077, sets specific permissions on newly created files and directories.

You can append the umask command to your .profile using the editor. The umask value of 077 gives you the most protection against the interloper, providing you maintain password security and implement password aging.

SUMMARY

The degree of security seems (almost) theoretically adequate, and the problems lie more in the necessity for care in the actual use of the system. The meticulous use of password aging, chmod, and the umask commands make the picture considerably brighter in the area of information protection by thwarting unauthorized perusal and destruction.

NOTES

APPLICATION

Using your student workbook and any available documentation, answer the following questions. Refer any questions to your instructor.

1. Referring to the table on Page 10, encode password aging with a maximum and minimum of two weeks. Record your data.

2. Referring to your answer in question 1, use the editor to append the data to the password file. Record the line entry from the password file.

3. Advance the date one week and log off. Now log back in. What is the systems response? _____

Why? _____

4. Log back in and advance the date three weeks. Log off. Log back in. Were you able to? If not, why?

5. Select one of your files, and change the permissions so only you can access it. What value will the permission have?

6. Select another file and change the permissions 007. Can you access the file? _____
If not, why? _____

7. What permissions would you use to restrict file access to you and your group?

8. What umask value would you use to allow owner and group access?

Add a "Creation Mode Mask" to your .profile using this value.

9. Reexecute your .profile by entering `. .profile` (return) on your terminal. Make a file using the editor. Using the long list command what is the octal value of the permission bits?

-
10. Using the editor, change the value of umask to allow only you, the owner, access to your files. Reexecute your .profile. Create another file. Using the long listing, what is the octal value of the permission bits? _____

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER BASIC OPERATIONS, MAINTENANCE,
AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 7.0
SYSTEM EXPANSION - RANDOM-ACCESS MEMORY (RAM)

Issue 1
November 1984

SYSTEM EXPANSION - RANDOM-ACCESS MEMORY (RAM)

CAUTIONS

Follow standard electrostatic discharge (ESD) procedures as covered in the student guide.

REFERENCE DOCUMENTATION

305-450 Random-Access Memory Expansion Manual

MATERIAL REQUIRED

AT&T 3B2 Computer and terminal
Static-ground wrist strap

OBJECTIVES

At the end of this work assignment you will be able to expand the main memory of an AT&T 3B2 computer from:

- 512 kilobytes to 1 megabyte
- 512 kilobytes to 2 megabytes
- 1 megabyte to 2 megabytes

MAIN MEMORY CONFIGURATIONS

- 512 KILOBYTES
- 1 MEGABYTE
- 2 MEGABYTES

3601 (3-92) 11/84-1

MAIN MEMORY CONFIGURATIONS

The 3B2 Computer Model 300 has three possible main memory configurations.

512 Kilobytes

The 512-kilobyte configuration is made up of two 256-kilobyte memory cards. This is the minimum memory configuration provided with the 3B2 computer system.

1 Megabyte

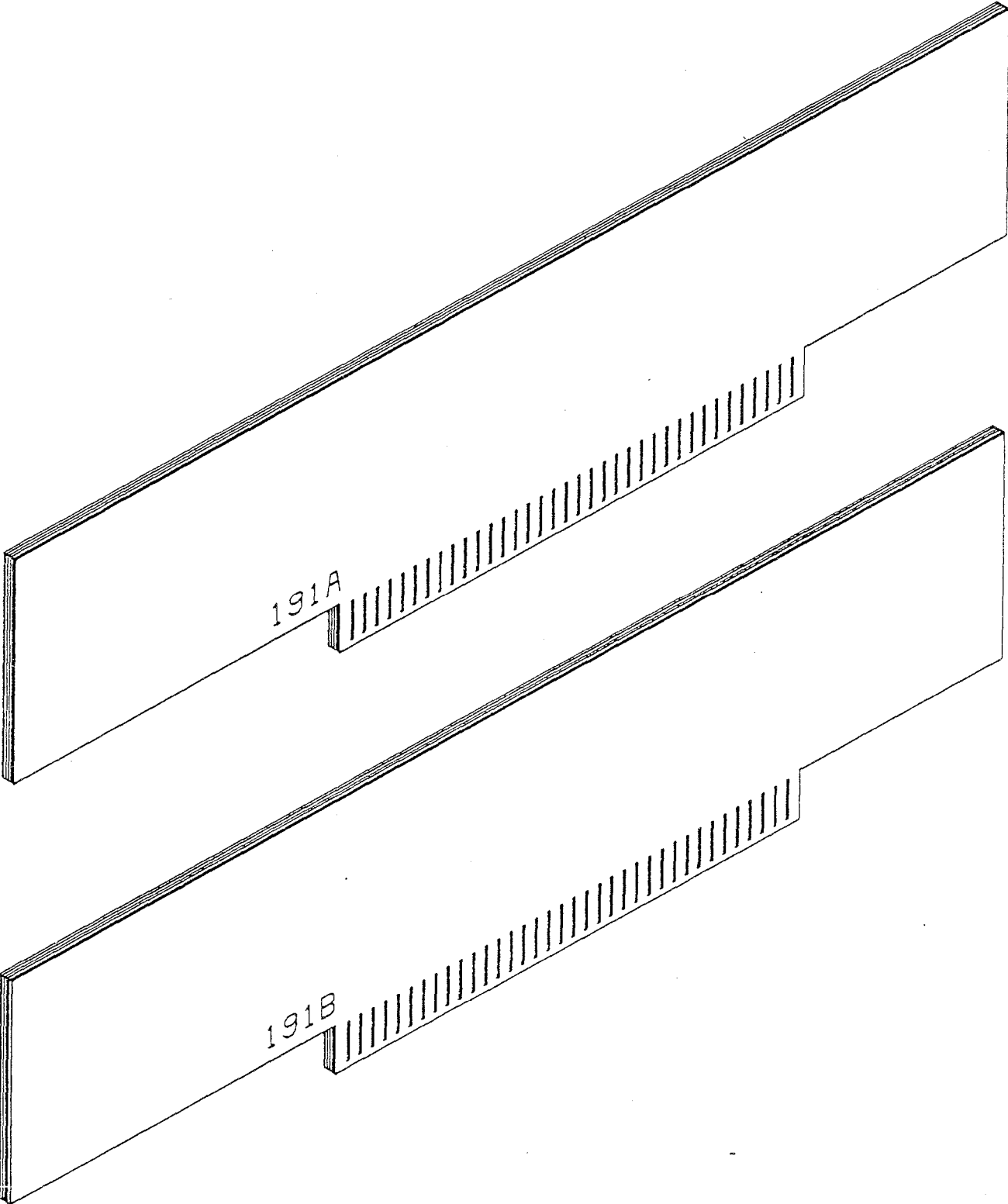
To achieve the 1-megabyte main memory configuration, the two 256-kilobyte memory cards must first be removed from the computer. A high-density 1-megabyte memory card is then installed.

2 Megabytes

The 2-megabyte configuration consists of two high-density 1-megabyte memory cards. To arrive at this configuration, a computer having two 256-kilobyte memory cards must have both of these cards replaced by 1-megabyte memory cards. A computer having one 1-megabyte memory card must simply add one more 1-megabyte memory card to the computer.

NOTE: Do not install a 256-kilobyte memory card and a 1-megabyte memory card together in a 3B2 computer. The computer will not operate properly with this combination of memory cards.

MEMORY CARDS



MEMORY CARDS

Unpacking the Memory Card

Always handle memory cards by the edges. The components on the memory cards are delicate and sensitive to static electricity. Follow the standard electrostatic discharge procedures given in the training manual.

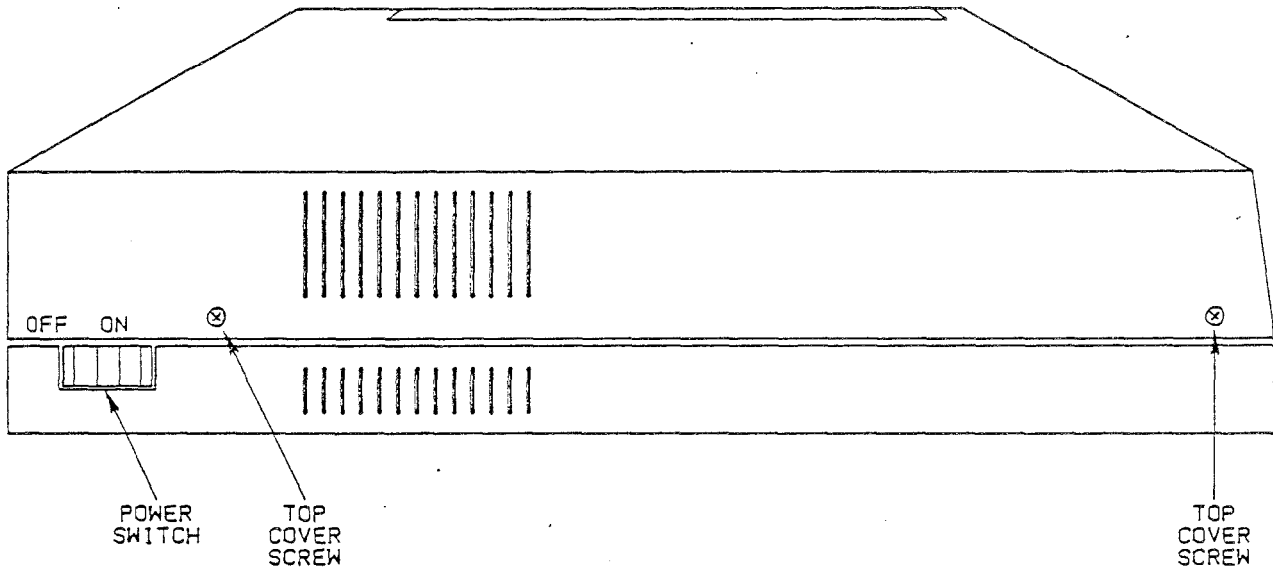
Carefully remove the memory card from the shipping carton and packing material.

Visually inspect the card for loose or defective components.

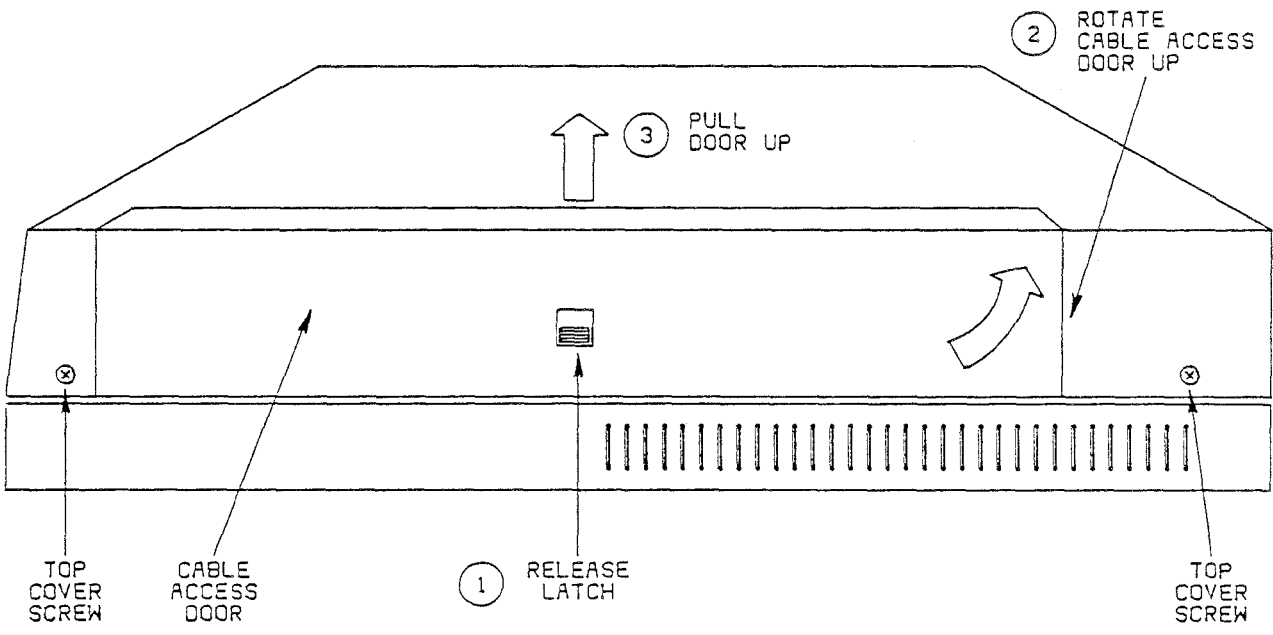
Identifying the Memory Cards

Verify that the card is of the correct byte capacity. The 256-kilobyte memory cards are stamped 191A. The 1-megabyte memory cards are stamped 191B.

REMOVING THE COMPUTER COVER



LEFT SIDE



RIGHT SIDE

3601 (9-94) 12/84-.80

Removing the Computer Cover

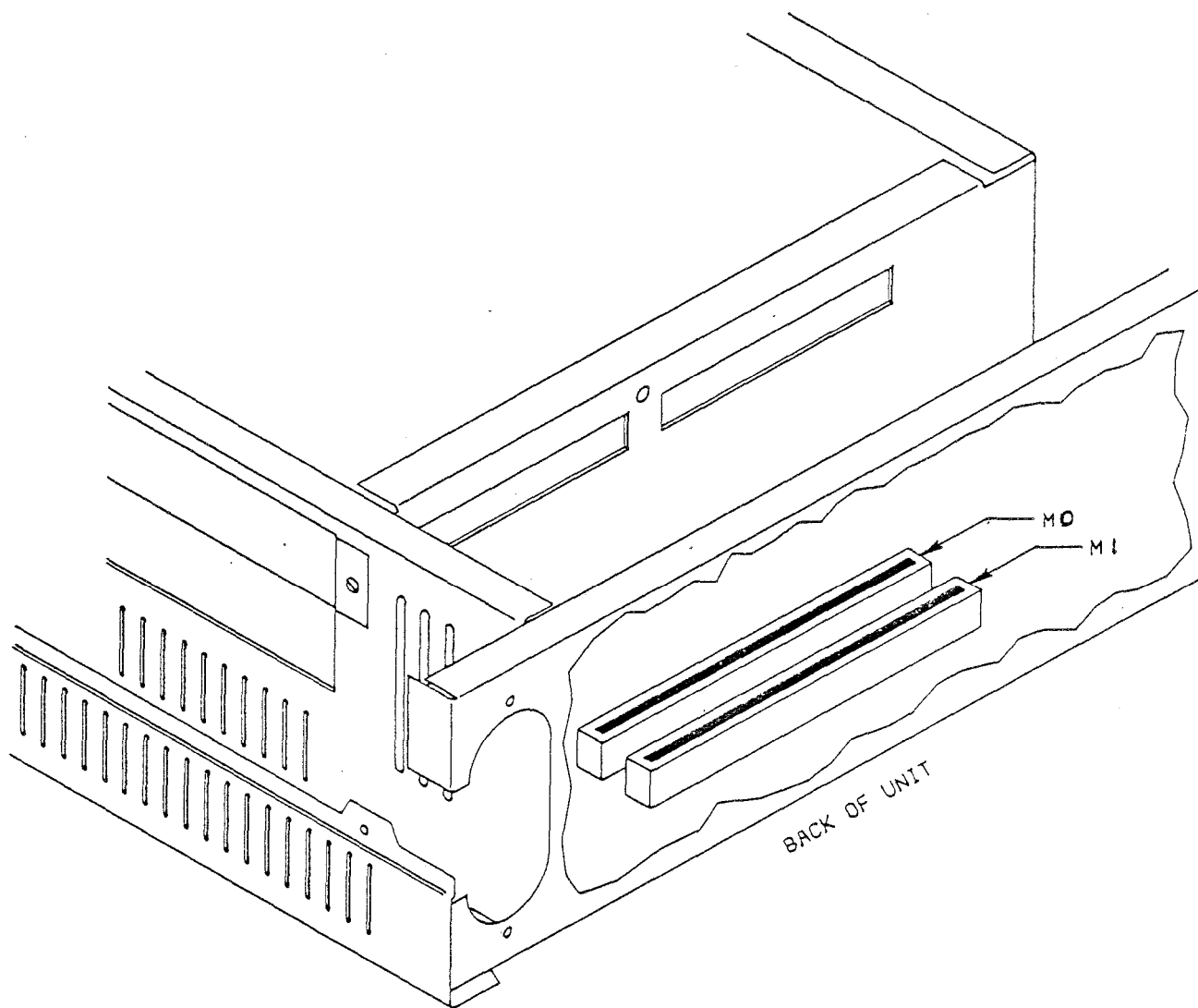
Before initiating the powerdown command and removing the computer cover it should be noted that everytime the memory is changed (increased or decreased), the system must be properly reconfigured. Otherwise, the system could panic or the auto-tuning of the buffers will not take place when the computer is powered back up. Therefore, prior to powerdown, login as root and enter the following command:

```
touch /etc/system
```

This will cause the system to reconfigure memory when the computer is powered back up.

After entering the above command, you may now perform the soft powerdown using the powerdown command. This powerdown procedure will take approximately 90 seconds and be completed when the console displays the message: SYSTEM IS DOWN Now, unplug the AC cord. Never pull the plug or externally remove power until the 3B2 Computer has completed its "soft" powerdown. After the power has been removed, it is safe to remove the computer cover. On the right side of the computer is a cable-access door. To open the door, ① release the "latch", ② swing up the cable access door, and ③ pull up and out. Remove the four screws holding the cover: two on the left side and two on the right side. Carefully, remove the top cover and set it aside.

INSTALLING THE MEMORY CARD



3601 (9-95) 12/84-1

Installing the Memory Card

Memory cards and memory card connectors (M0 and M1) are designed so that the cards can be installed in only one way. Make sure the card is properly positioned—do not force it.

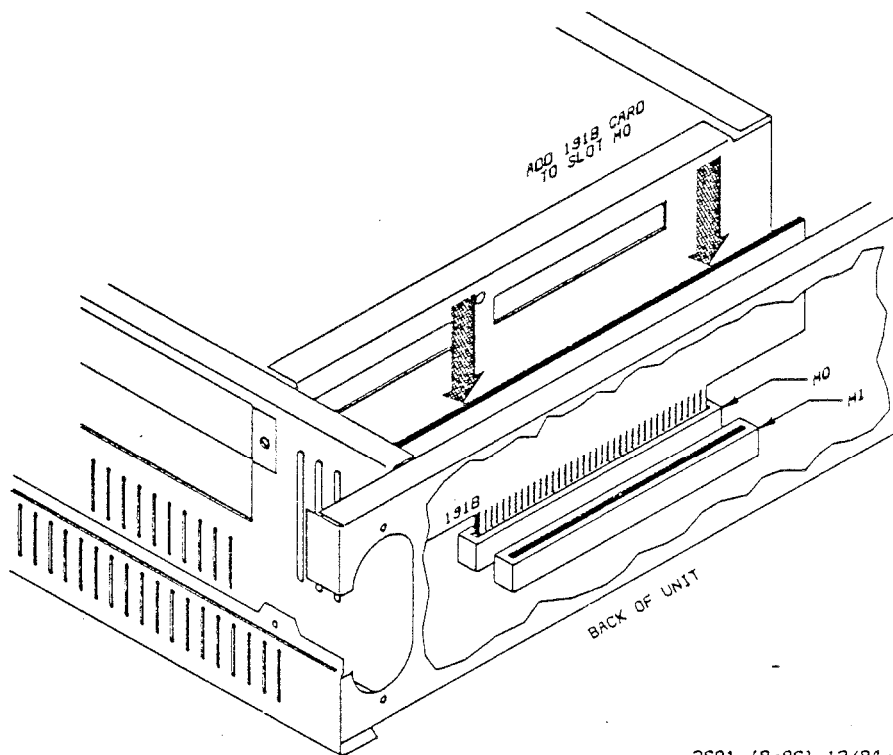
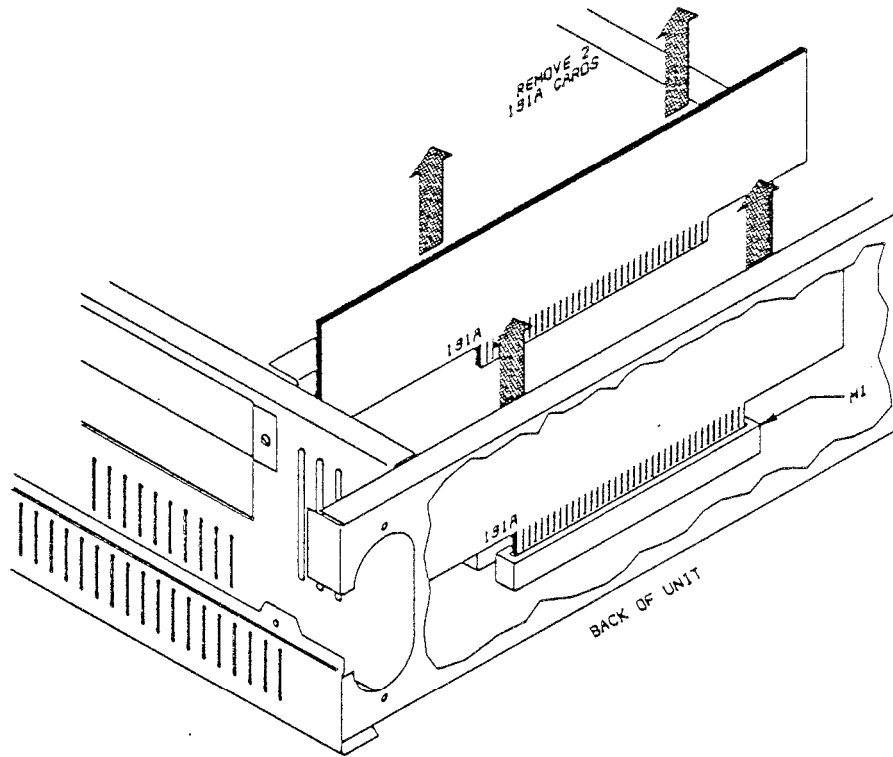
Loosen the screw located on the bracket that holds the memory cards in place.

Slide the bracket up and remove it from the 3B2 computer cabinet.

One of the three following conditions will apply to your 3B2 computer:

- It is equipped with two 256-kilobyte memory cards that are to be replaced with a 1-megabyte memory card.
- It is equipped with one 1-megabyte memory card and one more 1-megabyte memory card is to be added.
- It is equipped with two 256-kilobyte memory cards that are to be replaced with two 1-megabyte memory cards.

EXPANDING MAIN MEMORY FROM 512-KILOBYTES TO 1-MEGABYTE



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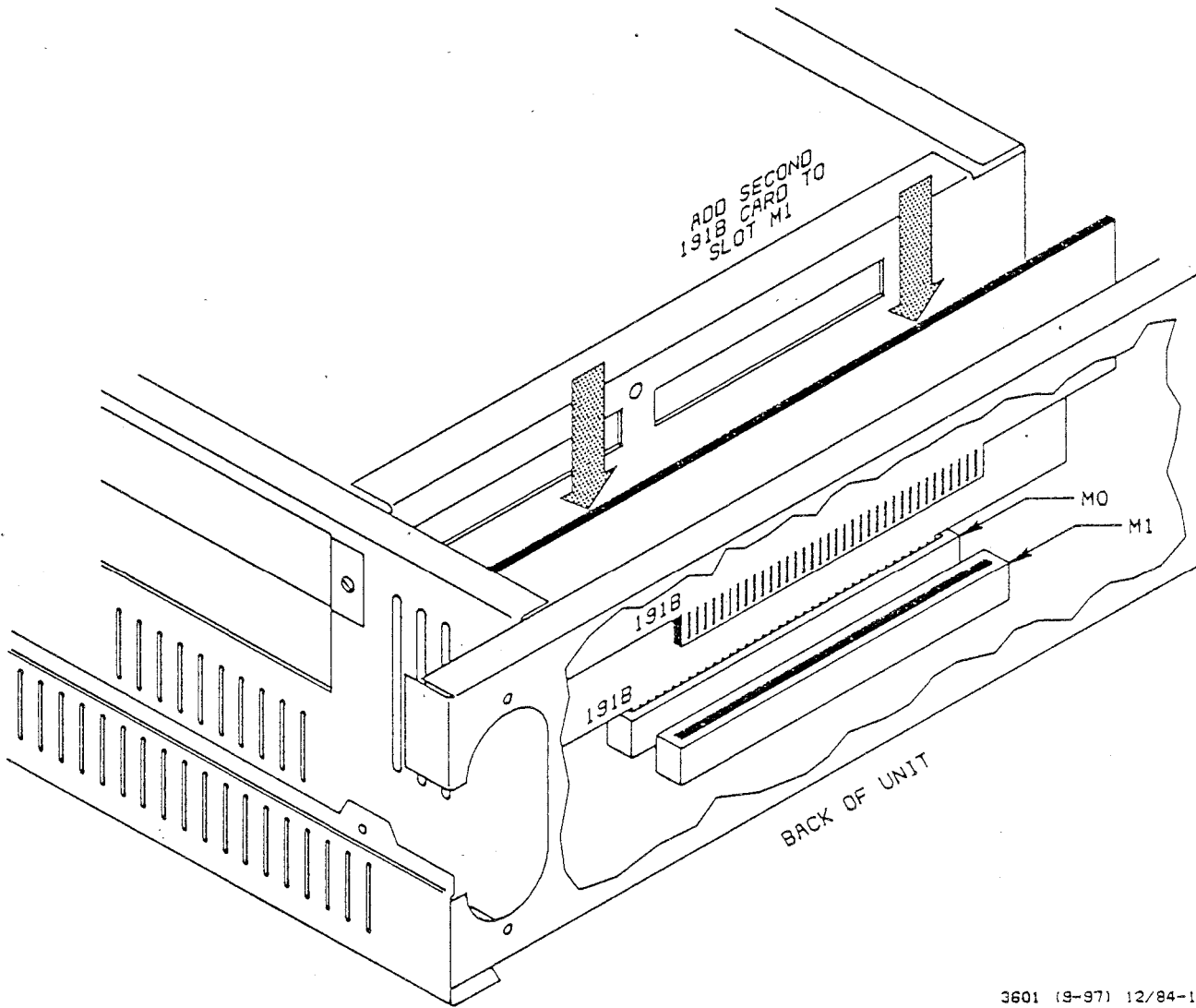
Expanding Main Memory from 512 Kilobytes to 1 Megabyte

If the 3B2 computer is equipped with the two 256-kilobyte memory cards that are to be replaced with a 1-megabyte memory card, then:

1. Locate the M0 memory card connector and grasp the 256-kilobyte memory card in the connector by its edges.
2. Remove the card by slowly pulling it straight up.
3. Similarly, remove the 256-kilobyte memory card from the M1 connector.
4. While holding the new 1-megabyte memory card by its edges, position it over the M0 connector with the component side of the card facing toward the front of the cabinet.
5. Carefully push the card into the connector until it is firmly seated.

NOTE: The M1 memory card connector should be left empty.

EXPANDING MAIN MEMORY FROM 1-MEGABYTE TO 2-MEGABYTE



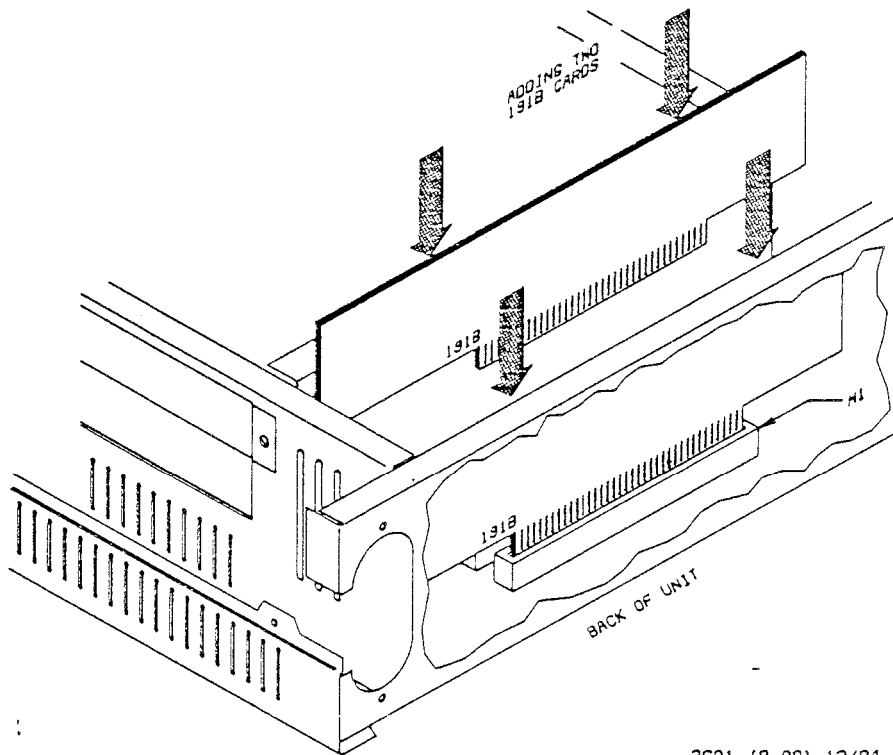
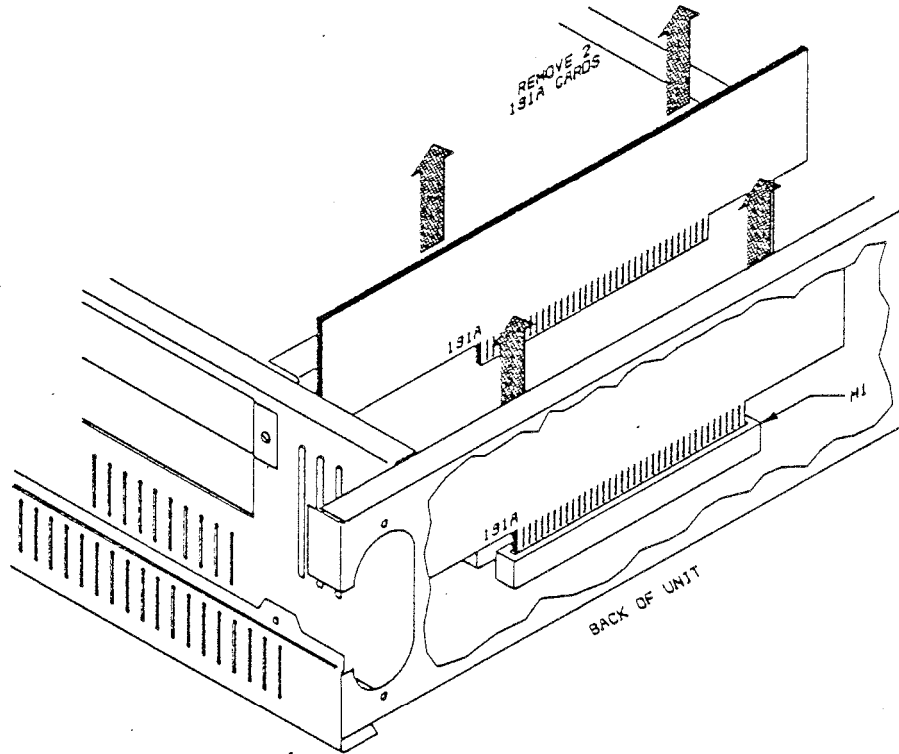
3601 (9-97) 12/84-1

Expanding Main Memory from 1 Megabyte to 2 Megabytes

If the 3B2 computer is equipped with one 1-megabyte card and one more 1-megabyte card is to be added, then:

1. While holding the new 1-megabyte memory card by its edges, position it over the M1 connector with the components side of the card facing toward the front of the cabinet.
2. Carefully push the card into the connector until it is firmly seated.

EXPANDING MAIN MEMORY FROM 512-KILOBYTES TO 2-MEGABYTES



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Expanding Main Memory from 512 Kilobytes to 2 Megabytes

If the 3B2 computer is equipped with two 256-kilobyte memory cards that are to be replaced with two 1-megabyte memory cards, then:

1. Perform the procedures described for replacing two 256-kilobyte memory cards with one 1-megabyte memory card.
2. Perform the procedures described for adding one 1-megabyte memory card to a computer that is equipped with one 1-megabyte memory card.

Completing the Main Memory Expansion

1. Slide the bracket down over the memory cards.
2. Tighten the screw to lock the bracket in place.
3. Replace the top cover on the 3B2 computer and fasten in place with the four screws.
4. Place the cable access door back on the computer and lock the slide latch.

This completes the installation of new memory cards. When the computer is powered up, diagnostic will automatically be run on all the hardware. No input messages are required to add the new memory cards to the system.

APPLICATION

The objective of this work assignment is for you to be able to disassemble a 3B2 computer, locate the main memory cards, and determine the main memory configuration of the computer.

Procedure

Follow the steps given on Page 7 for removing power from the 3B2 computer and removing the top cover.

Locate the main memory cards.

Using the procedures given on Page 9, remove the memory card bracket and one memory card. Carefully examine the memory card and determine the main memory capacity of the computer. Remember that a memory card stamped 191A has a capacity of 256 kilobytes and a memory card stamped 191B has a capacity of 1 megabyte.

NOTE: Remember to use a static ground wrist strap when working inside the computer cabinet.

Verify your findings with your instructor.

Replace the memory card into the proper connector and reassemble the 3B2 computer.

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER BASIC OPERATIONS, MAINTENANCE,
AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 8.0
SYSTEM EXPANSION - ADDITION OF A SERIAL PRINTER

Issue 1
November 1984

SYSTEM EXPANSION - ADDITION OF A SERIAL PRINTER

CAUTIONS

Follow standard electrostatic discharge (ESD) procedures as covered in the student workbook.

REFERENCE DOCUMENTS

305-454 Dot-Matrix Printer Manual

Dot-Matrix Printer Users' Manual

UNIX* System V User Guide and Essential Utilities Manual

MATERIALS REQUIRED

- AT&T 3B2 computer
- DQP-10 dot-matrix printer
- Terminal printer cable
- 8-Wire printer cable
- Printer ac power cable
- RS-232C plug
- Static-ground wrist strap

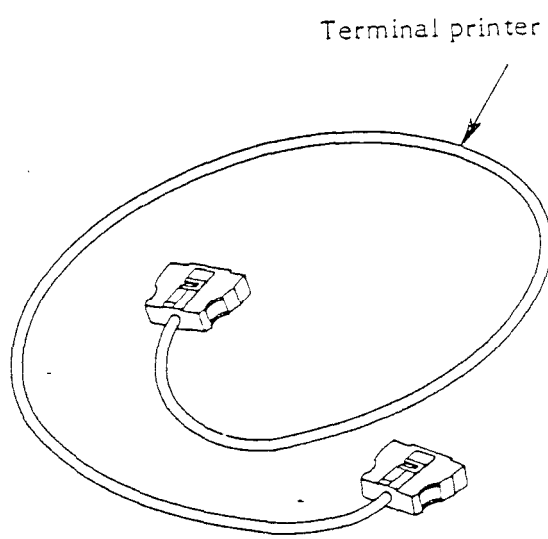
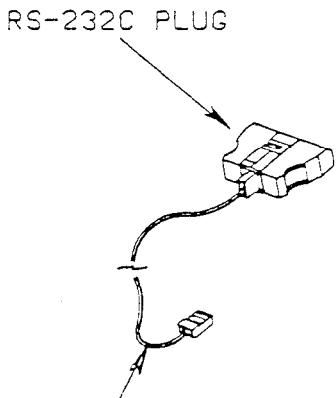
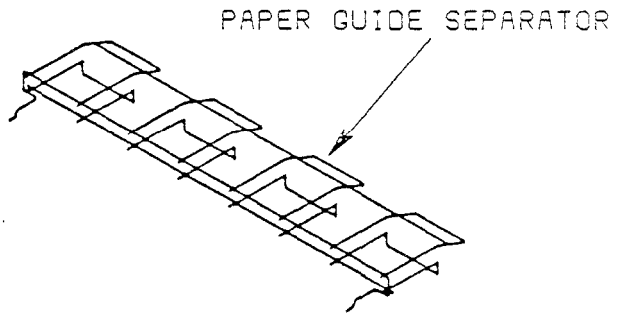
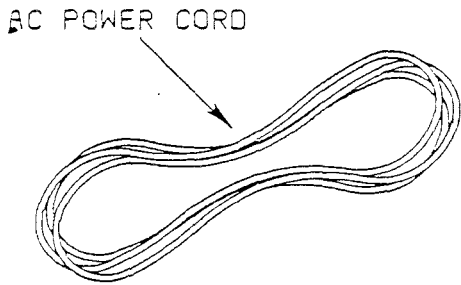
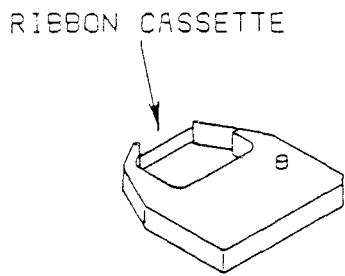
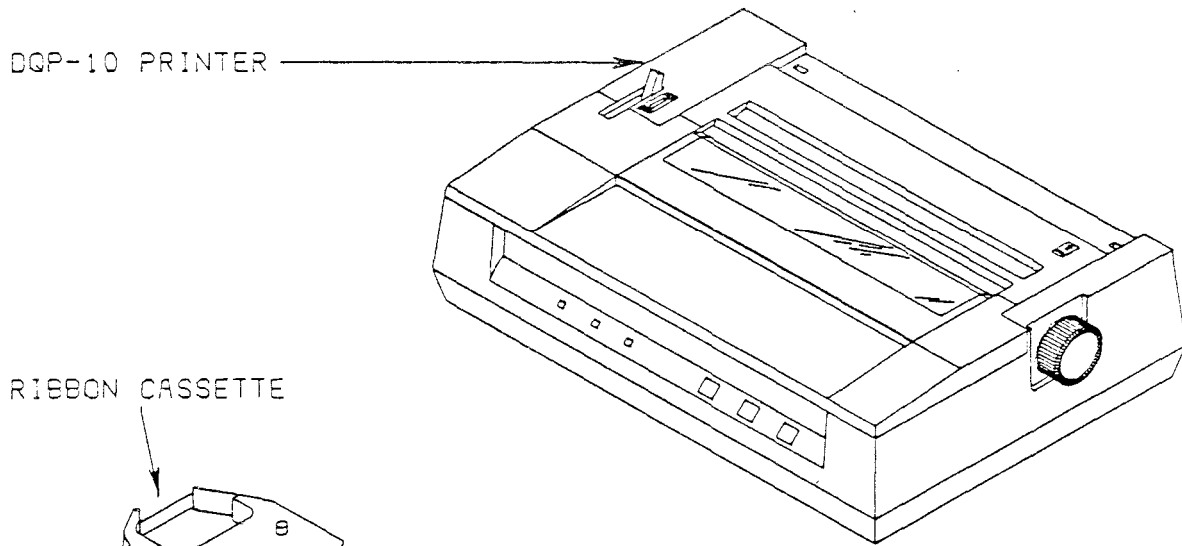
OBJECTIVES

At the end of this work assignment you will be able to:

- Install a DQP-10 line printer as a dedicated system-console printer.
- Install a DQP-10 line printer as a common-use system device.

*Trademark of AT&T Bell Laboratories

LINE PRINTER HARDWARE INSTALLATION



LINE PRINTER HARDWARE INSTALLATION

Required Line Printer Hardware

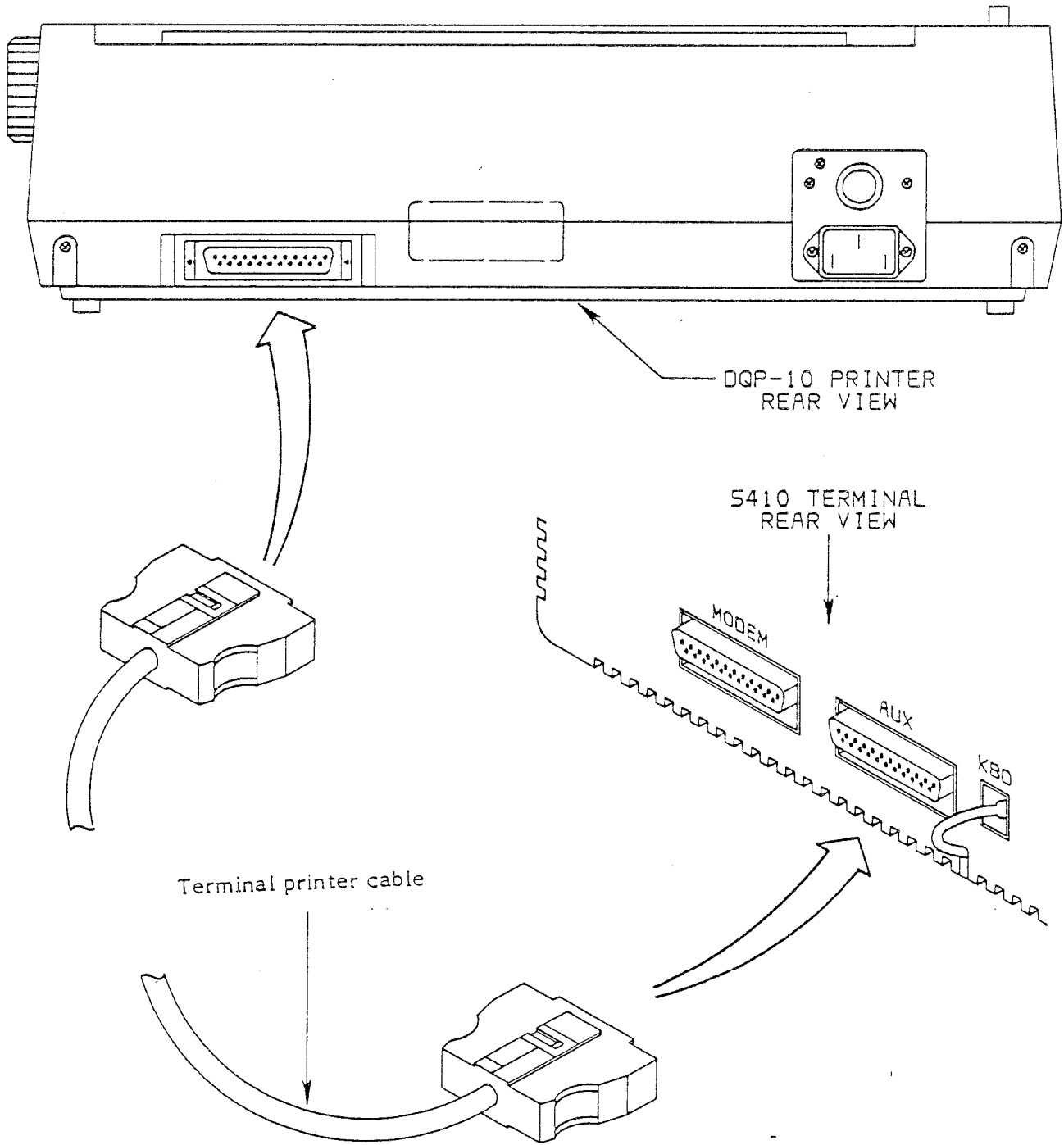
The standard draft-quality serial line printer for the 3B2 computer is the DQP-10 dot-matrix printer. In this work assignment, you will install the DQP-10 as a dedicated system-console printer and a common-use system device.

The DQP-10 is a dot-matrix serial impact printer. It is capable of bidirectional printing of 120 characters per second normally, at 10 characters per inch. The DQP-10 is capable of printing 6 or 8 lines per inch.

The following hardware is required to install a DQP-10 dot-matrix printer:

1. A DQP-10 dot-matrix printer.
2. One ribbon cassette. A ribbon cassette contains inked printing ribbon.
3. One paper guide separator. The separator prevents paper jams caused by the paper being fed into the line printer coming in contact with the paper already printed.
4. One ac power supply cord for the printer.
5. One terminal printer cable for the DQP-10 line printer, when used as a dedicated system-console printer.
6. One 3-wire cable (with an 8-pin modular phone plug at each end) and the associated RS-232C plug, used when the DQP-10 is connected to a serial port and configured as a common-use device.

HARDWARE INSTALLATION



HARDWARE INSTALLATION

Dedicated System Console Printer

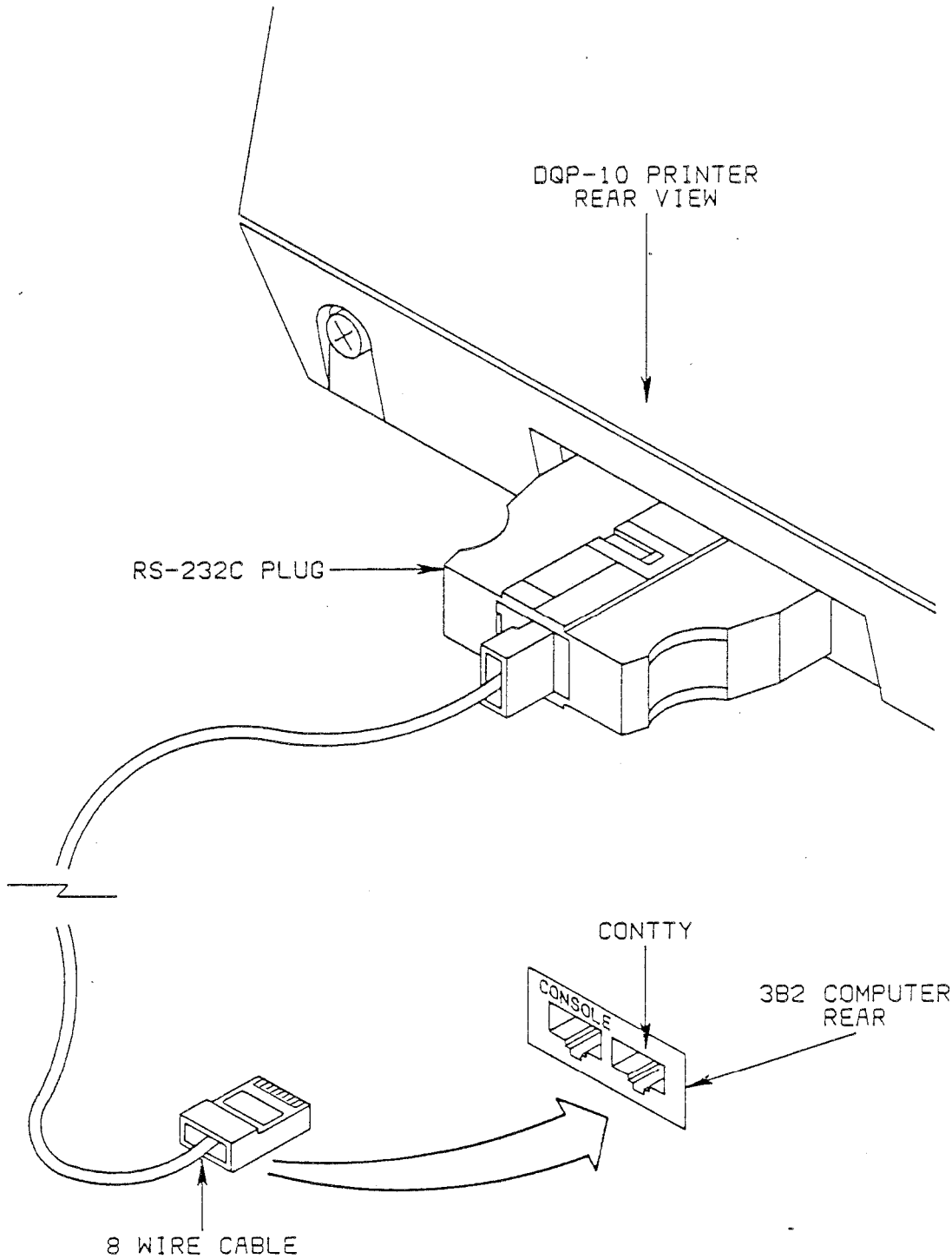
When a line printer is configured as a dedicated system-console printer, only messages received on the system console will be printed on the line printer. In order to use the DQP-10 line printer as a dedicated system-console printer, the system-console terminal must be equipped with an auxiliary connector. In this case, the system-console terminal is the Teletype* 5410 teletypewriter terminal, which is equipped with an auxiliary connector. Plug the terminal printer cable into the RS-232C connector (labeled AUX) at the rear of the 5410 terminal.

The other end of the terminal printer cable should be plugged into the RS-232C connector on the rear of the DQP-10 line printer.

The installation of the DQP-10 line printer as a dedicated system-console printer is now complete. Because the DQP-10 has been directly connected to the system console, no modifications of the 3B2 computer's UNIX operating system are required. The next operation to be performed is to verify the printer control switch settings. This is detailed starting on Page 8 of this work assignment.

*Registered Trademark of the Teletype Corporation

HARDWARE INSTALLATION



3601 (9-101) 12/84-1

HARDWARE INSTALLATION

DQP-10 Printer Serial Port Installation

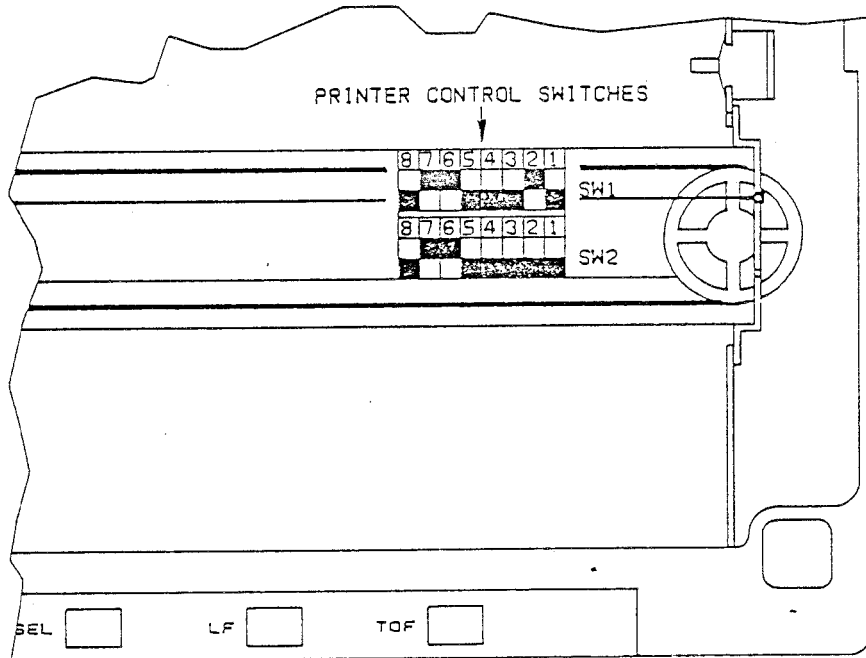
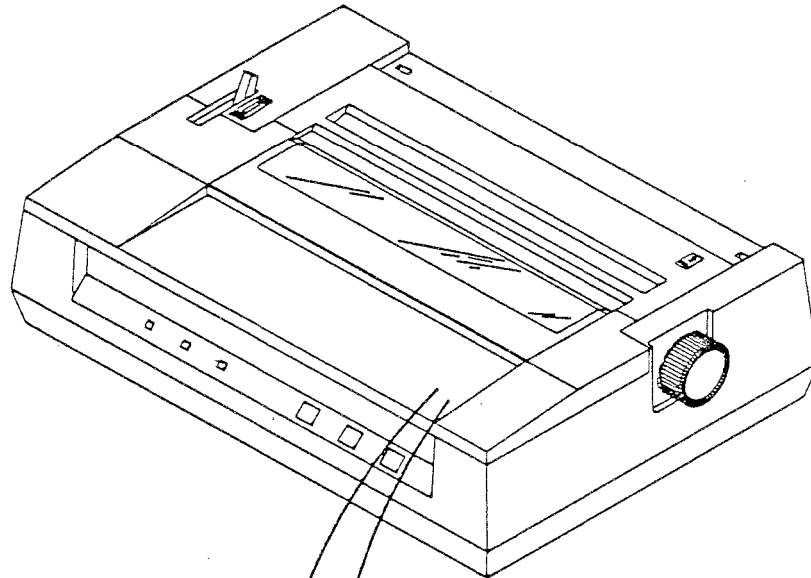
When the DQP-10 line printer is to be configured as a common-use device (common-use means it can be used by any user), it is connected to a serial port on the 3B2 computer. In this work assignment, you will connect the DQP-10 printer to the `contty` port on the 3B2 computer.

There are two parts to the printer cable: an RS-232C 25-pin plug and an 8-wire cable with an 8-pin modular phone plug at each end. One of the 8-pin modular plugs on the printer cable should be plugged into the 8-pin modular connector located on the RS-232C 25-pin plug. The RS-232C plug is then plugged into the RS-232C connector located in the rear of DQP-10 printer.

Cable Connections for the 3B2 Computer

There are two 8-pin modular input/output connectors located at the rear of the 3B2 computer. The console terminal should already be connected to the port labeled `CONSOLE`. For this work assignment, you will connect the printer to the unlabeled port, which is called the `contty` port. Just push the modular plug on the printer cable into the `contty` port.

PRINTER CONTROL SWITCHES



3601 (9-102) 12/84-.75

HARDWARE INSTALLATIONPrinter Control Switches

In order for the DQP-10 printer to work properly with the 3B2/300 computer, the printer control switches must be set correctly. Switches SW1 and SW2 are located under the top cover on the right side near the print head cable. These switches are set at the factory. However, it is best to verify that the factory settings are correct.

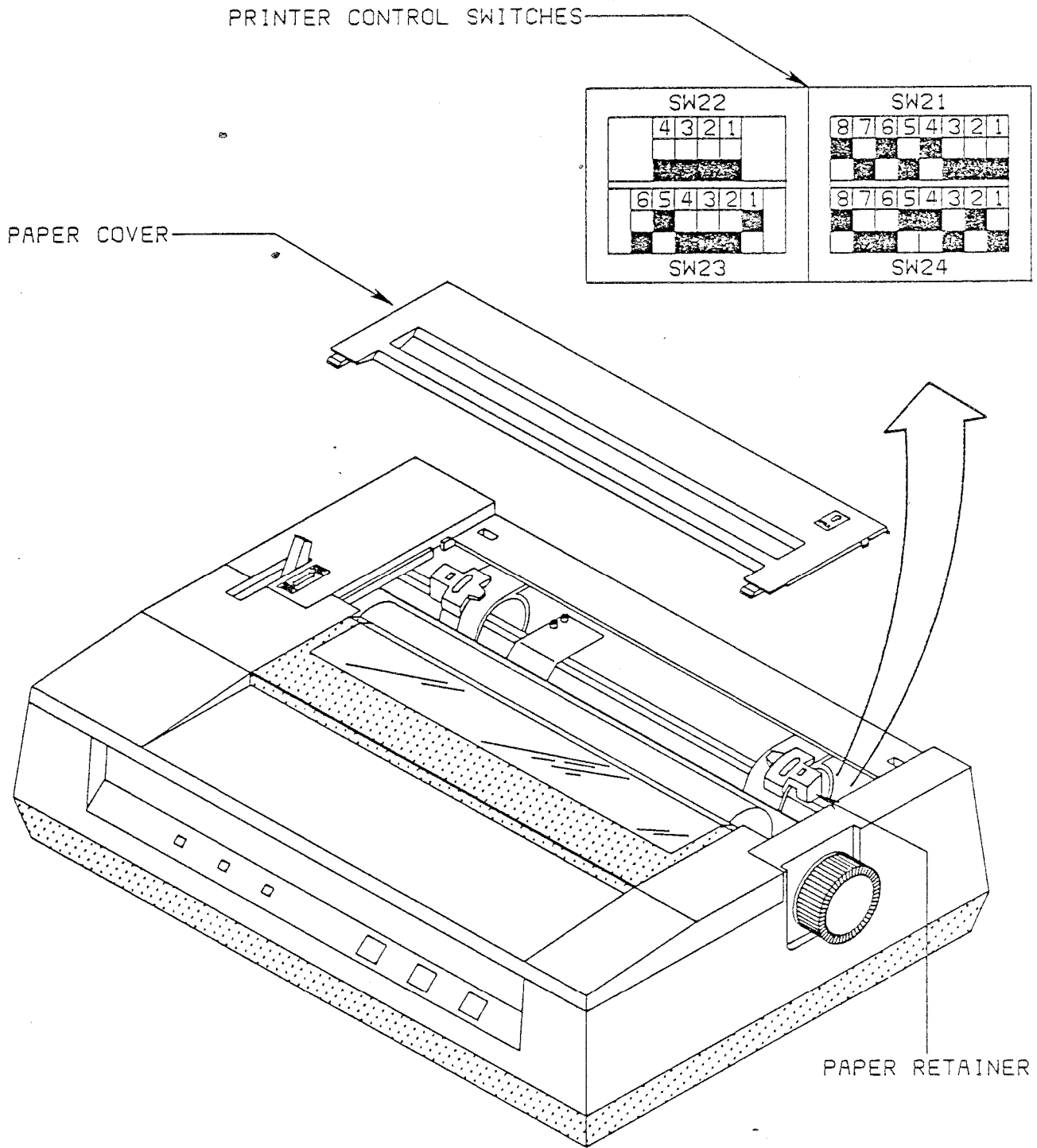
NOTE: The ac power cord must be removed from the printer before the switch settings can be changed.

Switch settings for the eight-position switches SW1 and SW2 are given in the table below. These switches will allow the DQP-10 printer to work with the 3B2 computer. The closed position of the switches is toward the number and the open position is away from the number.

SWITCH	POSITION	STATE	FUNCTION
SW1	1	OPEN	LANGUAGE SELECTION
	2	CLOSED	LANGUAGE SELECTION
	3	OPEN	LANGUAGE SELECTION
	4	OPEN	LANGUAGE SELECTION
	5	OPEN	DC1 OR DC3 SIGNAL PROCESSING
	6	CLOSED	LINE FEED SELECTION WHEN BUFFER IS FULL
	7	CLOSED	PRINT COMMAND CODE
	8	OPEN	LINE FEED SELECTION WHEN INVOKED BY A CARRIAGE RETURN
SW2	1	OPEN	PRINT SELECTION OF NUMERAL "0"
	2	OPEN	SELECTION OF BUFFER RECEPTION
	3	OPEN	SELECTION OF TOF-TO-TOF LENGTH
	4	OPEN	POWER ON LINE FEED PITCH SELECTION
	5	OPEN	POWER ON CHARACTER PITCH SELECTION
	6	CLOSED	SELECTION OF 7- OR 8-BIT DATA
	7	CLOSED	POWER ON SELECT/DESELECT SELECTION
	8	OPEN	SELECTION OF UNI- OR BI-DIRECTIONAL PRINTING

3601 (9-103) 11/84-.95

PRINTER CONTROL SWITCHES



PAPER RETAINER

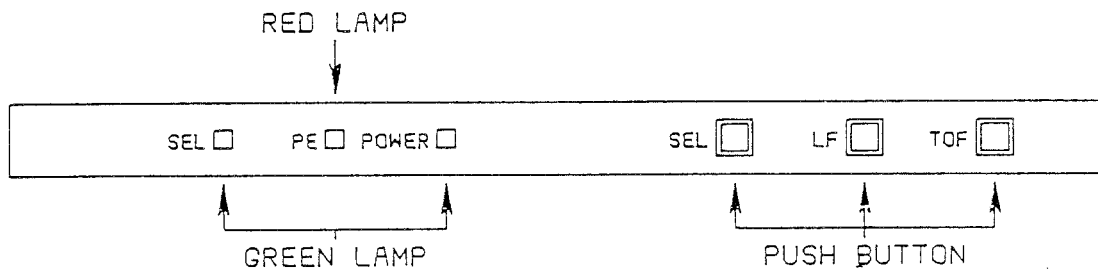
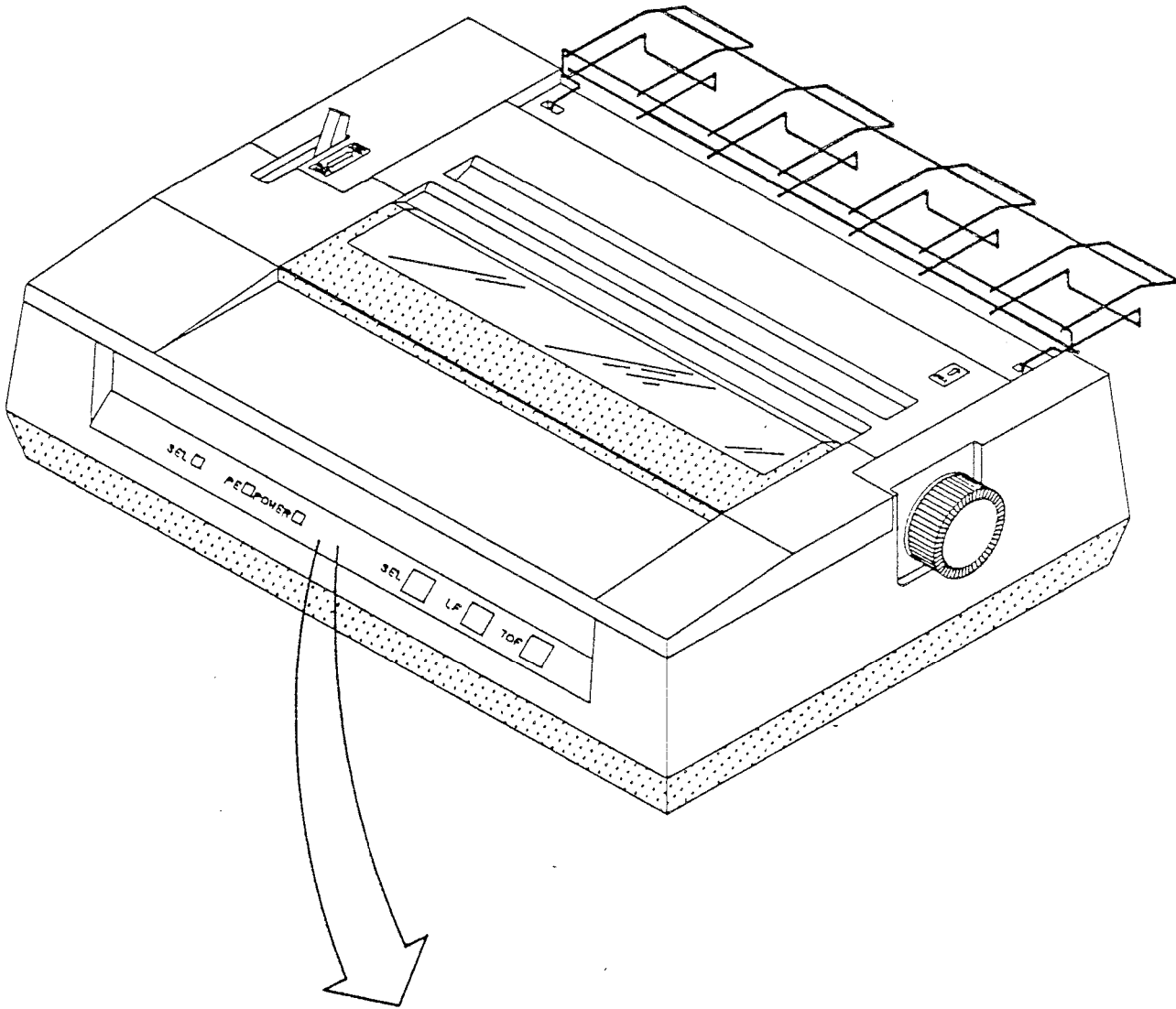
HARDWARE INSTALLATIONPrinter-Control Switches

Printer-control switches SW21, SW22, SW23, and SW24 are located under the right paper retainer. It will be necessary to release the right sprocket lever and slide the right paper retainer to the left to gain access to these switches.

Switch setting for the two 8-position switches SW21 and SW23, the 6-position SW23 switch, and the 4-position SW22 switch are given in the table below. These settings also enable the DQP-10 line printer to work with the 3B2 computer. The closed position of the switches is toward the number and the open position is away from the number.

SWITCH	POSITION	STATE	FUNCTION
SW21	1	OPEN	SELECTION OF NUMBER OF STOP BITS (1 OR 2)
	2	OPEN	SELECTION OF SEND DATA OR CARRIER ERROR
	3	OPEN	SELECTION OF PARITY CHECK
	4	CLOSED	SELECTION OF PARITY CHECK
	5	OPEN	NO FUNCTION
	6	CLOSED	SELECTION OF 7- OR 8-BIT DATA
	7	OPEN	SELECTION OF DATA PROTOCOL
	8	CLOSED	SELECTION OF DATA PROTOCOL
SW22	1	OPEN	SELECTION OF DATA TRANSMISSION SPEED
	2	OPEN	SELECTION OF DATA TRANSMISSION SPEED
	3	OPEN	SELECTION OF DATA TRANSMISSION SPEED
	4	OPEN	NO FUNCTION
SW23	1	CLOSED	SELECTION OF RS-232-C OR 20mA CURRENT LOOP
	2	OPEN	SELECTION OF RS-232-C OR 20mA CURRENT LOOP
	3	OPEN	SELECTION OF DATA SET READY
	4	OPEN	SELECTION OF DATA SET READY
	5	CLOSED	SELECTION OF DATA SET READY
	6	OPEN	NO FUNCTION
SW24	1	OPEN	SELECTION OF DATA TERMINAL READY
	2	CLOSED	SELECTION OF DATA TERMINAL READY
	3	OPEN	SELECTION OF REQUEST TO SEND OR DATA TERMINAL READY
	4	CLOSED	SELECTION OF REQUEST TO SEND OR DATA TERMINAL READY
	5	CLOSED	USE OF CLEAR TO SEND
	6	OPEN	USE OF CLEAR TO SEND
	7	OPEN	VALIDITY OF CARRIER DETECT
	8	CLOSED	VALIDITY OF CARRIER DETECT

DQP-10 LINE PRINTER OPERATION



DQP-10 LINE PRINTER OPERATION

Printer-Control Panel

Operation of the DQP-10 line printer is controlled by the three buttons located on the DQP-10 control panel. The DQP-10 control panel, which is located on the front of the DQP-10 line printer, contains three indicating lamps and three buttons that are used to control the operation of the DQP-10 after ac power is applied. A description of these lamps and switches is listed below.

SEL (lamp) - Lights when the DQP-10 line printer is in the select state.

PE (lamp) - Lights when the DQP-10 line printer runs out of paper.

POWER (lamp) - Lights when ac power is applied to the DQP-10 line printer.

SEL (button) - Causes the select and unselected states to alternate with every push. When the DQP-10 line printer is in the select state, it is able to be used by the 3B2 computer.

LF (button) - Causes one line feed to occur with every push. In addition, if this button is depressed while the SEL button is also depressed, printing will temporarily stop. To resume operations, depress the SEL button.

TOF (button) - Causes a paper feed to the next top of form position with every push.

DQP-10 LINE PRINTER SELF TEST

The DQP-10 line printer has a self-testing feature that can be used to test its operation. To start the self-test perform the following steps:

1. Make sure that the ac power switch is turned off.
2. Install paper as shown in the DQP-10 printer users' manual.
3. Install a ribbon cassette in the DQP-10 line printer.
4. While depressing the TOF button on the DQP-10, turn on the ac power to the DQP-10.
5. Release the TOF button on the DQP-10. The preprogrammed test pattern shown on Page 14 of this work assignment will be printed on the DQP-10 line printer. This test pattern will keep repeating until you depress the LF button, which interrupts the pattern until the SEL is pushed. At that time, the test pattern will resume. To terminate the self-test, turn the ac power off, and then back on.

gettydefs FILE

- ① Console login: root (return)
- ② password: (return)
- ③ # ed /etc/gettydefs (return)
- ④ 1009
- ⑤ /contty (return)
- ⑥ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #login:
#contty1
- ⑦ s/login: /: (return)
- ⑧ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty1
- ⑨ s/contty1/contty (return)
- ⑩ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty
- ⑪ w (return)
- ⑫ 1002
- ⑬ q (return)
- ⑭ # init q (return)
- ⑮ #

MODIFYING THE UNIX OPERATING SYSTEM

Editing the gettydefs File

In order for the DQP-10 line printer to function properly after it has been connected to the `contty` port, it will be necessary to alter the `gettydefs` file. The `gettydefs` file contains information used by the UNIX operating system to set up the speed, operational settings, and login information for the `contty` port. The `gettydefs` file must be edited to make the `contty` port a non-login type port. If the login feature is not removed, the word `login` will be printed intermittently on the line printer connected to the `contty` port. The procedure for editing the `gettydefs` file is given on the opposite page. The input commands are given in bolded type and system responses are printed in regular type.

Logging into the System

- ① The 3B2 computer will have the words `Console login:` displayed on the screen. Using the system console keyboard enter the word `root` followed by a carriage return (`return`) character. The carriage return indicates the end of the command to the UNIX operating system. The return character must be entered at the end of a command to tell the system to act on the command.
- ② The system will respond with `password:`. Type the password followed by a carriage return to complete the system login procedure.

gettydefs FILE

- ① Console login: root (return)
- ② password: (return)
- ③ # ed /etc/gettydefs (return)
- ④ 1009
- ⑤ /contty (return)
- ⑥ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #login:
#contty1
- ⑦ s/login: /: (return)
- ⑧ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty1
- ⑨ s/contty1/contty (return)
- ⑩ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty
- ⑪ w (return)
- ⑫ 1002
- ⑬ q (return)
- ⑭ # init q (return)
- ⑮ #

Editing the gettydefs File

- ③ The pound sign (#) prompt will be displayed on the screen by the UNIX system to indicate it is ready for input. The ed tells the UNIX operating system to activate the line editor. The line editor is a program that will enable you to change the contents of a file. The character string `/etc/gettydefs` is the pathname of the `gettydefs` file. The pathname will be used by the UNIX system to find the file to be edited. The first slash (/) in the path name indicates the root directory. The `etc` is a subdirectory of the root directory. The second slash is used to separate the `etc` directory name from the `gettydefs` file. The last file listed in the pathname, `gettydefs`, is the file to be edited. Using the pathname, the UNIX operating system will find the `gettydefs` file by looking in the root directory for a directory file called `etc`. Then the UNIX system will search the `etc` directory for the `gettydefs` file. When the `gettydefs` file is found, a copy of it will be loaded into a buffer area of the 3B2 computer's memory, where you will be able to edit it.
- ④ The UNIX operating system will respond to the `ed` command by printing a decimal number that indicates the number of characters that were loaded into the buffer. In this case, the number is 1009, but this number will vary from system to system.
- ⑤ Inputting the character string `/contty` tells the editor to search the buffered file, find the first line containing the character string `contty`, and print that line if a match is found.

gettydefs FILE

- ① Console login: root (return)
- ② password: (return)
- ③ # ed /etc/gettydefs (return)
- ④ 1009
- ⑤ /contty (return)
- ⑥ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #login:
#contty1
- ⑦ s/login: /: (return)
- ⑧ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty1
- ⑨ s/contty1/contty (return)
- ⑩ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty
- ⑪ w (return)
- ⑫ 1002
- ⑬ q (return)
- ⑭ # init q (return)
- ⑮ #

Editing the gettydefs File (Cont.)

- ⑥ This line is printed out in response to the find command entered in ⑤. There are five separate fields of information about the con tty port. Each field is separated by a # sign. These fields of information are used by the UNIX operating system to set up the speed (9600 baud) and the terminal settings for the con tty port. Two fields in this line must be changed in order for the con tty port to operate correctly with a line printer. The first field that must be altered is the one that contains the entry #login: #. This entry defines the con tty port as a login port. This means that the UNIX operating system expects to see a user terminal on the con tty port. The DQP-10 line printer has been connected to the con tty port, which makes it necessary to remove the login feature for this port. If you do not remove the login feature, the word login will be printed on the DQP-10 line printer each time something is sent to it.
- ⑦ This command is used to remove the login feature. The s stands for substitute. The first slash (/) separates the command from the regular expression login:. The second slash (/) separates the regular expression from the replacement string. This substitute command will search the line for the regular expression login: and substitute a (:) character for it.
- ⑧ This line will be printed in response to the substitute command entered in ⑦. As you can see, the login: has been replaced by a single colon (:).

gettydefs FILE

- ① Console login: root (return)
- ② password: (return)
- ③ # ed /etc/gettydefs (return)
- ④ 1009
- ⑤ /contty (return)
- ⑥ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #login:
#contty1
- ⑦ s/login: /: (return)
- ⑧ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty1
- ⑨ s/contty1/contty (return)
- ⑩ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty
- ⑪ w (return)
- ⑫ 1002
- ⑬ q (return)
- ⑭ # init q (return)
- ⑮ #

Editing the gettydefs File

- ⑨ There is one more field that must be changed in this line. This field, called the **next label field**, contains the character string `conttyl`. The next label field is used by the UNIX operating system to find other lines in the `gettydefs` file that contain information about the `contty` port. Because we have changed the `contty` port to a non-login port, this reference to the line containing the label `conttyl` is not needed. The substitute command in ⑨ will change the next line field to `contty`. This means that the `contty` port will always operate at the settings specified in this line. The command tells the editor to substitute the regular expression `conttyl` with `contty`.
- ⑩ This line will be printed in response to the substitute command entered in ⑨. This completes the changes needed in the `gettydefs` file. For information on other fields in the `gettydefs` file, please refer to the UNIX system users' guide.
- ⑪ The `w` stands for write. The write command will write the "altered" buffer copy of the `gettydefs` file back to the original `gettydefs` file. The old information in `gettydefs` will be replaced with the information from the buffer file.
- ⑫ The number 1002 is a character count of the buffer file that was used to replace the old content of the `gettydefs` file and indicates completion of the write command entered in ⑪.
- ⑬ The `q` command is entered to quit the editor and return to the UNIX system shell.

gettydefs FILE

- ① Console login: root (return)
- ② password: (return)
- ③ # ed /etc/gettydefs (return)
- ④ 1009
- ⑤ /contty (return)
- ⑥ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #login:
#contty1
- ⑦ s/login: /: (return)
- ⑧ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty1
- ⑨ s/contty1/contty (return)
- ⑩ contty# B9600 HUPCL OPOST ONLCR # B9600 SANE IXANY TAB3 #:#contty
- ⑪ w (return)
- ⑫ 1002
- ⑬ q (return)
- ⑭ # init q (return)
- ⑮ #

Editing the gettydefs File (Cont.)

- ⑭ The # prompt indicates that the editor program has been terminated and that you are back to the UNIX system. The `init q` command causes the `gettydefs` file entry for the `contty` port to be examined and any changes made in the file to be activated.
- ⑮ The # prompt is returned by the UNIX operating system upon completion of the `init q` command entered in ⑭ .

- ① pr /etc/gettydefs (return)

- ② pr /etc/gettydefs > /dev/contty (return)

- ③ who > /dev/contty (return)

Using the Line Printer

The Print Command

- ① The opposite page ① shows an example of the print command. The print command prints out the contents of the file specified in the command. The characters `pr` stand for print. The character string `/etc/gettydefs` tells the print command the name of the file to be printed out and where to find the file. The UNIX operating system will search the root directory (`/`) for a subdirectory named `etc`. When the `etc` directory is found, it will be searched for the `gettydefs` file. When the `gettydefs` file is found, it will be printed on the terminal on which the print command was entered. The `(return)` stands for carriage return, which tells the UNIX operating system to act on the command.

Redirection

- ② To have files printed on a DQP-10 line printer that has just been configured as a common system device, you must use output redirection. The command shown in ② is an example of output redirection. The print command `pr` and the pathname of the file to be printed out are entered in the same way as ①. The character string `>/dev/contty` will cause the contents of the `gettydefs` file to be sent to the `contty` port. The arrow character (`>`) immediately following the print command causes the output of the print command to be redirected. In this example, the contents of the `gettydefs` file are redirected to `/dev/contty`, which is the pathname for the `contty` port. The DQP-10 line printer has been connected to the `contty` port. Therefore, the contents of the `gettydefs` file will be printed on the DQP-10 line printer.
- ③ Another example of output redirection is shown in ③. The `who` command prints out a list of users currently logged on the 3B2 computer. The output redirection specification `>/dev/contty` will cause the list of users to be printed on the DQP-10 line printer connected to the `contty` port.

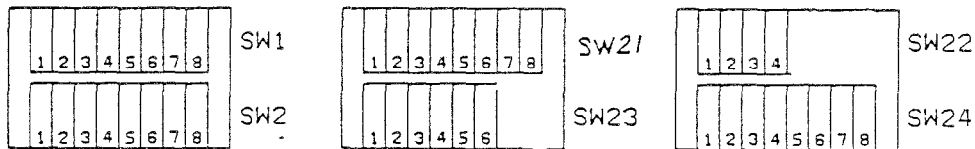
NOTES

APPLICATION

Answer the following questions using your training manual and the reference documents listed on Page 1 of this work assignment.

1. List the cable connections necessary to connect the DQP-10 line printer as a dedicated system-console printer.

2. A _____ cable must be used when connecting the DQP-10 line printer as a dedicated system-console printer.
3. Shade in the proper settings for the DQP-10 line printer to operate with the 3B2 computer.



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Verify the printer control switch settings in the DQP-10 line printer at your work station and refer any discrepancies to your instructor.

Set up the DQP-10 line printer at your work station as a dedicated system console printer.

Perform the printer self-test.

Enter a command to test the DQP-10 line printer and show the resultant printout to your instructor.

4. List the hardware that is required and the cable connections necessary to connect the DQP-10 line printer to the contty port.

5. What file must be edited when connecting a DQP-10 line printer to the contty port?

Connect the DQP-10 line printer to the contty jack and make the proper changes to the operating system to make it function as a common-use device.

6. What command would you enter to print out the contents of the gettydefs file on the DQP-10 line printer?

Enter your command to test the DQP-10 line printer and show the resultant printout to your instructor.

AT&T 3B2 MODEL 300 COMPUTER OPERATIONS, MAINTENANCE and SYSTEM ADMINISTRATION T662

(Student Guide)



AT&T

SERVICES DIVISION EDUCATION

May 1985

COURSE T662
AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE
AND
SYSTEM ADMINISTRATION

AT&T 3B2 MODEL 300 COMPUTER
OPERATION, MAINTENANCE AND SYSTEM ADMINISTRATION
INPUT/OUTPUT CAPABILITY

CAUTIONS

Follow standard electrostatic discharge (ESD) procedures as covered in the Student Guide.

This work assignment is written for a 3B2 Computer using UNIX System V Release 2 Version 1.

REFERENCE DOCUMENTATION

305-400 3B2/300 Owner/Operator Manual
305-394 Expanded Input/Output Capability Manual

MATERIALS REQUIRED

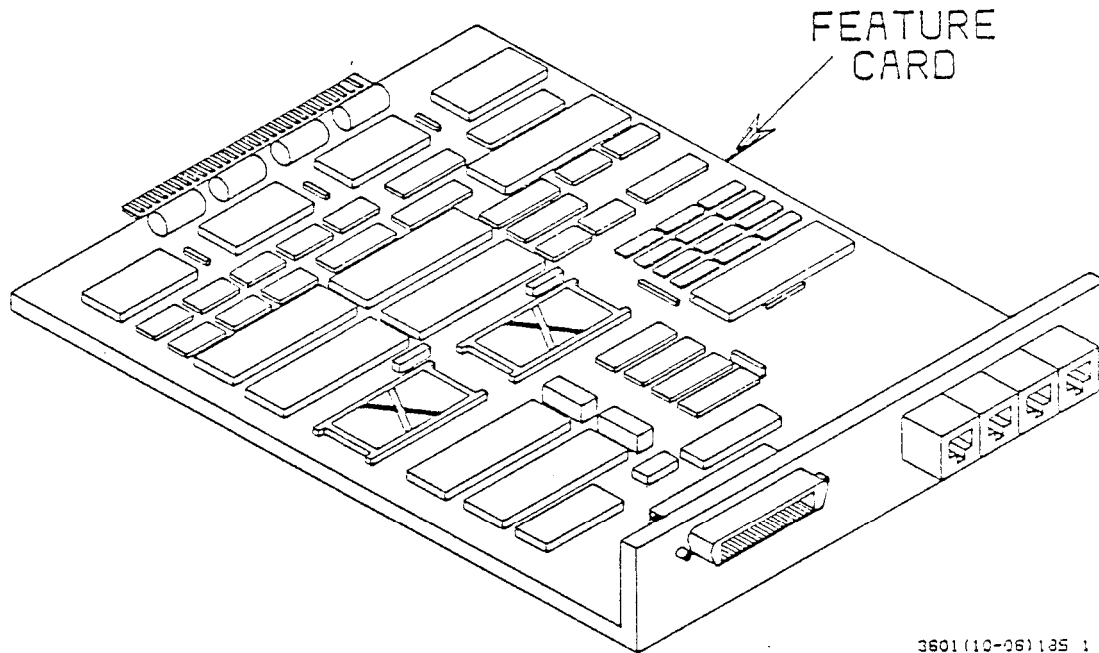
3B2 Computer and terminal
I/O expansion board
Common screwdriver
Static-ground wrist strap

OBJECTIVES

On Completion of this work assignment you will be able to:

- Identify an I/O expansion board
- Explain serial and parallel ports
- Install the associated hardware
- Explain software operations
- Activate and deactivate I/O ports
- Test ports
- Connect common devices to the I/O expansion board

INPUT/OUTPUT EXPANSION BOARD



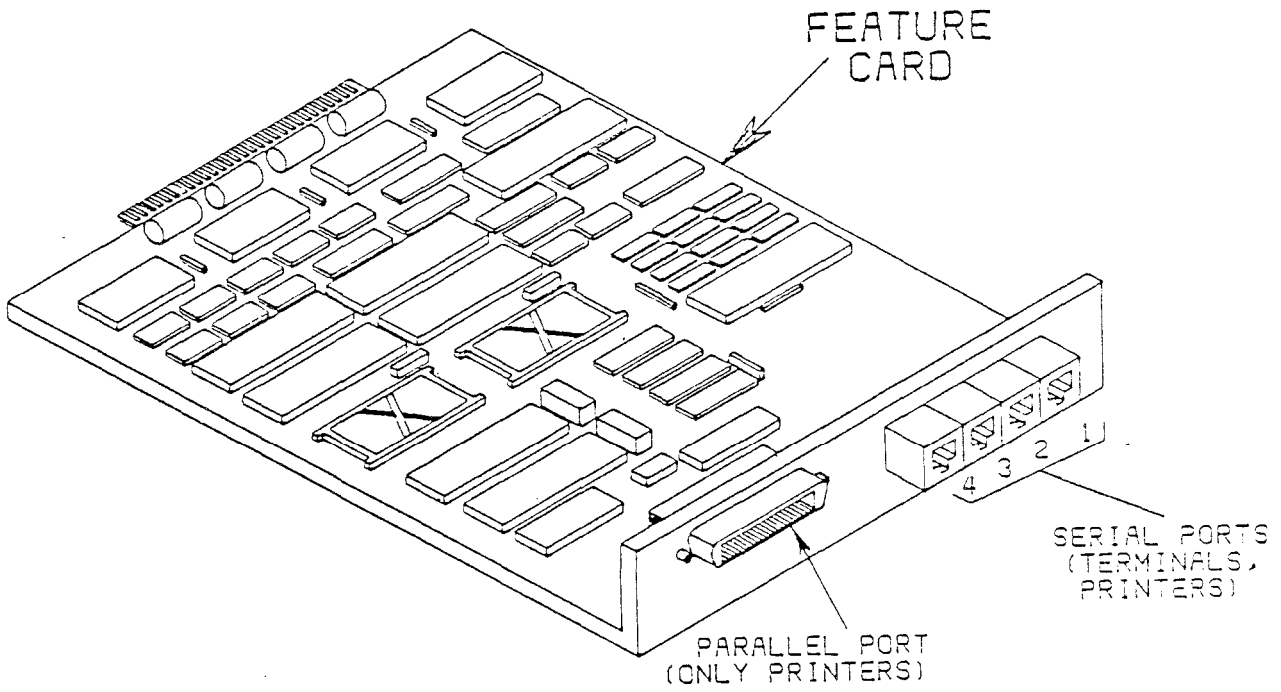
INPUT/OUTPUT EXPANSION BOARD

The Input/Output Expansion Board is an optional 3B2 Computer add-on feature that adds extra ports (called expansion ports) so you can connect more computer devices, such as terminals, printers and modems. The I/O Expansion Board may also be referred to as a feature card. The 3B2 Computer can have a maximum of four expansion boards.

Features of the I/O Expansion Board

- o Single width (approximately 0.7 inches high by 6 inches wide by 7 inches deep).
- o Four serial asynchronous full-duplex ports using 8-pin modular jacks.
- o 19200 baud maximum per expansion serial port.
- o One parallel port using 36-pin jack.
- o 5 to 38 degrees Celsius operating temperature.
- o 10 watt dissipation.

INPUT/OUTPUT EXPANSION BOARD



3601(10-07)185 1

PORTS

Devices connect to the 3B2 Computer through ports (sometimes called interfaces). Besides providing a means to connect devices, a port provides buffering, which ensures operational compatibility with devices supported by the 3B2 Computer.

Serial Ports

The Input/Output Expansion Board has four serial ports, which may connect to printers, terminals or modems. The serial ports use serial data transmission, which sends each byte of data one bit at a time. The serial port provides a standard RS-232C serial interface that is asynchronous full duplex. RS-232C is an industry standard adopted by the Electronic Industries Association for connectors used. Asynchronous is data being transmitted without sync signals, and each character is sent with its own synchronizing information.

Parallel Ports

The Input/Output Expansion Board has one parallel port, which may connect only to a parallel printer. The parallel port uses parallel data transmission, which sends each byte of data (all eight bits) at the same time. This is the standard parallel interface for connecting printers that are popular with manufacturers of parallel printers.

ADDING HARDWARE

- o Remove the computer cover
- o Install the feature card
- o Replace the cover and power up

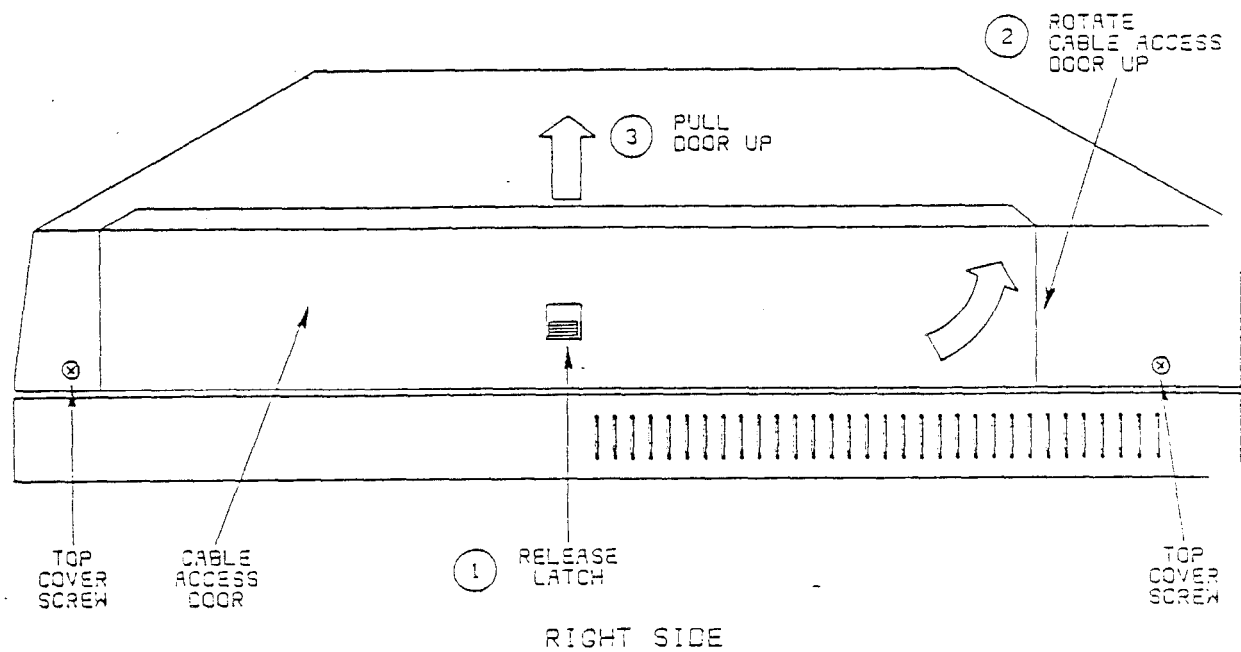
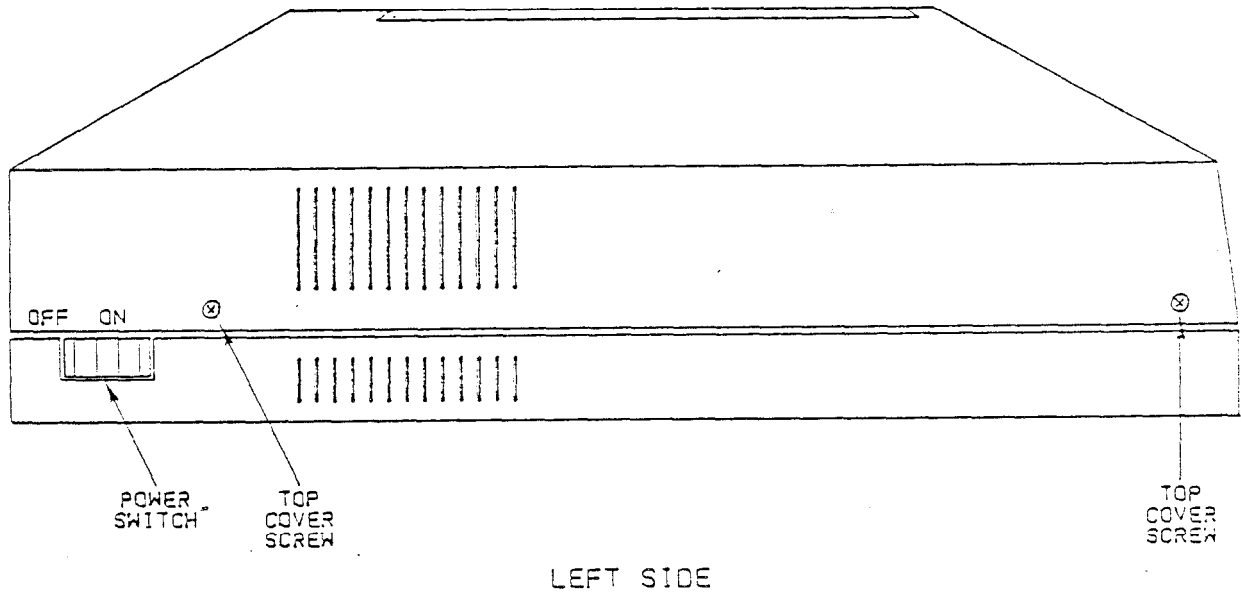
ADDING HARDWARE

The only hardware involved in adding expansion ports to the 3B2 Computer is the I/O Expansion Board. This feature card is added with three basic steps:

1. Remove the computer cover.
2. Install the feature card.
3. Replace the cover and power up.

The 3B2 Computer should be powered down, but as an added precaution prior to starting the add hardware procedure, the AC cord should be unplugged from the AC outlet.

REMOVING THE COMPUTER COVER



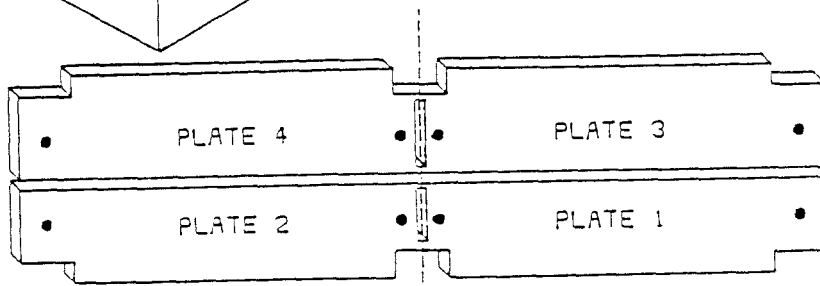
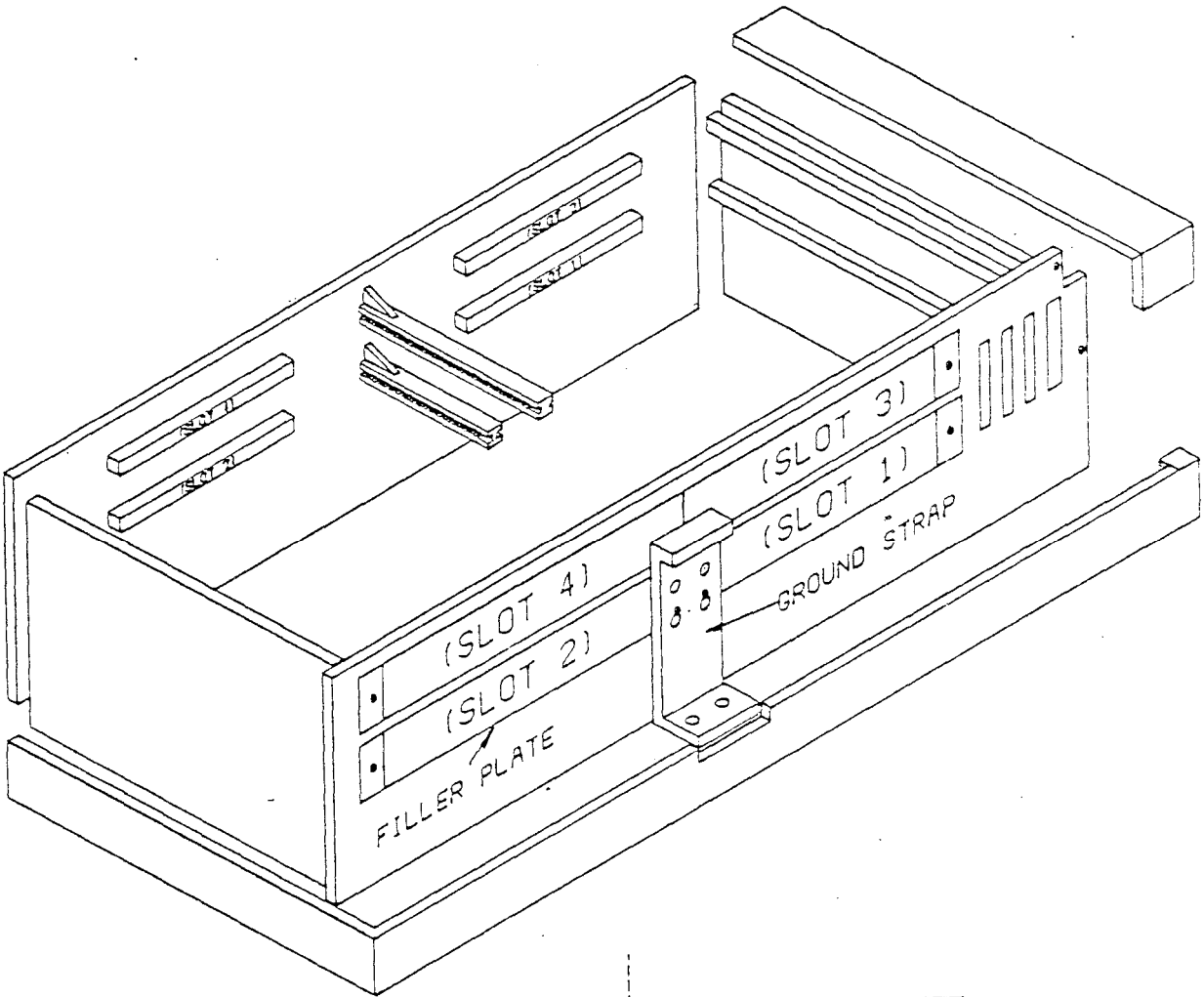
3601 (9-84) (2/84) .30

REMOVE THE COMPUTER COVER

After the power has been removed it is safe to remove the computer cover.

1. On the right side of the computer is a cable access door. To open the door, 1) release the "latch", 2) swing up the cable access door, 3) pull up and out.
2. Remove the four screws holding the cover (two on the left side and two on the right side).
3. Carefully remove the top cover and set aside.

INSTALLING THE FEATURE CARD



BREAK LINE

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INSTALLING THE FEATURE CARD

Now that the cover has been removed, the next step is to add the "feature card".

1. To begin, select the next available feature card connector slot on the backplane.

Caution:

You must follow the 1-2-3-4 sequence in using your feature connector slot.

- (A) Loosen the four screws holding the ground strap to the filler plate.
- (B) Remove the two screws holding the ground strap to the chassis.
- (C) Remove the ground strap by pulling the strap up and away from the filler plate.
- (D) Remove the appropriate filler plate where the feature card will be installed.

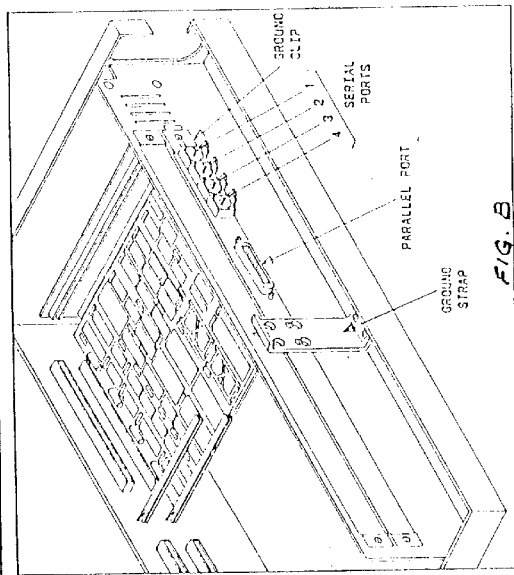
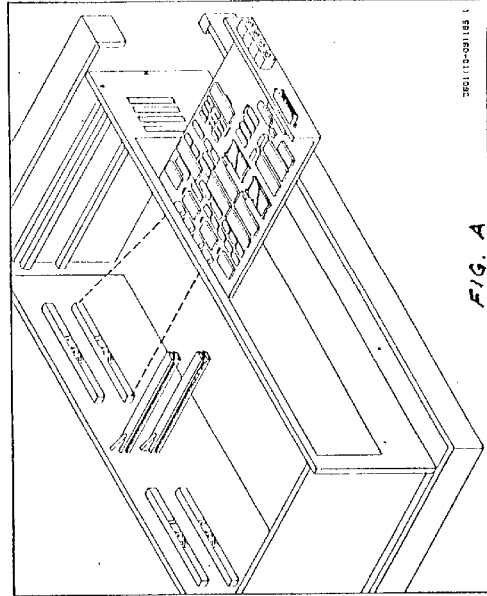
Note:

If the filler plate covers two feature card slots, remove it. Break off the unwanted side of the filler plate and reinstall the plate that covers the unused slot.

Warning:

Failure to replace the filler plates over the unused slots will disrupt air flow and may cause radiation noncompliance with Class B limits of Subpart J, Part 15, of the FCC Rules.

INSTALLING THE FEATURE CARD



INSTALLING THE FEATURE CARD

2. Insert the feature card pins into the selected connector slot with the component side up. (Figure A)

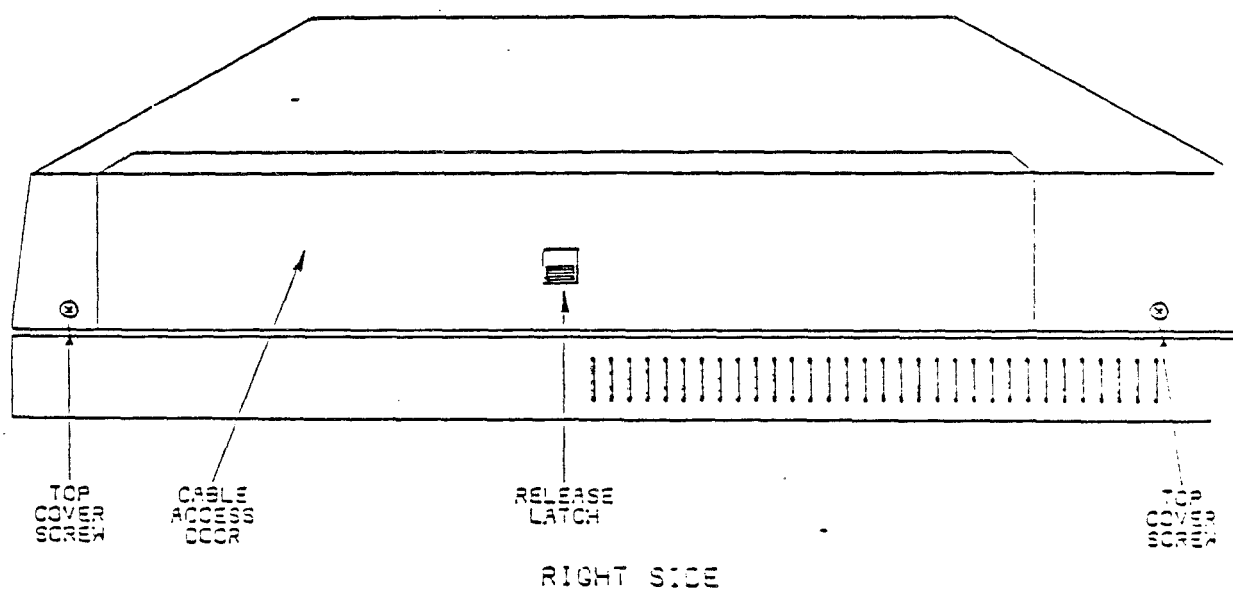
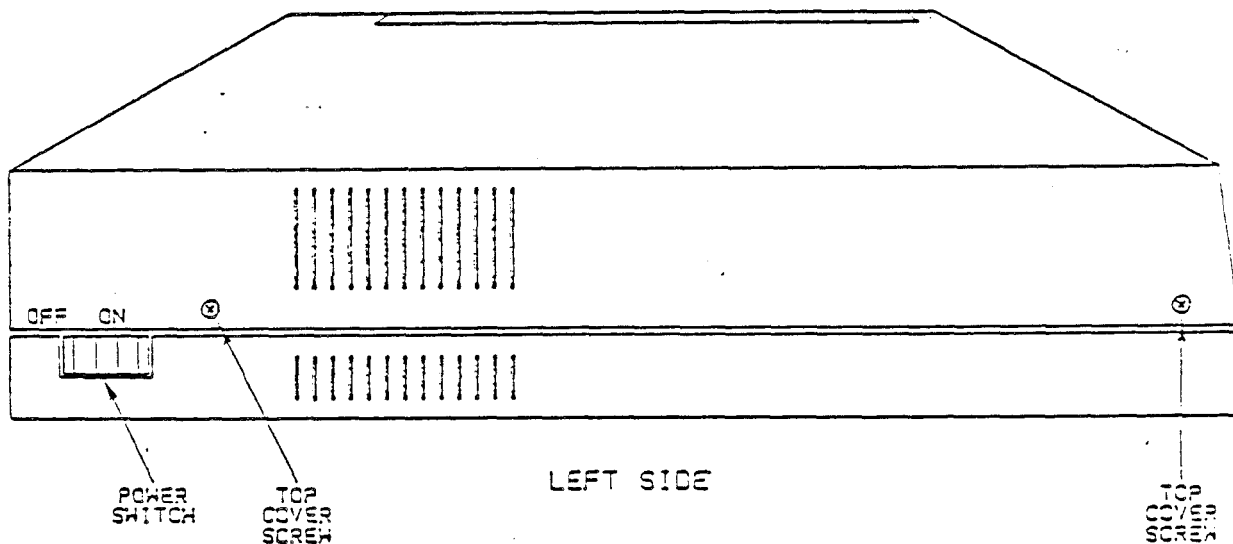
For this example, the feature card will be installed in slot 1.

Warning:

Handle the feature card by the edges only (like a record album).

3. Install the ground clip that was provided with the feature card and reinstall the ground strap. (Figure B)

REPLACE THE COVER AND POWER UP



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REPLACE THE COVER AND POWER UP

After the feature card has been added, ground strap and ground clip installed, the computer cover may be placed back on the computer.

1. Install the four screws holding the cover (two on the left side and two on the right side.)
2. Place decal provided with feature card on inside of the cable access door and place door on computer cover.
3. Reconnect the AC power cord to the outlet. Check to make sure the computer terminal is still powered up.
4. Now press the power switch to ON and the 3B2 Computer will come up. (Console Login: should appear on the terminal screen in approximately 90 seconds).

This completes the procedure for adding hardware for the 3B2 Computer Expanded Input/Output Capability.

SOFTWARE OPERATION

- o Expansion Port Assignment
- o Device Directory
- o Inittab File

SOFTWARE OPERATION

After the Input/Output Expansion Board is added to the 382 Computer several software changes take place. The system makes these changes automatically. However, it may be helpful to have an understanding of the expansion port assignments, device directory, and the inittab file.

The expansion port assignments are completed by the system based on the slot in which the I/O expansion board is installed. The device directory will then list each port on the board as a separate device. The inittab file sets up the initialization for each of the devices.

The expansion port assignments, the /dev directory, and the /etc/inittab file will be discussed on the following pages.

EXPANSION PORT ASSIGNMENTS

EXPANSION FEATURE CARD	PORT NAME	PORT TYPE	STATUS	BAUD	DEVICE
1	tty11	Serial			
1	tty12	Serial			
1	tty13	Serial			
1	tty14	Serial			
1	tty15	Parallel			
2	tty21	Serial			
2	tty22	Serial			
2	tty23	Serial			
2	tty24	Serial			
2	tty25	Parallel			
3	tty31	Serial			
3	tty32	Serial			
3	tty33	Serial			
3	tty34	Serial			
3	tty35	Parallel			
4	tty41	Serial			
4	tty42	Serial			
4	tty43	Serial			
4	tty44	Serial			
4	tty45	Parallel			

EXPANSION PORT ASSIGNMENT

The chart on the opposite page is an example of expansion port assignments for a maximum of four expansion port feature cards. This chart will be helpful in maintaining a record of devices connected to the expansion port feature cards. The six columns are defined below.

Expansion Feature Card

This column lists the four possible I/O expansion boards that can be added to a 3B2 Computer. You must start by adding the first feature card and continue in descending order with the second through the fourth feature cards as needed. Each I/O expansion board operates independently of the other.

Port Name

This column lists the name of each port on the four I/O expansion boards. The assigning of the serial and parallel port names use the ttyXX convention. The first X (1-4) designates the feature card; the second X designates the port number. The tty names always require two digits. The ports use a ttyXX name format whether used for a terminal, modem, or line printer.

For example, if you attached a serial printer to the first serial port on the third feature card, the printer would be attached to tty31.

EXPANSION PORT ASSIGNMENT

EXPANSION FEATURE CARD	PORT NAME	PORT TYPE	STATUS	BAUD	DEVICE
1	tty11	Serial			
1	tty12	Serial			
1	tty13	Serial			
1	tty14	Serial			
1	tty15	Parallel			
2	tty21	Serial			
2	tty22	Serial			
2	tty23	Serial			
2	tty24	Serial			
2	tty25	Parallel			
3	tty31	Serial			
3	tty32	Serial			
3	tty33	Serial			
3	tty34	Serial			
3	tty35	Parallel			
4	tty41	Serial			
4	tty42	Serial			
4	tty43	Serial			
4	tty44	Serial			
4	tty45	Parallel			

EXPANSION PORT ASSIGNMENT

Port Type

This column lists the serial and one parallel port on each of the four I/O expansion boards. Shown are the physical ports on each board. The five hardware ports will always be equipped on the I/O expansion board.

Status

This column can be used by the system administrator, or user, to record the status of the port.

For example, what user ID is assigned to the port.

Baud

This column is used to record the baud rate of the device attached to the individual port.

For example, a terminal set to 9600 baud.

Device

This column is used to list the device that is connected to each I/O expansion port. This column can be used as a handy reference for the system administrator, or user to keep track of which devices are attached to the 382 Computer.

For example, if you added a 5410 terminal to tty11, which is the first serial port on the first feature card, you would simply write in the column 5410 under the device heading.

EXPANSION PORT IN THE /dev DIRECTORY

CHARACTER FILE DESIGNATOR	MODE	LINKS	OWNERSHIP	MAJOR DEVICE NUMBER (ALWAYS 1)	MINOR DEVICE NUMBER	LAST USED	NAME
c	rw-r--r--	1	root root	1,0	Nov 8 13:07	tcyl1	
c	rw-r--r--	1	root other	1,4	Nov 8 13:09	ttyle	

EXPANSION PORT IN THE /dev DIRECTORY

The example on the opposite page shows a typical expansion port entry, for two of the five possible ports per board, in the device (/dev) directory. Unless you already have I/O expansion ports equipped, there should be no entry in the /dev directory that ends with the ttyXX convention. The entries shown, for two of the five possible ports per board, only appear in the /dev directory after the I/O expansion board is added to the 3B2 Computer. The /dev directory can be viewed by doing a long list of the directory. The expansion ports will appear at the end of the directory.

Even though adding entries to the /dev directory is an automatic function of the system when the feature card is added, it may be helpful to have an understanding of the entries. Each item in the entry is explained below.

Character File Designator

All expansion ports will be character file type entries, as indicated by the "c". A character file is a special file. Character devices either work directly to user processes without buffering or perform their own specialized form of buffering.

Mode

Modes or permissions can vary, depending on the system administrator. They control access to the file by mode bits for the owner, group, and other.

For example, the rw-r--r-- mode gives the owner read and write permissions, and the group and other just read permissions.

EXPANSION PORT IN THE /dev DIRECTORY

CHARACTER FILE DESIGNATOR	MODE	LINKS	OWNERSHIP	MAJOR DEVICE NUMBER (ALWAYS 1)	MINOR DEVICE NUMBER	LAST USED	NAME
c	rw-r--r--	1	root root	1,0		Nov 8 13:07	tty11
c	rw-r--r--	1	root other	1,4		Nov 8 13:09	tty15

EXPANSION PORT IN THE /dev DIRECTORY

Links

Links indicate the number of links or branches attached to the file.

Ownership

In our example on the opposite page, the first word under OWNERSHIP indicates who owns the file. In both examples, the file owner is root. The second word under OWNERSHIP indicates the group to which the owner of the file belongs. In the first example, the group the owner belongs to is root; in the second example, the group is other.

Major Device Number

The major device number for all I/O expansion ports is always 1. The major device number refers to the device type and is used to index into tables in the configuration file (configure c).

Minor Device Number

The minor device number is used by the corresponding driver to identify a particular subdevice, channel, or option and is, therefore, device dependent. The minor device number depends on the port and the card the port is mounted on. The minor device number is the same as the port number discussed previously.

Last Used

Indicates the last month, day, and time the file was modified, changed or added to.

Name

The name is the port name for each port on the I/O expansion board previously discussed.

EXPANSION PORT IN THE INITTAB FILE

<u>ID</u>	<u>LEVEL</u>	<u>ACTION</u>	<u>PATH</u>	<u>NAME</u>	<u>BAUD RATE</u>
ll	: 2	:respawn:	/etc/getty	ttyl1	9600

EXPANSION PORT IN THE INITTAB FILE

The system will add an entry to the /etc/inittab file for each port added. This file contains instructions for the "init" command that define the processes to be created or terminated for each initialization state.

While again, this is a system function it may be helpful to understand the information given in this file.

The example on the opposite page shows a typical entry for one port in the /etc/inittab file. The entries are defined below:

ID Number

A unique 2-digit identifier assigned to each line. This number is the same as the "tty" number. The example on the opposite page shows ID 11, which is identifying "tty11" on the feature card 1, port 1.

Level

The number 2 indicates run level 2, which is multiuser. The only time these entries are active is in multiuser run level 2.

EXPANSION PORT IN THE INITTAD FILE

<u>ID</u>	<u>LEVEL</u>	<u>ACTION</u>	<u>PATH</u>	<u>NAME</u>	<u>BAUD</u> <u>RATE</u>
II	: 2	:respawn:	/etc/getty	ttyl1	9600

EXPANSION PORT IN THE INITTAB FILE

Action

The action line tells the system if the port is on or off. If the port is on (active), then respawn is the action line. If the port is off (inactive), then off is the action line.

Path

The path for I/O expansion ports used for terminals will always be /etc/getty, which is a command used by the system to connect it to the user.

Name

This is the same name used earlier in the work assignment to identify a port in the /dev directory.

Baud Rate

Baud rate indicates the rate at which data is to sent. The baud rate can be 300, 1200, 2400, 4800, 9600, 19200.

ACTIVATE AND DEACTIVATE I/O PORTS

SYSTEM ADMINISTRATION

- | | | |
|---|--------------|--------------------------|
| 1 | diagnostics | system diagnostics menu |
| 2 | diskmgmt | disk management menu |
| 3 | filemgmt | file management menu |
| 4 | machinmgmt | machine management menu |
| 5 | packagemgmt | package management |
| 6 | softwagemgmt | software management menu |
| 7 | syssetup | system setup menu |
| 8 | ttymgmt | tty management menu |
| 9 | usermgmt | user management menu |

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, q to QUIT: 8

TTY MANAGEMENT

- | | | |
|---|---------|------------------------------------|
| 1 | baud | change the baud rate on a tty line |
| 2 | disable | turn off a tty line |
| 3 | enable | turn on a tty line |

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT: 3

The following is a list of the changeable tty lines:

NAME	STATUS	BAUD
contty	respawn	contty
tty11	off	9600
tty12	off	9600
tty13	off	9600
tty14	off	9600

Enter tty line (11-14, 21-24, 31-34, 41-44, contty): 11

This is the tty line before the change.
11:2:off:/etc/getty tty11 9600

This is the tty line after the change.
11:2:respawn:/etc/getty tty11 9600

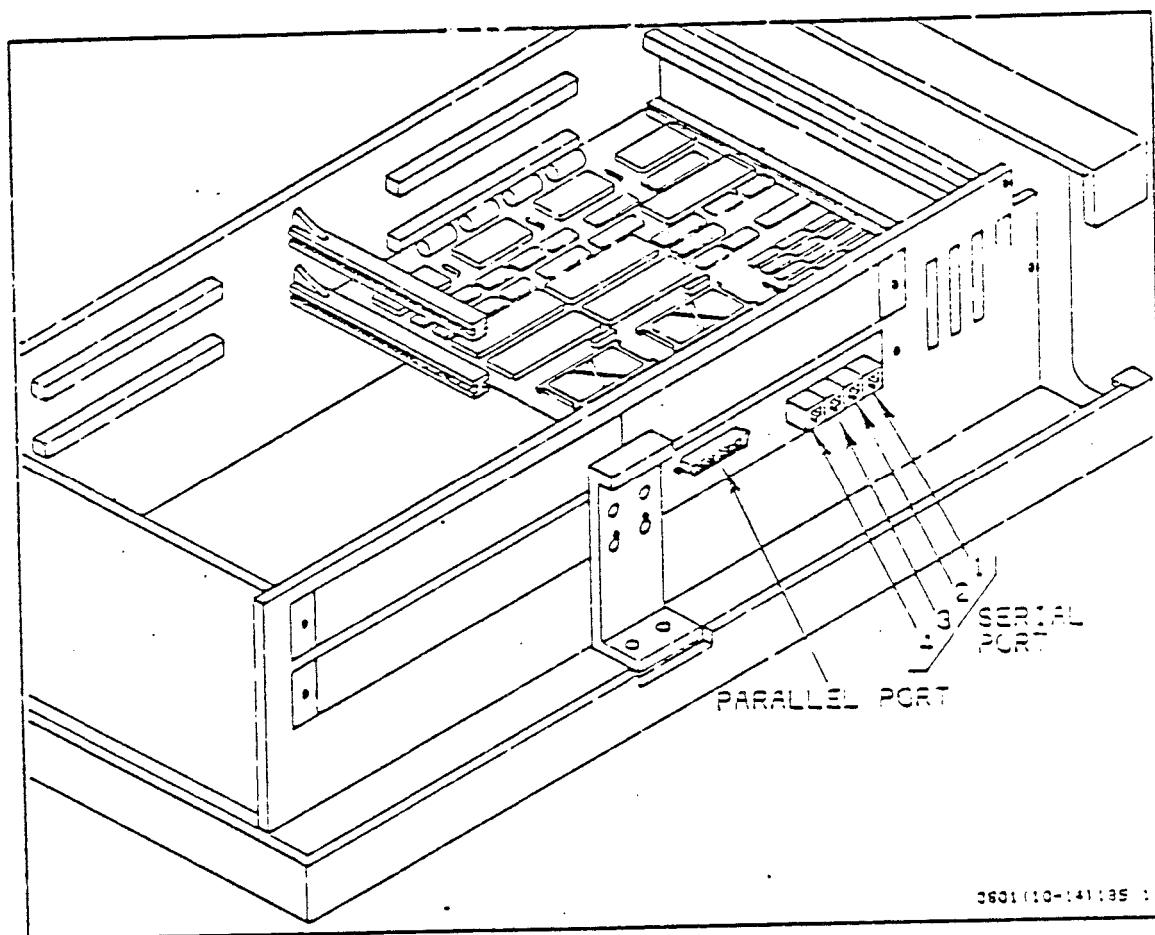
Do you want to see the table again? (y, n) n

ACTIVATE AND DEACTIVATE I/O PORTS

The I/O ports, at the time of installation of the board, are turned off or deactivated. The I/O ports can be activated, set to respawn, via the System Administration menu. However, only ports that will be used for terminals need to be set to respawn. The ports used for serial and parallel printers can remain in the off state.

The example on the opposite page shows the System Administration Menu and the TTY Management subcommands. The menu and subcommands were discussed in the Simple Administration Module. In this example the tty11 port is changed from off to respawn by selecting the "enable" subcommand. The first serial port on the first I/O expansion board may now have an active terminal attached. The port baud rate can also be changed, or the port disabled or deactivated again using the same menu.

I/O EXPANSION BOARD INSTALLED



I/O EXPANSION BOARD INSTALLED

The example on the opposite page shows a 3B2 Computer with the cover removed and an I/O expansion board installed in slot 1.

With the installation of the I/O expansion board and the associated software changes, the 3B2 Computer can now support additional terminals, modems or printers.

Each I/O expansion board can support up to four serial devices, such as Teletype 5410 terminals or C.Itoh dot-matrix printers (DQP-10), and one parallel device, such as a Daisywriter letter-quality printer (LQP-40).

For example, installed off the I/O expansion board in slot 1 (shown on the opposite page) we could have the following configuration:

- o Serial port 1 5410 terminal
- o Serial port 2 5410 terminal
- o Serial port 3 DQP-10 printer
- o Serial port 4 5425 terminal
- o Parallel port LQP-40 printer

TESTING PORTS

- o Normal Diagnostics
- o Pretest Checklist
- o Test of Individual Ports

TESTING PORTS

The first step after installation of the I/O expansion board is to test the individual ports to assure they are functioning properly. There are three steps to establish that the I/O expansion ports are in working order.

1. Normal diagnostics
2. Pretest checklist
3. Test of the individual ports

Normal Diagnostics

Normal diagnostics are tests run by the system every time the 382 Computer is powered on or rebooted. These tests check the basic sanity of the system and its equipped devices.

For example, if the 382 Computer was equipped with an I/O expansion board, on power up or reboot the system would first run normal diagnostics on the system board and then run normal diagnostics on the I/O expansion board.

These tests may also be run using the Diagnostic Monitor Program. Diagnostics will be discussed in detail later in the course.

After the I/O expansion board is installed and the 382 Computer is powered up or rebooted, a "DIAGNOSTIC PASSED" message should appear on the console display. This message would be the first indication that the I/O expansion board is functioning properly.

TESTING PORTS

- o Feature card properly installed?
- o Ports activated if required?
- o Records updated?

TESTING PORTS

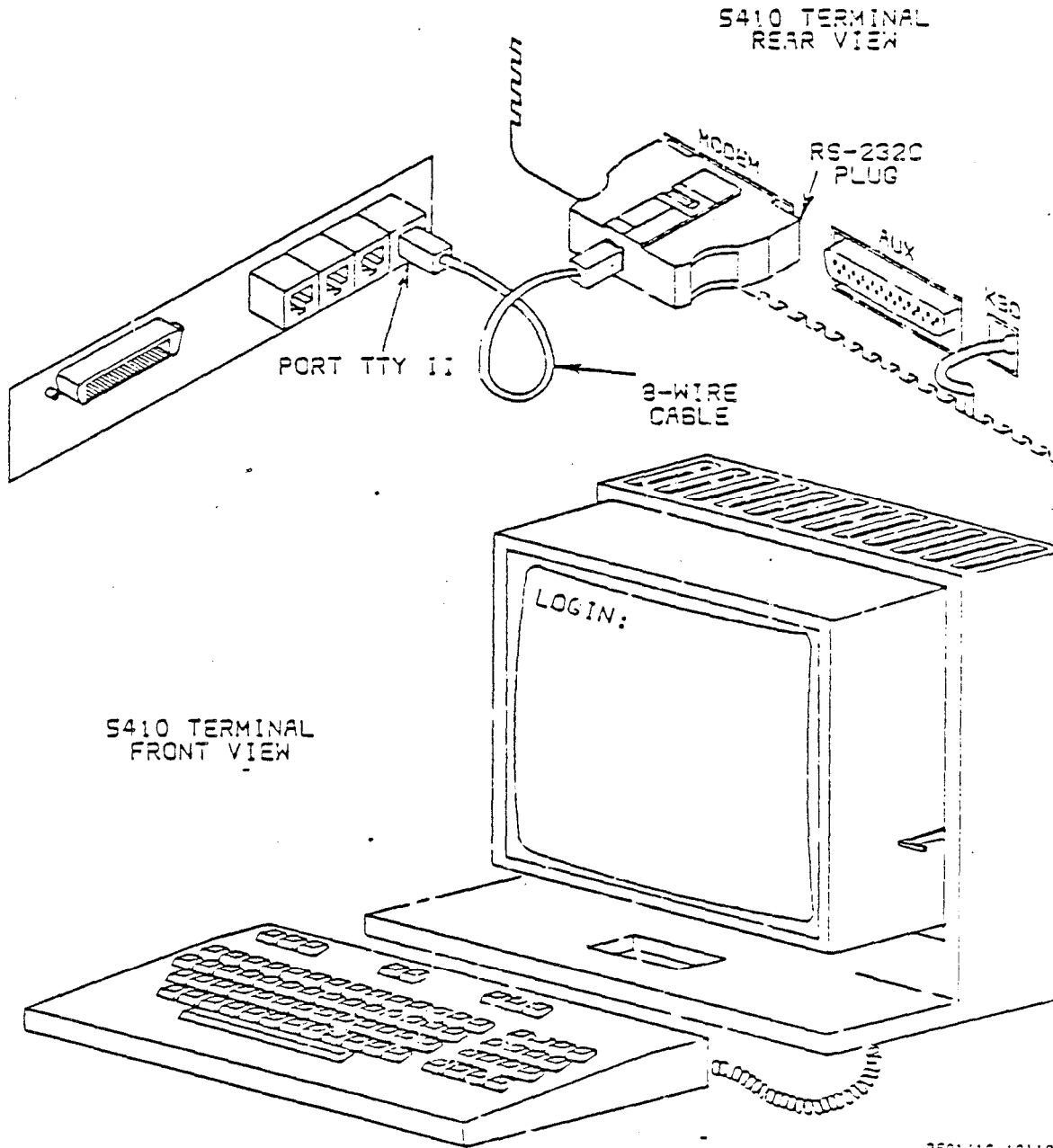
Pretest Checklist

Prior to testing the individual ports, the Pretest Checklist should be verified. The items on the checklist are listed below:

1. Feature card properly installed?
2. Ports activated if required? .
3. Records updated?

Once it has been determined that the above items are complete, the individual ports may now be tested.

TESTING PORTS



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TESTING PORTS

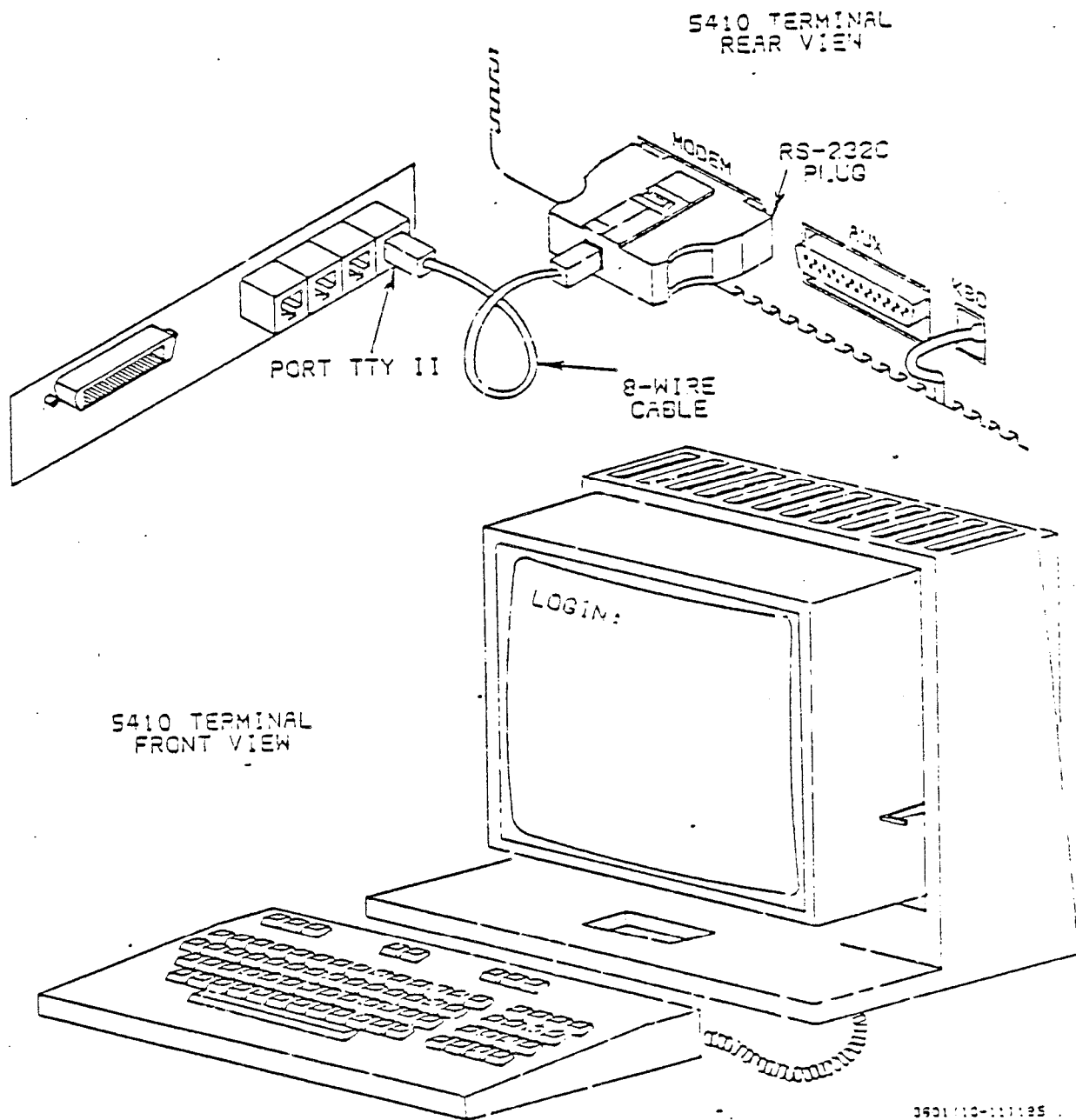
Test of the Individual Ports

Each individual port on the I/O expansion board must be tested. This test is accomplished by simply plugging in a serial or parallel device, depending on whether you are testing a serial or parallel port, and receiving the login: output message on the terminal screen or the printer output.

The example on the opposite page shows the first serial port, tty11, being tested by plugging in a 5410 terminal. If the login: message is displayed on the terminal screen, it indicates that port tty11 is ok. The 5410 terminal can be used to check all four serial ports, even if one of the ports will later be used for a serial printer.

The terminal used for the test may be a new terminal available for use at a later time, or the main system console terminal may be unplugged from the console port of the 3B2 Computer and plugged into the individual serial ports being tested. A parallel printer must be used to test the parallel port on the I/O expansion board.

INSTALLING A TELETYPE 5410 TERMINAL



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INSTALLING A TELETYPE 5410 TERMINAL

The procedure to install the 5410 terminal is the same as the test of the individual port. Simply decide which serial port will be used and plug in the terminal to the serial port.

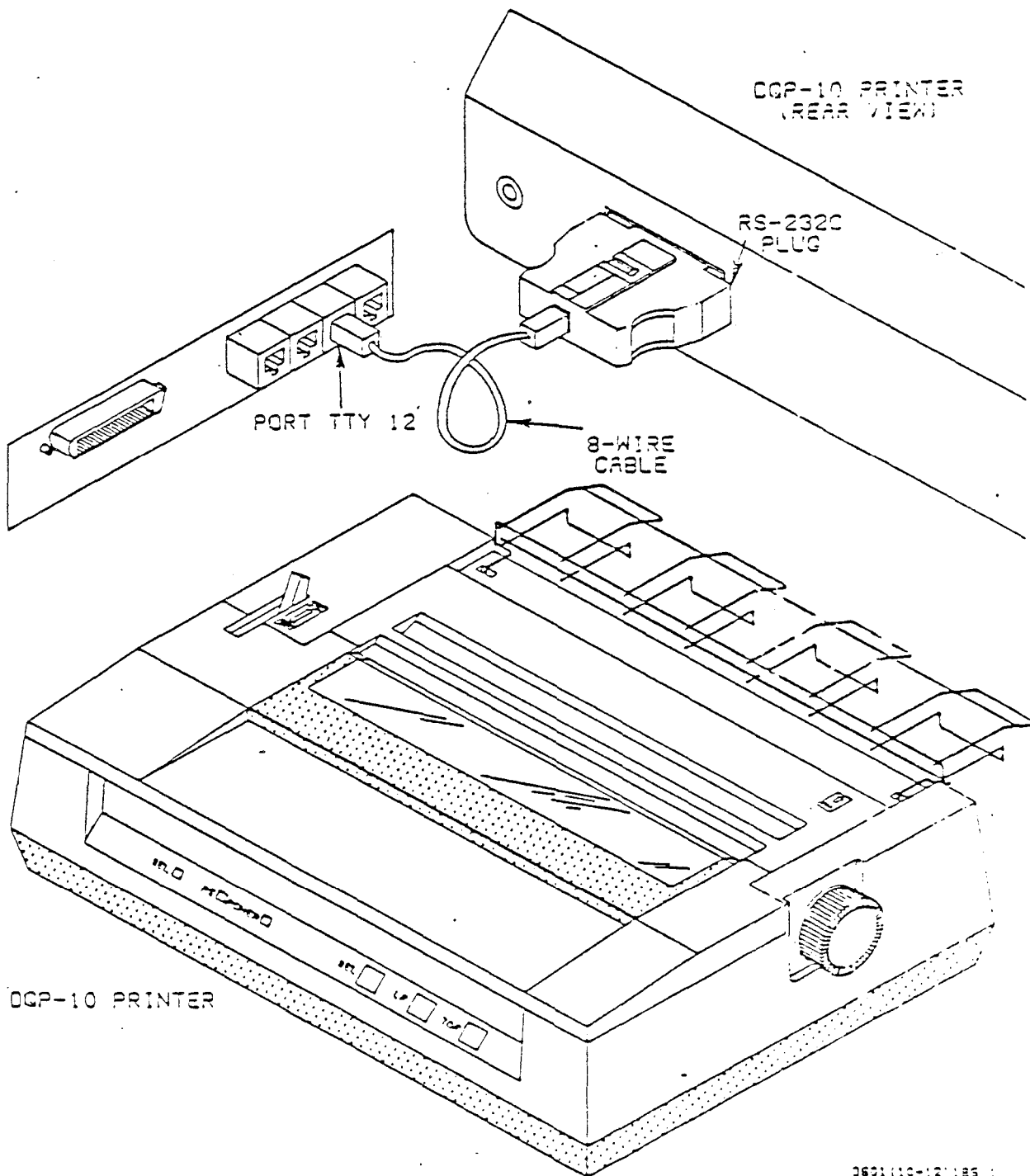
Of course, the terminal should be plugged into an AC outlet, turned on, and set up per instructions given in the terminal operations manual.

Once a login: message is received, the device is ready to use. One to four 5410 terminals may be added to each I/O expansion board on the 3B2 Computer.

The example on the opposite page shows a 5410 terminal being installed in port tty11 and the login: output message being received on the terminal screen.

This work assignment talks about adding a Teletype 5410 terminal, but the same procedure can be followed for adding 5425, 5420, or any serial terminal supported by the UNIX Operating System.

INSTALLING A DGP-10 SERIAL PRINTER



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INSTALLING A DQP-10 SERIAL PRINTER

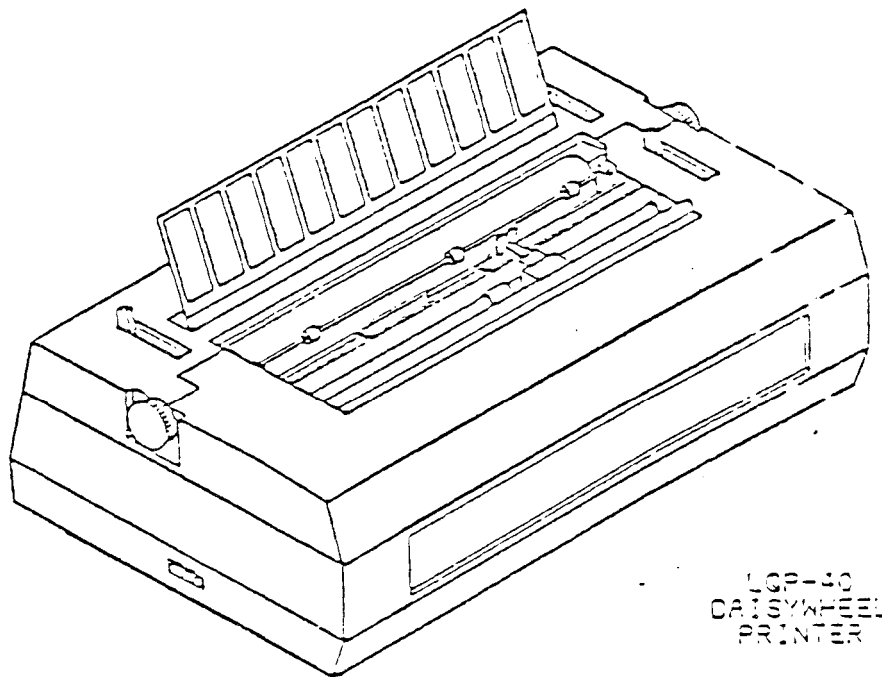
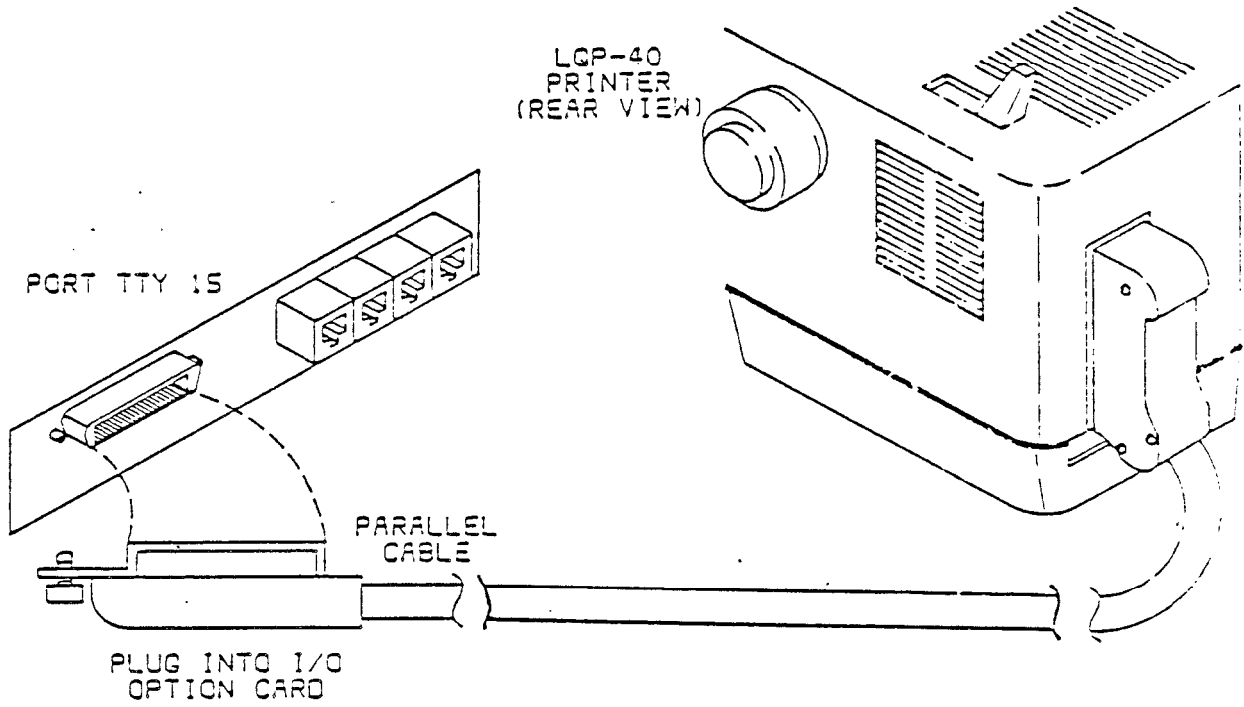
In a previous work assignment, a serial printer was added to the system. In that work assignment, the contty port and the direct connections to the terminal were discussed. At this point we will add a serial printer to the I/O expansion board.

The procedure to install the C.Itoh DQP-10 serial printer is to simply take the same connector used to connect the printer to the contty port and plug it into one of the four serial ports on the I/O expansion board. Of course, the DQP-10 printer should be plugged into an AC outlet, turned on, and set up per instructions in the previous work assignment.

The example on the opposite page shows a DQP-10 printer being installed in port tty12, after which the login: output message would be received on the printer.

This work assignment talks about adding a C.Itoh DQP-10 serial printer, but the same procedure can be followed for adding any serial printer to the 3B2 Computer.

INSTALLING AN LQP-40 PARALLEL PRINTER



INSTALLING AN LQP-40 PARALLEL PRINTER

The Daisywriter letter-quality LQP-40 parallel printer can be used as a serial printer by setting various options, but for this work assignment only parallel setup is discussed.

The procedure to install the LQP-40 printer is to simply plug the printer cable into the rear of the LQP-40 printer and then plug the standard parallel cable into the parallel port on the I/O expansion board. Of course, the LQP-40 printer should be plugged into an AC outlet, turned on, and set up per instructions in the LQP-40 printer manual.

The example on the opposite page shows an LQP-40 printer being installed in port tty15, the parallel port, after which the login: output message would be received on the printer.

This work assignment talks about adding a Daisywriter LQP-40 parallel printer, but the same procedure can be followed for adding any parallel printer to the 382 Computer.

NOTES

APPLICATION

1. The I/O expansion board has _____ serial and _____ parallel ports
2. What is the minor device number of the parallel port on the 1st expansion board?

3. The inittab file action line has two options, off and _____
4. The I/O expansion board can be installed in slot 3 if slots 1 & 2 already have feature cards installed. TRUE or FALSE?

5. Can the filler plates be discarded after installing a feature card? Explain.

6. The 382 Model 300 Computer can support _____ users.
7. How many ports on the I/O expansion board can be used for terminals?

8. How many ports on the I/O expansion board can be used for printers?

9. The major device number for all I/O expansion ports is always _____.
10. What System Administration subcommand will allow you to change the tty baud rate?

The I/O expansion board is already installed in slot 1. Activate tty11 and using the system console test the port. If the port is ok, deactivate the port and return the system to its normal state.

LINE PRINTER
SPOOLING
UTILITIES

WARNING

Some of the procedures outlined herein will cause various degrees of service impairment and should not be attempted on an in-service computer without the knowledge of the system administrator.

Portions of this training package are designed to be performed by a system administrator or maintenance person having access to the "root" (superuser) password. Those messages to be input by the superuser are preceded by the root prompt sign "#".

Messages which can be used by a normal system user, such as, line printer status, sending printer requests, and other general commands pertaining to the line printer system are preceded by the user prompt sign "\$".

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NOTES

LINE PRINTER SPOOLING UTILITIES

CAUTION

Follow standard electrostatic discharge (ESD) procedures using an approved personal grounding device when handling circuit packs.

This training package reflects the software contained in Line Spooling Utility package #104160650 for release 2.0.

REFERENCE DOCUMENTATION

305-430 Line Printer Spooling Utilities Guide

MATERIAL REQUIRED

AT&T 3B2 Computer and terminal

Printer*

Line Printer Spooling Utility diskette

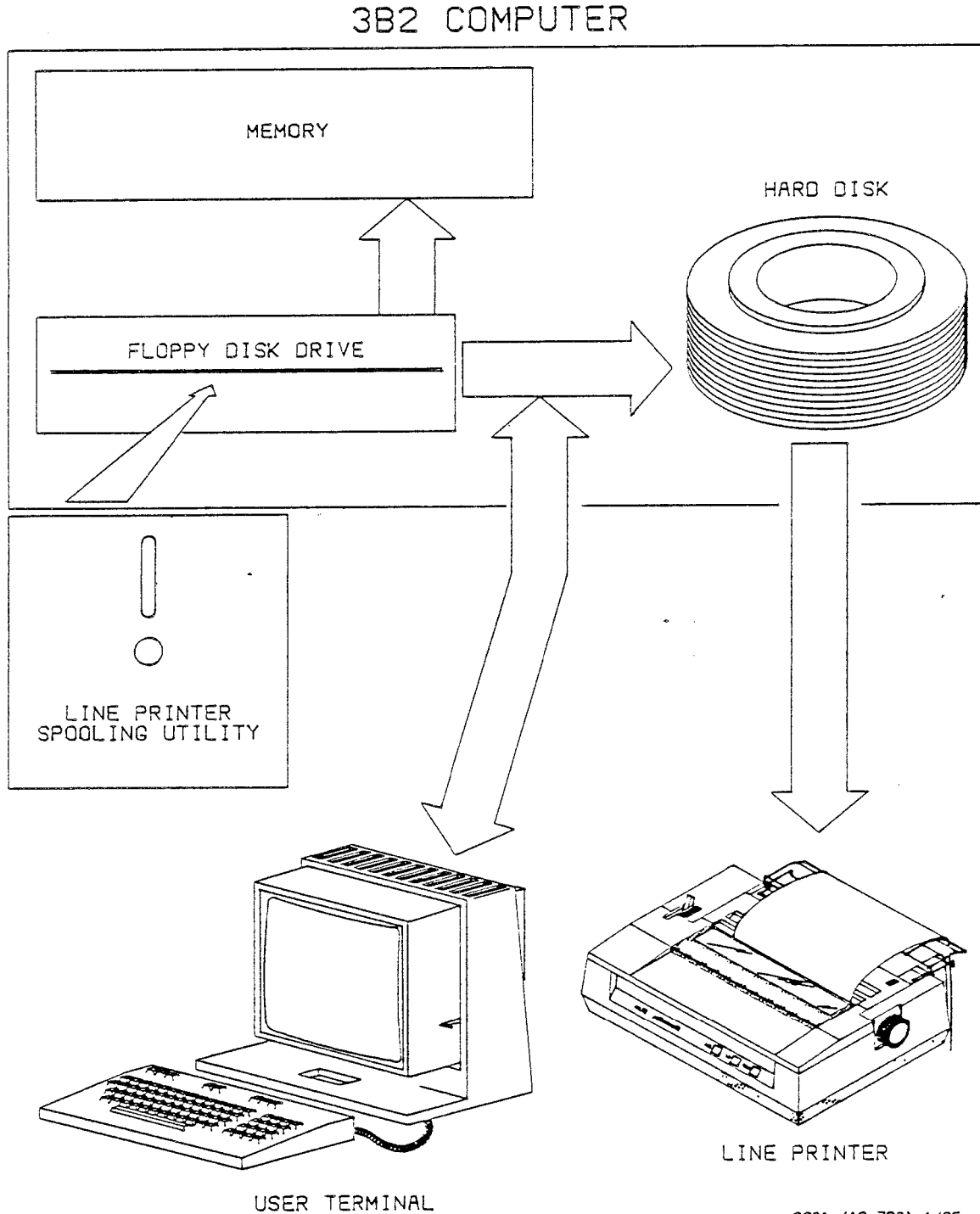
*This document uses the LPQ-10 dot matrix printer in the examples.

OBJECTIVES

At the end of this training package, you will be able to:

- Install the Line Printer Spooling Utility and configure the system.
- Use the general commands to initiate print requests, cancel print requests, and disable and enable printers.
- Use the administration commands to reconfigure the Line Printer Spooling System.

LINE PRINTER SPOOLING PROGRAM



LINE PRINTER SPOOLING PROGRAM

Background

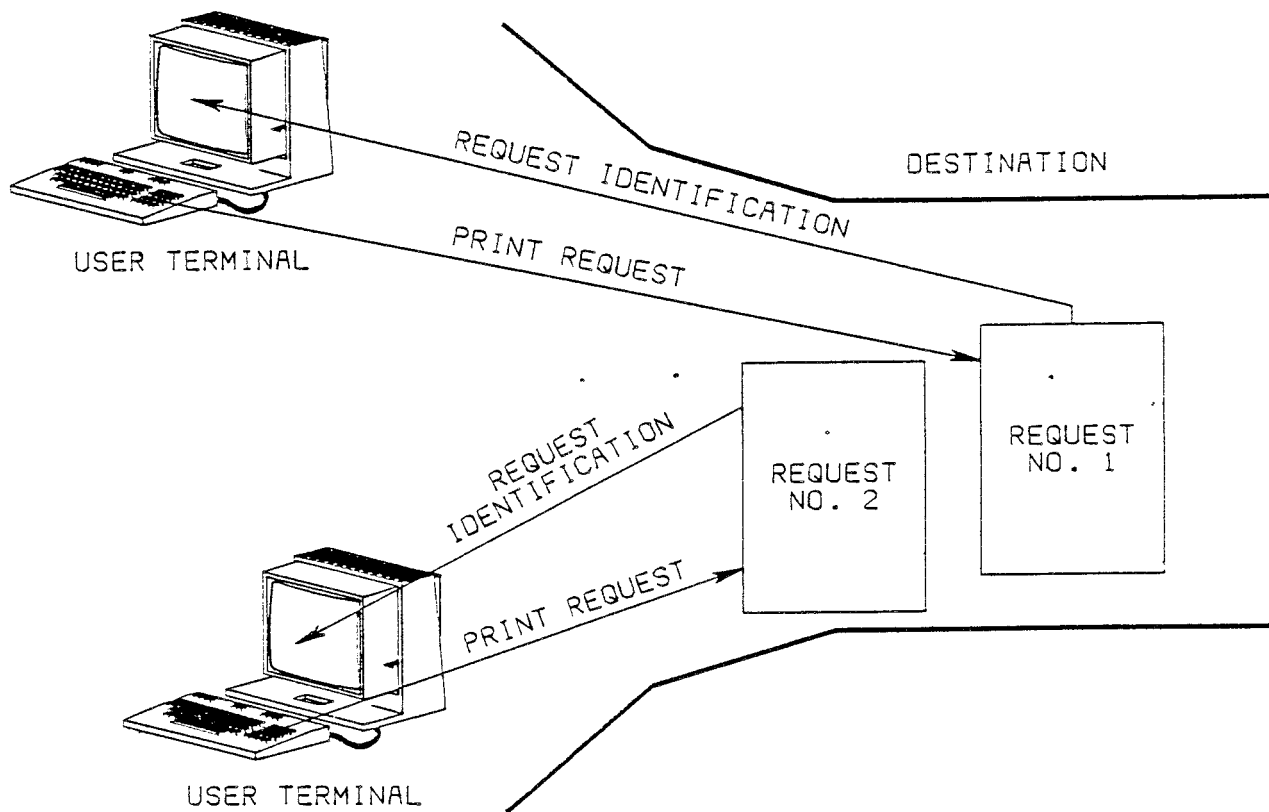
This training package is an introduction to the Line Printer Spooling Utility. When finished, you will have a basic understanding of the Line Printer Spooling System. You will also have the opportunity to install the Line Printer Spooling Utility and use the commands associated with it. (The Line Printer Spooling commands have many options available that are not used in this material. Refer to the Line Printer Spooling Utilities Guide for more information on the commands.)

Line Printer Spooling Program

The 3B2 computer has utility programs used to carry out specific functions necessary to the operation of a computer system. A utility program is a set of software programs that enables the 3B2 computer to perform common system procedures such as printing, moving data, reading from disk, etc. The utility program this training package covers is the Line Printer Spooling Utility Program, which is a set of programs that permits users to print files on line printers connected to the 3B2 computer.

The Line Printer Spooling Utility is loaded from floppy disk into the 3B2 computer memory and hard disk. The Line Printer Spooling Program receives print requests from user terminals and controls printing of the request on a common line printer.

LINE PRINTER SPOOLING UTILITY FUNCTION



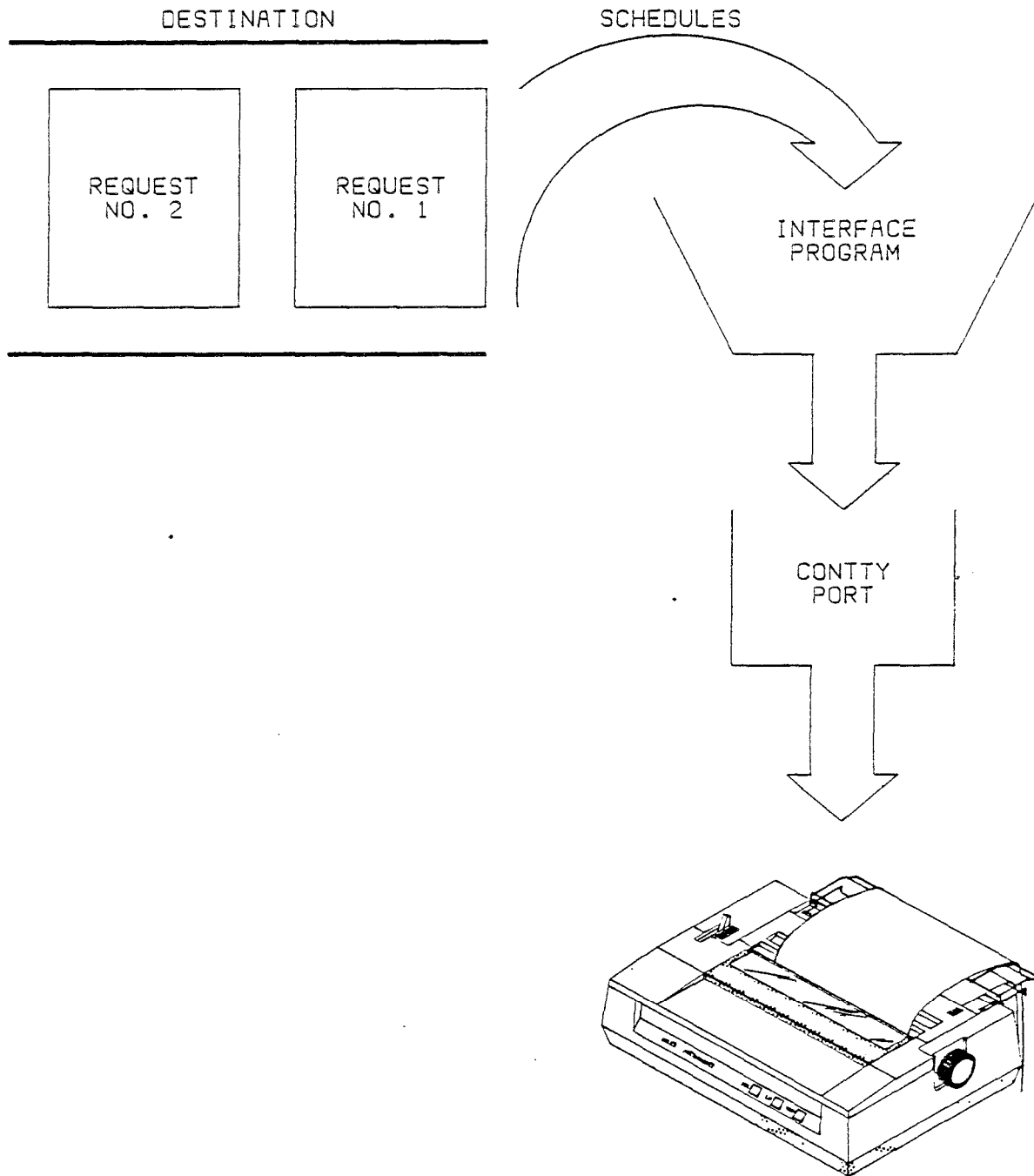
LINE PRINTER SPOOLING UTILITY FUNCTION

Print requests are initiated by users at their terminals through the use of the `lp` command. Each time the `lp` command is used, it creates a print request consisting of the file to be printed. The print request is then sent to a temporary storage area while it is waiting to be printed. The temporary storage area is on the 3B2 computer hard disk and is called the **destination**. Each printer in the Line Printer Spooling System will have its own destination area on the hard disk. One destination may be designated the system default destination. The `lp` command will direct all print requests to the default destination unless you specify a particular destination.

As each print request is received in the destination it is put in a line with other print requests waiting to be printed. This line of print requests is called a **queue**, which means a line of items waiting to be processed in a designated order. In this case, the print requests are queued in the destination in the order they are received. In other words, the first request put into the destination will be the first request printed.

Each request is assigned a unique identification number when it is put in the destination queue. The request identification number is printed on the user's terminal, and control of the terminal is returned to the user. The user is then able to use the terminal for other tasks, and the print request will be printed under control of the Line Printer Spooling Program.

LINE PRINTER SPOOLING UTILITY FUNCTION



3601 (13-732) 1/85 1

LINE PRINTER SPOOLING UTILITY FUNCTION (CONT.)

The queued print requests will remain in the destination until scheduled for printing by a program known as the **scheduler**. The scheduler keeps track of which printers are free and what destinations have queued requests waiting to be printed. The requests will be scheduled for printing in the order they were queued (the first request into the destination is the first scheduled for printing). When the printer associated with a particular destination becomes available, the scheduler routes the next print request to be printed from the destination to the printer interface program.

The function of the printer interface program is to match the output of the 3B2 computer to the operating characteristics of the printer. The Line Printer Spooling Utility provides interface programs for six different printers. The printer interface program will format the request and route it to the device the printer is connected to.

The Line Printer Spooling Program makes a distinction between printers and printing devices. A device is the port on the 3B2 computer that the printer is connected to. The UNIX* operating system associates a device with a file. For example, the **contty** port is identified as a device file named **/dev/contty**. When a print request is to be printed on the printer connected to the **contty** port, the interface program will route the request to a file named **/dev/contty**. The **/dev/contty** file is the **contty** port. Therefore, the request will be printed on the printer connected to the **contty** port. On completion of printing a request, the printer interface program will notify the scheduler program and the scheduler will route the next request to the interface program.

In the event a printer is malfunctioning or requires service, the user population has the ability to stop printing on that printer through the use of the **disable** command. When a printer is "disabled", the scheduler is prevented from routing requests queued in the printer's destination to the printer's interface program. The queued print requests will remain in the destination until the printer is returned to service through the use of the **enable** command. When the printer is enabled, the queued print requests in the destination will be routed to the printer's interface program in the order they were queued.

*Trademark of AT&T Bell Laboratories

LINE PRINTER SPOOLING UTILITY FEATURES

- Queuing and canceling print requests
- Preventing and allowing the use of printers
- Finding the status of the line printer system

LINE PRINTER SPOOLING UTILITY FEATURES

Some of the features of the Line Printer Spooling Utility are as follows.

- **Queuing and canceling print requests** - The Line Printer Spooling Utility Program receives print requests from users' terminals. The spooling program has the ability to accept simultaneous requests for the same printer. Each request is assigned a unique identification number and is stored in a temporary area on the disk. Requests are "queued" (lined up) in this temporary area in the order the spooling program receives them. The requests are scheduled to print in the order they are queued. Users may cancel print requests by using the unique identification number.
- **Preventing and allowing the use of printers** - The Line Printer Spooling Utility Program gives the user the ability to either prevent or allow the printing of requests on a particular printer.
- **Finding the status of the line printer system** - Users can determine the status of requests that have been submitted to the Line Printer Spooling Program.

INSTALLING THE LINE PRINTER SPOOLING SYSTEM

Adding the Software

```

# shutdown -y<cr>
shutdown started.
Broadcast Message from root (console) day date time
THE SYSTEM IS BEING SHUTDOWN NOW !!!
Log off now or risk your files being damaged.
The system is coming down. Please wait.
System services are now being stopped.
**** SYSCON CHANGED TO /dev/console ****
init : NEW RUN LEVEL : S
init : SINGLE USER MODE
# mount /dev/idsk02 /usr<cr>
# sysadm installpkg
Running subcommand 'installpkg' from menu 'softwaremgmt'
SOFTWARE MANAGEMENT
Insert the removable medium for the package you want to install
into diskette drive.
Press (RETURN) when ready. Type q to quit.
Installing the Line Printer Spooling Utilities
  Copyright (c) 1984 AT&T Technologies, Inc.
  All Rights Reserved
The following files are being installed:
//usr/bin/cancel
//usr/bin/disable
//usr/bin/enable
//usr/bin/lp
//usr/bin/lpstat
//usr/lib/hp2631a
//usr/lib/accept
//usr/lib/lpadmin
//usr/lib/lpmove
//usr/lib/lpsched
//usr/lib/lpshut
//usr/lib/pprx
//usr/lib/prx
//usr/lib/reject
//usr/spool/lp/outputq
//usr/spool/lp/pstatus
//usr/spool/lp/qstatus
//usr/spool/lp/model/1640
//usr/spool/lp/model/dqp10
//usr/spool/lp/model/lqp40
//usr/spool/lp/model/dumb
//usr/spool/lp/model/f450
//usr/spool/lp/model/hp
//usr/spool/lp/model/pprx
//usr/spool/lp/model/prx
//usr/options/lp.name
643 blocks

```


INSTALLING THE LINE PRINTER SPOOLING SYSTEM

Adding the Software

All commands and data for the 3B2 computer Line Printer Spooling Utilities Program are on a floppy disk, which is labeled as follows:

Line Printer Spooling
Utilities Package

Prerequisites

Before you install the 3B2 computer Line Printer Spooling Utilities Package, you must be logged in as **root** on the console terminal. The pound (#) symbol is the system prompt when you are logged in as **root**.

Procedure

The procedure for installing the Line Printer Spooling Utility is shown on the opposite page. The input commands are shown in **bold type** and system responses are shown in regular type. After each command, wait for the system to respond with the system prompt before entering the next command.

In response to the **sysadm installpkg** command, the system will respond with a set of instructions that will prompt you through the installation of the utility. Follow these instructions. Refer to the opposite page for an example of the messages that will appear on the console terminal as the files of the Line Printer Spooling Utility are loaded from floppy disk.

If problems are encountered, the computer will respond with messages indicating the source of the problem(s) and the action to be taken.

NOTE: The Line Printer Spooling Utility does not have an uninstall feature. The only way to remove this utility is to remove all files that are installed with the utility.

INSTALLING THE LINE PRINTER SPOOLING SYSTEM

Adding the Printers

- ① Available printer types are:
- ② "lqp40" for LQP-40 Letter Quality Printer,
- ③ "dqp10" for DQP-10 Matrix Printer,
- ④ "hp" for Hewlett-Packard 2631A line printer at 2400 baud,
- ⑤ "prx" for Printronix¹ P300 at 4800 baud using XON/XOFF protocol on a serial interface,
- ⑥ "1640" for Diablo² 1640 at 1200 baud using XON/XOFF protocol,
- ⑦ "450" for DASI³ 450 using XON/XOFF protocol,
- ⑧ "dumb" for a line printer without special functions or protocol,
- ⑨ "done", if no more printers are to be configured.
- ⑩ Enter the type of printer to be added to lp system: dqp10<cr>
- ⑪ The printer name is dqp10_1.
- ⑫ If dqp10_1 is OK, hit RETURN, or
- ⑬ if you would prefer another name, enter the name: <cr>

¹Product of Printronics, Inc.

²Product of Xerox Corp.

³Product of Data Access Systems, Inc.

INSTALLING THE LINE PRINTER SPOOLING SYSTEM (CONT.)

Adding the Printers

- ① Lines ① through ⑩ are printed on the screen after the files for the Line Printer Spooling Utility have been copied from the Line Printer Spooling Utility floppy disk.
- ②-⑧ These lines list the standard printer interface programs that are provided with the Line Printer Spooling Program. For this work assignment, you will be adding a DQP-10 line printer.
- ⑨ This line is printed to explain how to terminate the installation of the Line Printer Spooling Utility without adding the printers to the system.
- ⑩ This line is printed to prompt you to enter the type of printer to be added to the Line Printer Spooling System. The DQP-10 Matrix Printer is used throughout this example, therefore "dqp10" is used in response to this line. You will, of course, use the input corresponding to the type of printer you are adding.
- ⑪ From the input on line ⑩, the system will respond with this line. The system will assign a name and identity to the printer. In this example, the name is **dqp10** and the identity is 1 because this is the first DQP-10 printer assigned to the spooling system.
- ⑫ & ⑬ These lines are printed to give you the opportunity to change the name of the printer being entered. If you wish to identify the printer being entered by a name other than **dqp10_1**, you will enter the new name at this time. In the example, the system default name was assigned by hitting the <cr> key.

INSTALLING THE LINE PRINTER SPOOLING SYSTEM

Adding the Printers

- ⑭ The choices for device name are:
/dev/tty11 /dev/tty12 /dev/tty13 /dev/tty14
/dev/contty
- ⑮ Enter the device name: /dev/contty
- ⑯ destination "dqp10_1" now accepting requests
- ⑰ printer "dqp10_1" now enabled
- ⑱ Available printer types are:
- ⑲ "lqp40" for LQP-40 Letter Quality Printer,
- ⑳ "dqp10" for DQP-10 Matrix Printer,
- ㉑ "hp" for Hewlett Packard 2631A line printer at 2400 baud,
- ㉒ "prx" for Printronix P300 at 4800 baud using XON/XOFF protocol on a serial interface,
- ㉓ "1640" for Diablo 1640 at 1200 baud using XON/XOFF protocol,
- ㉔ "450" for DASI 450 using XON/XOFF protocol,
- ㉕ "dumb" for a line printer without special functions or protocol,
- ㉖ "done", if no more printers are to be configured.
- ㉗ Enter the type of printer to be added to lp system: done<cr>
- ㉘ Select the name of the printer to be the default destination from the following:

dqp 10_1
(or type <return> for none)
- ㉙ dqp10_1<cr>
- ㉚ Current lp system status:
- ㉛ scheduler is running

INSTALLING THE LINE PRINTER SPOOLING SYSTEM (CONT.)

Adding the Printers (Cont.)

- ⑭ & ⑮ These lines are printed in response to the input in line ⑬ . As stated earlier, the DQP-10 line printer is connected to the `contty` port. Device name `/dev/contty` is entered to associate the DQP-10 line printer with the port on the 3B2 computer it is connected to.
- ⑯ & ⑰ These lines are printed to verify that the Line Printer Spooling Program can now handle print requests directed to the DQP-10 line printer just assigned. Line ⑯ refers to `dqp101` as a destination. A destination is an area on the hard disk where print requests are queued while they are waiting to be printed. In this example, requests directed to the DQP-10 line printer we just added to the spooling system will be queued in the destination known as `dqp10_1`.
- ⑱ - ⑲ These lines are printed to prompt you to enter additional printers.
- ⑳ In this example, no additional printers were to be added, so `done<cr>` was entered in response to this line.
- ㉓ & ㉔ One printer may be designated as the system default destination. All print requests will be sent to the default destination unless you specify otherwise. In line ㉔ of the example, `dqp10_1` is specified as the default destination since it is the only printer that has been added to the system.
- ㉖ This line is printed to inform you that a status printout of the Line Printer Spooling System will follow.
- ㉗ The scheduler referred to in this line is the program that controls the printing of requests that have been queued in the destination. The scheduler program prints requests on a first-come, first-served basis. There is no priority given to any job.

INSTALLING THE LINE PRINTER SPOOLING SYSTEM

Adding the Printers

- ③② system default destination: dqpl0_1
- ③③ device for dqpl0_1: /dev/contty
- ③④ dqpl0_1 accepting requests since OCT 17 15:07
- ③⑤ printer dqpl0_1 is idle. enabled since Oct 17 15:07
- ③⑥ Installation of Line Printer Spooling Utilities is complete.
You may now remove the medium from the diskette drive.
- ③⑦ Insert the removable medium for the package you want to install
into the diskette drive.
Press <RETURN> when ready. Type q to quit. q <cr>
- ③⑧ # init 2

INSTALLING THE LINE PRINTER SPOOLING SYSTEM (CONT.)Adding the Printers (Cont.)

- ③② This line is printed to verify the system default printer.
- ③③ This line verifies that the Line Printer Spooling System now recognizes the fact that printer `dqp10_1` is connected to the `contty` port.
- ③④ This line is printed to verify that the Line Printer Spooling System is able to accept print requests directed to printer `dqp10_1`.
- ③⑤ This line is printed to show the current status of printer `dqp10_1`. The idle status means no requests are being printed on the `dqp10_1` printer at this time.
- ③⑥ This line is printed to verify that installation of the Line Printer Spooling Utility is complete and to remove the Line Printer Spooling Utility floppy diskette from the disk drive.
- ③⑦ This line is printed to show that you are still in the "sysadm installpkg" program and, if you wish, you may install another software utility package at this time. However, we are not going to install another package at this time, so you will enter a "q" to quit.
- ③⑧ The `init 2` command is entered at this time to return the system to the multiuser level of operation.

LINE PRINTER SYSTEM STATUS

```
lpstat -a[list] -d -o[list]  
-r -s -t -p[list] -u[list] -v[list]
```

LP - 100 / 100 percent

LINE PRINTER SYSTEM STATUS

There are two levels of commands associated with the Line Printer Spooling Program. The administration commands are used by the system administrator to set up and oversee the smooth operation of the Line Spooling System. The general commands, which we will discuss in this section, are entered at the user's terminal to initiate and control the printing of files by the Line Printer Spooling System.

The `lpstat` command will tell you the status of the destinations, the scheduler, and the queued print requests.

Command Format

The general format of the `lpstat` command is shown on the opposite page. As you can see, there are a number of options that can be used with this command. A brief description of each option follows.

- `-a[list]` This option prints a list of printers that are available for use. The `[list]` is a list of printer names. When `[list]` is used, only the availability of the printers specified in the list will be printed. If `[list]` is not used, the availability of all printers will be printed.
- `-d` This option prints a report of the status of the system default destination.
- `-o[list]` This option causes only the status of queued requests to be printed. In this case, the `[list]` can be a list of printer names or a request for identification numbers.
- `-r` This option requests the status of the scheduler only.
- `-s` This option requests a summary printout that includes the status of the scheduler, the system default destination, a list of printers, and the associated devices.

LINE PRINTER SYSTEM STATUS

```
lpstat -a[list] -d -o[list]
-r -s -t -p[list] -u[list] -v[list]
```

* lp Intel/proc

* lp Intel/proc / LP

* LP < Intel/proc

Acd

LINE PRINTER SYSTEM STATUS (CONT.)

- t This option reports the total status of the system of the Line Printer Spooling System.

- p[list] This option issues a status report on the printers specified in the [list].

- u[list] This option causes a report to be printed on the status of print requests submitted by the users specified in the [list]. The [list] is a list of users' login names.

- v[list] This option causes a report to be printed that contains the status and the pathname of the device (i.e., port) the printer is connected to. The [list] is a list of printer names.

LINE PRINTER SYSTEM STATUS

- ① \$ lpstat -t<cr>
- ② scheduler is running
- ③ system default destination: dqp10_1
- ④ device for dqp10_1: /dev/contty
- ⑤ dqp10_1 accepting requests since Oct 22 13:43
- ⑥ printer dqp10_1 enabled since Oct 22 13:43
- ⑦ dqp10_1-21 vince 3572 Oct 23 15:04 on dqp10_1

LINE PRINTER SYSTEM STATUS (CONT.)

Status Report

The example on the opposite page illustrates the use of the `status` command with the `-t` option to obtain a printout of the total system status. The command inputs are again shown in **bold type** and system responses are shown in regular type.

- ① The dollar sign (\$) is the UNIX system prompt that will be displayed on the user's terminal. The prompt indicates that the UNIX system is ready to accept a command. The `lpstat` command tells the UNIX operating system to issue a report on the Line Printer Spooling System. The `-t` command option indicates that all (total) status information should be reported.
- ② The scheduler must be running in order for the queued print requests to be sent to the line printer interface program.
- ③ The default destination is where all print requests are directed unless the user that originates the request specifies a particular printer.
- ④ This line tells us that printer `dqp10_1` is connected to the `contty` port.

LINE PRINTER SYSTEM STATUS

- ① \$ lpstat -t<cr>
- ② scheduler is running
- ③ system default destination: dqp10_1
- ④ device for dqp10_1: /dev/contty
- ⑤ dqp10_1 accepting requests since Oct 22 13:43
- ⑥ printer dqp10_1 enabled since Oct 22 13:43
- ⑦ dqp10_1-21 vince 3572 Oct 23 15:04 on dqp10_1

LINE PRINTER SYSTEM STATUS (CONT.)Status Report (Cont.)

- ⑤ The term **accept** means the Line Printer Spooling System is able to accept print requests directed to printer **dqp10_1**. The print requests will be queued in the **dqp10_1** destination.
- ⑥ The term **enabled** means the spooling system is able to actually send the queued print requests from the destination to the **dqp10_1** printer. If the **dqp10_1** printer is "disabled", print requests directed to it will be queued in the destination. The queued requests will remain in the destination until the printer is enabled, at which time the scheduler program will send the request to the **dqp10_1** printer.
- ⑦ This line is an example of a queued print request. The first field in this line contains the destination (**dqp10_1**) in which the print request is queued.

-21 This field is the unique request identification number assigned to this request. Request identification numbers are assigned by the spooling program when the request is accepted.

vince This field contains the login name of the user that initiated this print request. In this example, the user's login name is **vince**.

3572 This field is the number of characters to be printed by the line printer.

Oct 23 15:04 This field is the date and the time that this request was entered by the user.

on dqp10_1 The last field "on dqp10_1" is telling you that this report is currently being printed on printer **dqp10_1**.

SENDING PRINT REQUESTS TO THE SYSTEM DEFAULT PRINTER

```
cat ( file name ) | lp
```


SENDING PRINT REQUESTS TO THE SYSTEM DEFAULT PRINTER

Command Format

Print requests are initiated by users with the `lp` command. There are several formats that can be used to enter this command. An example of the `lp` command is shown on the opposite page.

The `cat` command causes the UNIX operating system to read the specified file (`file name`) and write it on the terminal that the `cat` command was entered from. The `|` character is known as a pipe. The pipe character tells the UNIX operating system to take the output of the `cat` command and send it directly to the `lp` command.

The `lp` command accepts the piped input and assigns a request identification number to it. The requested file is then queued in the destination. In this example, the destination is not specified; therefore, the print request will be queued in the default destination.

SENDING PRINT REQUESTS TO A SPECIFIED PRINTER

```
cat ( file name ) | lp -d[dest]
```

SENDING PRINT REQUESTS TO A SPECIFIED PRINTER

Command Format

Another example of the lp command is shown on the opposite page. The difference between this example and the first example is the use of the -d option to specify a destination. Because we have installed only one line printer, the system default destination and the dqp10_1 destination are the same. Therefore, no matter which format you use, the requests will be printed on the DQP-10 line printer. However, later in this work assignment we will be adding a printer to the Line Printer Spooling System, which means it will then be necessary to specify a particular destination.

SENDING PRINT REQUESTS TO THE dqp10_1 PRINTER

- ① \$ cat /etc/gettydefs | lp -ddqp10_1<cr>
- ② request id is dqp10_1-27
- ③ \$

SENDING PRINT REQUESTS TO THE dqp10 1 PRINTER

Command Format

Each time a print request is entered, the Line Printer Spooling System will respond with a unique request identification. An example of initiating a print request and the system response is shown on the opposite page.

- ① The `cat` command will generate a copy of the `/etc/gettydefs` file. The `|` character will cause the copy of the file to be sent to the `lp` command. The `lp` command will accept the copy of the `gettydefs` file generated by the `cat` command as a print request and assign a unique identification number to it. The print request will then be sent to destination `-ddqp10_1`, as specified in the command.
- ② This line will be printed on the terminal in response to the print request entered in line ①. The `dqp10_1` destination and request identification number `27` are returned to the user. (Request identification number `27` was used just for demonstration purposes in this example.)
- ③ The UNIX system prompt is returned to the user terminal. The prompt indicates that the UNIX system is ready for the next input.

The print request will now be processed by the scheduler program. Progress of the print request can be tracked by the user by using one of the `lpstat` commands previously mentioned.

GENERAL COMMANDS

Canceling Print Requests

- ① \$ cancel dqp10_1-27<cr>
- ② request "dqp10_1-27" canceled
- ③ \$

GENERAL COMMANDS

Canceling Print Requests

A print request can be removed from queue through the use of the `cancel` command. An example of the `cancel` command is shown on the opposite page.

- ① The `cancel` command tells the Line Printer Spooling System to stop printing the request specified in the command. In this example, we have told the Line Printer Spooling System to cancel request `dqpl0_1-27`.
- ② The Line Printer Spooling System will respond with a message (as shown in this line) to verify that the print request has been canceled.
- ③ The UNIX system prompt is returned to the terminal.

The `cancel` command can be initiated by any user to stop either their own or other users' print requests.

GENERAL COMMANDS

Disabling Printers

- ① \$ disable dqp10_kcr>
- ② printer "dqp10_1" now disabled
- ③ \$

GENERAL COMMANDS (CONT.)

Disabling Printers

The `disable` command prevents the scheduler from routing requests to printers. When a printer is disabled, the Line Printer Spooling System will accept print requests directed to that printer and queue them in the destination. However, the scheduler will not send requests to the printer until it is enabled. Printers may be disabled for several reasons, including paper jams, malfunctioning hardware, and end-of-day shutdowns of the system.

Command Format

An example of the `disable` command is shown on the opposite page.

- ① The `disable` command must be followed by the name of the printer (in this case, `dqp10_1`) to be disabled.
- ② The Line Printer Spooling System will return a message (as shown in this line) to verify that the printer has been disabled.
- ③ The UNIX system prompt is returned to the terminal.

Printers may be disabled by any user.

GENERAL COMMANDS

Enabling Printers

- ① \$ enable dqp10_1<cr>
- ② printer "dqp10_1" now enabled
- ③ \$

GENERAL COMMANDS (CONT.)

Enabling Printers

The `enable` command will undo the effects of the `disable` command. Printers that were disabled will be returned to service and the scheduler will start to send queued print requests to the printer as a result of the `enable` command.

Command Format

In the example on the opposite page, we will enable the `dqp10_1` printer, which was disabled previously.

- ① The `enable` command is entered at the user terminal followed by the name of the printer (in this example, `dqp10_1`) to be enabled.
- ② The Line Printer Spooling System will respond with a message (as shown) to verify that the printer has been enabled.
- ③ The UNIX system prompt is returned to the terminal.

As is the case with all the commands we have examined, the `enable` command may be initiated by any user.

NOTES

APPLICATION EXERCISES

The following two application exercises cover the same material. One is not to be used on an in-service computer. Use the one suitable to your environment.

EXERCISE 1

WARNING - This exercise should not be performed on an in-service computer except by an experienced system administrator.

Answer the questions and perform the operations listed in the following hands-on application, using the reference documents listed on page 1 of this training package.

1. In order to install the Line Printer Spooling Utility, what prompt must be displayed on the console terminal?

2. Assuming the UNIX operating system is in the multiuser state, list the commands that must be entered from the console terminal to start the installation of the Line Printer Spooling Utility.

Log in on the system console terminal and enter the commands referenced in question 2 to start the installation process.

Install the Line Printer Spooling Utility. If you have any problems with the installation of this utility, please ask your instructor for help.

3. After installing the Line Printer Spooling Utility, what command would you enter to return the UNIX operating system to the multiuser state?

Enter the command referenced in question 3.

4. What command would you enter to determine the system status?

5. Is the scheduler running?

If you answered no to the previous question, please ask for help.

Using the UNIX system editor, create two files containing unique contents. Name the first file `file1` and the second `file2`.

6. List the commands you would enter to obtain separate printouts of each file, using the Line Printer Spooling System.

7. What command would you enter to find out the status of the entire spooling system?

Enter the commands referenced in questions 6 and 7.

8. What identification numbers were assigned to your requests?

Verify your printouts before proceeding.

9. What command would you enter to remove the line printer from service?

Enter the command to remove the printer from service.

Send another request to the printer.

Determine the status of the system.

10. Is the last print request being printed on the printer?

11. What command would you enter to cancel the request that is presently in queue?

Cancel the print request in queue.

12. What command would you enter to return the printer to service?

Return the printer to service.

Verify that the printer is in service, using the `lpstat` command.

NOTES

EXERCISE 2

NOTICE - This exercise is written to cause no service impairment on an in-service computer. However, it should not be performed without the knowledge of the system administrator.

Answer the questions using the reference documents listed on the first page of this training package.

1. In order to install the Line Printer Spooling Utility, what prompt must be displayed on the console terminal?

2. Assuming the UNIX operating system is in the multiuser state, list the commands that must be entered from the console terminal to start the installation of the Line Printer Spooling Utility.

3. After installing the Line Printer Spooling Utility, what command would you enter to return the UNIX operating system to the multiuser state?

4. What command would you enter to determine the system status?

_____ If you have access to a terminal, log in and enter the command.

5. Is the scheduler running?

If you answered no to the previous question, please ask for help.

Using the UNIX system editor, create two files containing unique contents. Name the first file `file1` and the second `file2`.

6. List the commands you would enter to obtain separate printouts of each file, using the Line Printer Spooling System.

7. What command would you enter to find out the status of the entire spooling system?

Enter the commands referenced in questions 6 and 7.

8. What identification numbers were assigned to your requests?

Verify your printouts before proceeding.

9. What command would you enter to remove the line printer from service?

Enter the command to remove the printer from service.

Send another request to the printer.

Determine the status of the system.

10. Is the last print request being printed on the printer?

11. What command would you enter to cancel the request that is presently in queue?

Cancel the print request in queue.

12. What command would you enter to return the printer to service?

Return the printer to service.

Verify that the printer is in service, using the `lpstat` command.

LINE PRINTER SPOOLING SYSTEM ADMINISTRATION

- Adding printers to the Line Printer Spooling System
- Deleting printers from the Line Printer Spooling System
- Moving printers from one port to another
- Moving print requests from one printer to another

LINE PRINTER SPOOLING SYSTEM ADMINISTRATION

The system administration commands are used by the system administrator to oversee the day-to-day operation of the Line Printer Spooling System. The commands allow the administrator to make changes in the Line Printer Spooling System after the utility has been installed. Some of these changes include adding or deleting printers, moving a printer from one port to another, and moving print requests from one printer to another. The Line Printer Spooling System administrative commands are the tools the system administrator uses to accomplish the required changes in the system.

The use of the administration commands is restricted to the UNIX system administrator or the line printer administrator. Typically, the UNIX system administrator and the line printer administrator are the same person. In this section, each administrator command and its options will be described. In addition, examples of how to use each command will be presented.

REJECTING PRINT REQUESTS

```
/usr/lib/reject -r"reason" dest<cr>
```

REJECTING PRINT REQUESTS

The `reject` command is used by the system administrator to prevent the Line Printer Spooling System from accepting print requests for destinations. If printers have been removed or are waiting to be repaired, or if too many print requests are building up in a printer's destination, it may be necessary to have the spooling system reject print requests directed to the problem destination. Print requests that were already queued in the destination will continue to be routed to the printer interface program for printing.

Command Format

The format of the `reject` command is shown on the opposite page. Use of the Line Printer Spooling System administrator's commands is restricted to the administrator. The Line Printer Spooling administrative commands are under the `lib` directory, which is a subdirectory of the `usr` directory. In order to access these restricted commands, it is also necessary to preface the command with the pathname so the system can find the command. That portion of the `/usr/lib/reject` command tells the system to search the `usr` directory for the `lib` subdirectory. The system will then search the `lib` subdirectory for the `reject` command, which will be executed along with its options.

The `-r` option allows the administrator to state a "reason" the print requests are being rejected. The "reason" must be enclosed in double quotes. The `dest` is the destination name of the printer in trouble.

When a user directs a print request to the rejecting destination, a message will be printed on the user's terminal to inform them that their print request has been rejected. If a reason is included in the `reject` command, it will also be printed on the user's terminal.

REJECTING PRINT REQUESTS

- ① Console login: root<cr>
- ② password: <cr>
- ③ # usr/lib/reject -r"printer being repaired" dqp10_1<cr>
- ④ destination "dqp10_1" is no longer accepting requests

REJECTING PRINT REQUESTS (CONT.)

An example of using the `reject` command is shown on the opposite page. The inputs being entered are shown in **bold type** and the system responses are shown in regular type.

- ① In response to "Console login:", which is displayed on the screen, the administrator enters **root**. It is necessary to log in as **root** because use of the Line Printer Spooling administrator commands is restricted. Character string `<cr>` stands for carriage return, which must be entered to terminate the input.
- ② Character string "password:" is printed in response to the input from line ①. The **root** password is entered at this time.
- ③ The system prompt (`#`) is returned to tell you the system is ready to accept your input. The portion of the `/usr/lib/` command line tells the system the location of the `reject` command.

The `-r` followed by the text "**printer being repaired**" gives the reason the destination is rejecting print requests.

`dqp10_1` is the name of the destination for the printer being repaired.

- ④ The system returns this line to verify that destination `dqp10_1` is now rejecting print requests.

ALLOWING PRINT REQUESTS

- ① # /usr/lib/accept dqp10_1<cr>
- ② destination "dqp10_1" now accepting requests

ALLOWING PRINT REQUESTS

The `accept` command is used by the system administrator to allow a destination that was rejecting print requests to accept requests. The `accept` command is also used by the system administrator to allow the Line Printer Spooling System to accept print requests for a destination that has been added to the system. An example of the use of the `accept` command is shown on the opposite page.

- ① The `#` character is the system prompt. It is displayed by the system to show it is ready for input. The portion of the command line that reads `/usr/lib/` is the pathname of the `accept` command. The pathname tells the system the path to follow to find the `accept` command. `dqp10_1` is the destination being allowed to accept print requests, and `<cr>` is the carriage return character.
- ② This line will be printed to verify that the destination is now able to accept print requests.

STOPPING THE SCHEDULER PROGRAM

① /usr/lib/lpshut<cr>

② scheduler stopped

RM /usr/lib/lpshut
/usr/lib/lpshut

STOPPING THE SCHEDULER PROGRAM

The `lpshut` command is used by the administrator to stop or "shut down" the scheduler program. Stopping the scheduler causes all printers to stop printing. When the scheduler is shut down, the system will accept print requests and queue them in the destinations. The queued requests will remain in the destinations because the scheduler is the program that routes requests from the destination to the printer interface program. All requests being printed when the scheduler stops will be terminated. When the scheduler is restarted, the requests terminated when the scheduler stopped will be reprinted in their entirety.

It is necessary for the administrator to stop the scheduler before adding or deleting printers or when moving a printer from one device to another. An example of the `lpshut` command is shown on the opposite page.

- ① The `#` character is the system prompt. The portion of the `/usr/lib/` command line is the pathname of the `lpshut` command.
- ② This line is printed in response to the `lpshut` command entered in line ①. As you can see by the response, the scheduler is no longer running.

STARTING THE SCHEDULER

① # /usr/lib/lpsched<cr>

② # lpstat -r<cr>

③ scheduler is running

STARTING THE SCHEDULER

The `lpsched` command is used by the system administrator to start the scheduler program. When the scheduler is started, the queued print requests stored in the various destinations will be routed to the appropriate printer interface programs. An example of the `lpsched` command is shown on the opposite page.

- ① The `#` character is the system prompt. The portion of the `/usr/lib/` command line is the pathname that allows the system to find the `lpsched` command in the `lib` directory.
- ② The `#` character is returned in response to the `lpsched` command entered in line ①. The system will not return a verification message to tell you the scheduler has started. In order to verify that the scheduler is running, the `lpstat` command is entered with the `-r` option. The `-r` option asks for the status of the scheduler program only.
- ③ This line will be printed in response to the input entered in line ②. As you can see, the scheduler is now running.

MOVING PRINT REQUESTS

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpmove dqpl01 lqp40_1<cr>
- ④ destination dqpl0_1 is not accepting print requests
- ⑤ move in progress ...
- ⑥ total of 1 requests moved from dqpl0_1 to lqp40_1
- ⑦ # /usr/lib/lpsched<cr>
- ⑧ scheduler running

MOVING PRINT REQUESTS

Occasionally, it is necessary for the administrator to move queued print requests from one destination to another destination. For instance, when a printer has been disabled for repairs, it may be desirable to move all pending print requests to the destination of a working printer. The `lpmove` command is the tool the administrator uses to move queued print requests. As a side effect of the `lpmove` command, the destination the requests are moved from will reject any print requests directed to it after `lpmove` has been used. An example of the `lpmove` command is shown on the opposite page.

- ① The `#` character is the system prompt. The system will not accept the `lpmove` command while the scheduler is running. The `lpshut` command is entered at this time to stop the scheduler. The full `/usr/lib/lpshut` pathname must be entered.
- ② This line will be printed in response to the input entered in line ① to inform you the scheduler has stopped.
- ③ The system prompt (`#`) is displayed again to show the system is ready to accept the next input. The portion of the `/usr/lib/lpmove` command line is the full pathname of the `lpmove` command. As with all Line Printer Spooler administrative commands, the full pathname must be entered when `lpmove` is used. `dqp10_1` is the destination name the queued requests are being moved out of. The destination name and the name of the printer are the same. `lqp40_1` is the name of the destination the print requests are being moved into.

In effect, this command line tells the system to move all print requests queued in the destination for printer `dqp10_1` to the destination for printer `lqp40_1`.

MOVING PRINT REQUESTS

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpmove dqpl01 lqp40_1<cr>
- ④ destination dqpl0_1 is not accepting print requests
- ⑤ move in progress ...
- ⑥ total of 1 requests moved from dqpl0_1 to lqp40_1
- ⑦ # /usr/lib/lpsched<cr>
- ⑧ scheduler running

MOVING PRINT REQUESTS (CONT.)

- ④ This line is printed in response to the input entered in line ③. As stated earlier, a side affect of the `lpmove` command is that it causes the destination the requests are moved from to reject any further requests directed to it. This line is printed by the system to verify that destination `dqp10_1` is now rejecting print requests.
- ⑤ This line is printed by the system to indicate that the print requests are being moved.
- ⑥ This line is printed to inform the administrator that the move of print requests from destination `dqp10_1` to destination `lqp40_1` is done. The number of requests that were moved is also listed.
- ⑦ The `#` prompt is returned by the system when it is ready for the next input. The print requests that were moved into destination `lqp40_1` will remain in queue and not be printed since the scheduler is still stopped. The `/user/lib/lpsched` command must be entered at this time to start the scheduler program.
- ⑧ This line is returned by the system in response to the input entered in line ⑦. It verifies that the scheduler is running. The print requests queued in destination `lqp40_1` will now be printed.

RECONFIGURING THE LINE PRINTER SYSTEM

```

/usr/lib/lpadmin -pprinter -v[device]
                 -m[model] -e[printer] -i[interface]
                 -d[destination] -x[destination]

```

Log in root

```

# chmod a+r /dev/tty12
# chmod a+w /dev/tty12
# chmod a+x /dev/tty12
# /usr/lib/lpshot
# /usr/lib/lpadmin -ppr2 -v/dev/tty12 -mdvms
# /usr/lib/accept pr2
# enable pr2
# /usr/lib/lpshot

```

RECONFIGURING THE LINE PRINTER SYSTEM

The `lpadmin` command is used by the system administrator to reconfigure the Line Printer System as needs change. This command is used to add printers to the system, delete printers from the system, and move printers in the Line Printer System.

Command Format

The format of the `lpadmin` command is shown on the opposite page. This command, like all the Line Printer System administrator commands, must be prefaced with the `/usr/lib/` pathname. This pathname tells the system where to find the `lpadmin` command in the file structure of the UNIX system. As you have probably already noticed, there are a number of options available with this command. An explanation of these options follows.

- p** This option is used to define the name of a destination and the associated printer. This option must be used whenever the `lpadmin` command is used to add a new printer to the Line Printer System. Character string `[printer]` stands for the printer's name. A printer's name can be no longer than 14 characters and can consist of alphanumeric characters and underscores. In addition, the name must be unique; it cannot be the name of a printer or a destination that exists in the system.
- v** This option tells the system which device file the new printer will be associated with. The `[device]` will be the special UNIX system device file name associated with the port on the 3B2 computer to which the new printer will be connected. For example, if the new printer is to be connected to the `contty` port, the device will be `/dev/contty`.

RECONFIGURING THE LINE PRINTER SYSTEM

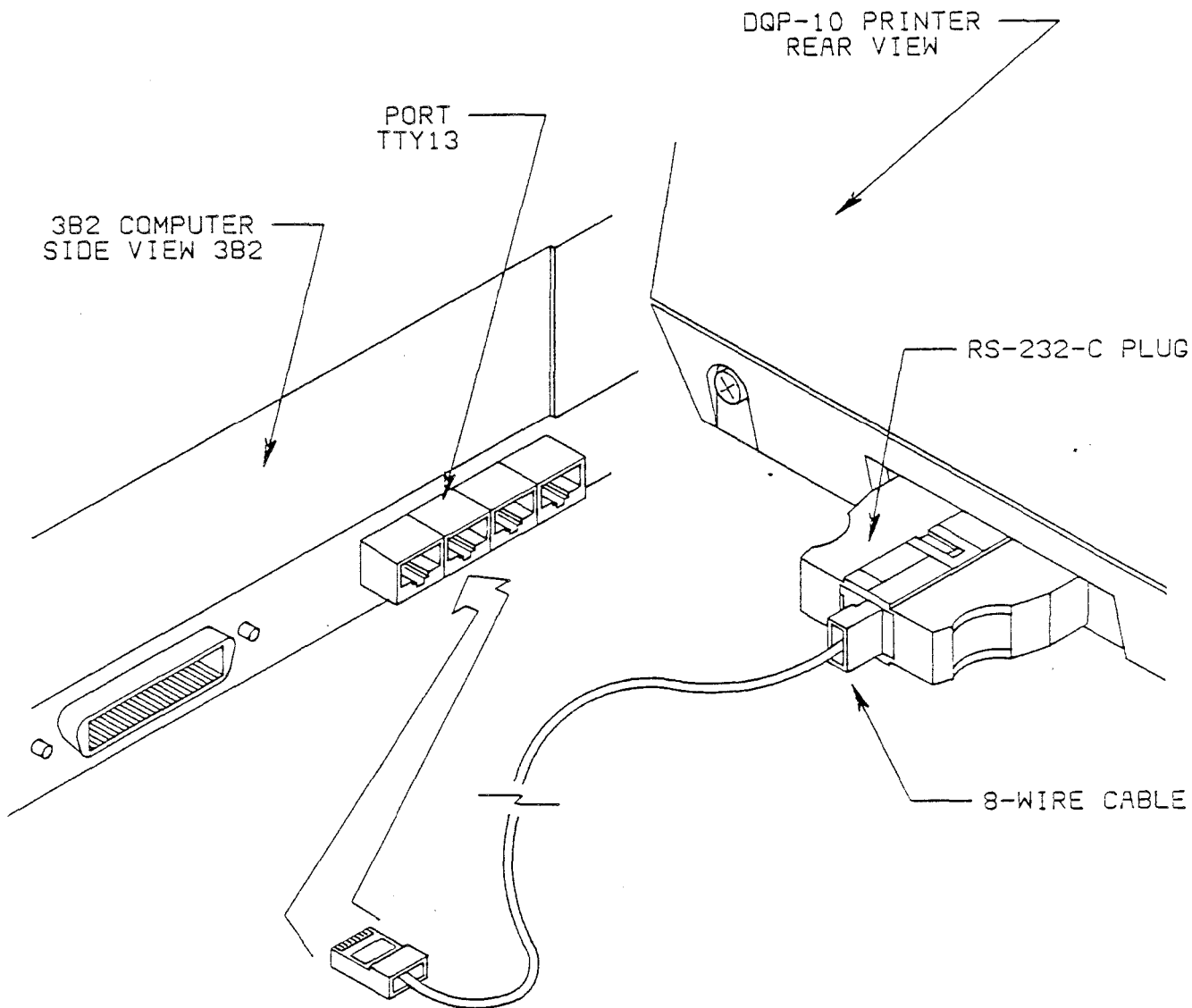
```
/usr/lib/lpadmin -pprinter -v[device]  
-m[model] -e[printer] -i[interface]  
-d[destination] -x[destination]
```

RECONFIGURING THE LINE PRINTER SYSTEM (CONT.)

The `-m[model]`, the `-e[printer]`, and the `-i[interface]` are options used to select the printer interface program. One, and only one, of these options must be used when a new printer is added to the Line Printer System. An explanation of these options follows.

- `-m` This option is used to select one of the standard interface programs provided in the 3B2 computer Line Printer Spooling Utility Package. The `[model]` is the name associated with the interface programs provided for the six standard printer models available with the 3B2 computer.
- `-e` This option is used to tell the system that the new printer will use the same interface program that an existing printer uses. `[printer]` is the name of the existing printer.
- `-i` This option is used when the printer interface program is a new interface program being provided by the system administrator. This option is also used when the printer being added to the system is not one of the standard printers. Character string `[interface]` will be a name the administrator assigns to a program when it is put into the system.
- `-d` This option is used to make an existing destination the default destination. `[destination]` is the name of the existing destination that is to be made the default destination. No other options can be used when this option is used.
- `-x` This option is used to delete a printer from the Line Printer System. `[destination]` is the name of the printer and the destination to be deleted. No other options can be used when this option is used.

ADDING A PRINTER TO THE LINE PRINTER SYSTEM



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ADDING A PRINTER TO THE LINE PRINTER SYSTEM

This section of the work assignment illustrates how to add a printer to the Line Printer System after the Line Printer Spooling Utility has been installed. In the example, we will add another DQP-10 printer to the Line Printer System. The new printer will be connected to I/O expansion port `tty13`.

Hardware Installation

Cable Connections

There are two parts to the printer cable: an RS-232C 25-pin plug and an 8-wire cable with an 8-pin modular phone plug at each end. One of the 8-pin modular phone plugs on the printer cable should be plugged into the 8-pin modular connector located on the RS-232C 25-pin plug. The RS-232C plug is then plugged into the RS-232C jack located in the rear of the DQP-10 printer.

Connect the 8-pin modular connector at the other end of the cable to port `tty13`, which is located under the cover at the side of the 3B2 computer.

This completes the hardware installation portion of this example.

ADDING A PRINTER TO THE LINE PRINTER SYSTEM

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpadmin -pdqp10_2 -v/dev/tty13 -edqp10_1<cr>
- ④ # /usr/lib/accept dqp10_2<cr>
- ⑤ destination "dqp10_2" now accepting requests
- ⑥ # enable dqp10_2<cr>
- ⑦ printer "dqp10_2" now enabled
- ⑧ # /usr/lib/lpsched<cr>
- ⑨ scheduler running
- ⑩ # lpstat -adqp10_2 -pdqp10_2 -vdqp10_2<cr>
- ⑪ dqp10_2 accepting requests since Nov 26 13:55
- ⑫ printer dqp10_2 enabled since Nov 26 13:56
- ⑬ device for dqp10_2: /dev/tty13

ADDING A PRINTER TO THE LINE PRINTER SYSTEM (Cont.)

The example on the opposite shows the sequence of commands necessary to add a printer to the system.

- ① The # character is the system prompt that is displayed on the terminal when the system is ready to accept input.

In order to add a printer to the system, the scheduler program must be halted. The `/usr/lib/lpshut` command is entered to terminate the scheduler program.

- ② This line will be printed in response to the input entered in line ① to inform you that the scheduler program has stopped.

- ③ The system prompt (#) is displayed again to inform you the system is ready for input.

The `lpadmin` command is used at this time to add another printer to the system. The portion of the `/usr/lib/` command line is the pathname of the `lpadmin` command.

The `-p` option must be used to specify the name of the printer being added to the system. The name of the new printer must be entered immediately following the `-p` option. The name entered cannot be the same as a printer already used in the system. For example, the name `dqp10_1` has already been used to identify the printer installed with the Line Printer Spooling Utility. Since we now want to add another DQP-10 printer, we must use another name. Printer name `dqp10_2` stands for the second DQP-10 printer.

ADDING A PRINTER TO THE LINE PRINTER SYSTEM

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpadmin -pdqp10_2 -v/dev/tty13 -edqp10_1<cr>
- ④ # /usr/lib/accept dqp10_2<cr>
- ⑤ destination "dqp10_2" now accepting requests
- ⑥ # enable dqp10_2<cr>
- ⑦ printer "dqp10_2" now enabled
- ⑧ # /usr/lib/lpsched<cr>
- ⑨ scheduler running
- ⑩ # lpstat -adqp10_2 -pdqp10_2 -vdqp10_2<cr>
- ⑪ dqp10_2 accepting requests since Nov 26 13:55
- ⑫ printer dqp10_2 enabled since Nov 26 13:56
- ⑬ device for dqp10_2: /dev/tty13

ADDING A PRINTER TO THE LINE PRINTER SYSTEM (CONT.)

The `-v` option must be used when adding a printer. This option identifies the special UNIX system device file associated with the port on the 3B2 computer that the printer is connected to. The device file name used in this example is `/dev/tty13`. The Line Printer Spooling System will route all information to be printed on printer `dqp10_2` to device file `/dev/tty13`. Device file `tty13` is the device file associated with port `tty13`. Port `tty13` is the third serial port on I/O expansion card 1.

The `-e` option identifies the printer interface program to be used with the new `dqp10_2` printer. The `-e` option tells the system to use an existing printer's interface program when printing requests on this printer. The existing `dqp10_1` printer and the new `dqp10_2` printer are both standard DQP-10 printers. Since both printers are the same type and printer `dqp10_1` is already existing in the system, we can use the `-e` option.

- ④ The system prompt (`#`) will be returned in response to the input entered in line ③. The `accept` command must be used at this time to tell the system to accept print requests directed to new destination `dqp10_2`. The portion of the command line that reads `/usr/lib` is the pathname that tells the system where to find the `accept` command. The name of the new destination, `dqp10_2`, must follow the `accept` command.
- ⑤ This line is printed by the system in response to the input entered in line ④. It verifies that the system can now accept requests for destination `dqp10_2`.

ADDING A PRINTER TO THE LINE PRINTER SYSTEM

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpadmin -pdqp10_2 -v/dev/tty13 -edqp10_1<cr>
- ④ # /usr/lib/accept dqp10_2<cr>
- ⑤ destination "dqp10_2" now accepting requests
- ⑥ # enable dqp10_2<cr>
- ⑦ printer "dqp10_2" now enabled
- ⑧ # /usr/lib/lpsched<cr>
- ⑨ scheduler running
- ⑩ # lpstat -adqp10_2 -pdqp10_2 -vdqp10_2<cr>
- ⑪ dqp10_2 accepting requests since Nov 26 13:55
- ⑫ printer dqp10_2 enabled since Nov 26 13:56
- ⑬ device for dqp10_2: /dev/tty13

ADDING A PRINTER TO THE LINE PRINTER SYSTEM (CONT.)

- ⑥ The system prompt (#) is returned to indicate that the system is ready for the next input. When a new printer is added to the system it is automatically disabled. In order for print requests directed to printer `dqp10_2` to be printed, the printer must be activated. The `enable` command is entered at this time to activate the new printer. The portion of the `dqp10_2` command line is the name of the printer to be activated.
- ⑦ This line is printed to verify that printer `dqp10_2` is enabled.
- ⑧ The system prompt (#) is returned to indicate that the system is ready for the next input. The scheduler program must now be turned on to allow the system to start printing requests queued in the destinations of the various printers. The portion of the `/usr/lib/` command line is the pathname that allows the system to find the `lpsched` command, which starts the scheduler program.
- ⑨ This line is printed by the system to verify that the scheduler is now running.

ADDING A PRINTER TO THE LINE PRINTER SYSTEM

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpadmin -pdqp10_2 -v/dev/tty13 -edqp10l<cr>
- ④ # /usr/lib/accept dqp10_2<cr>
- ⑤ destination "dqp10_2" now accepting requests
- ⑥ # enable dqp10_2<cr>
- ⑦ printer "dqp10_2" now enabled
- ⑧ # /usr/lib/lpsched<cr>
- ⑨ scheduler running
- ⑩ # lpstat -adqp10_2 -pdqp10_2 -vdqp10_2<cr>
- ⑪ dqp10_2 accepting requests since Nov 26 13:55
- ⑫ printer dqp10_2 enabled since Nov 26 13:56
- ⑬ device for dqp10_2: /dev/tty13

ADDING A PRINTER TO THE LINE PRINTER SYSTEM (CONT.)

- ⑩ The system prompt (#) is returned to indicate that the system is ready for the next input. The `lpstat` command can now be used to verify the status of the new printer. The `-a` option and printer name `dqp10_2` are entered with the `lpstat` command to determine if the Line Printer System is now accepting print requests for destination `dqp10_2`.

The `-p` option with printer name `dqp10_2` is entered to request the status of the new printer.

The `-v` option with printer name `dqp10_2` is entered to request a printout of the device file associated with the printer.

- ⑪ This line is printed in response to the `-a` option entered in line ⑩. It verifies that the system is able to accept requests for destination `dqp10_2`. The date (Nov 26) and time (13:55) indicate when the destination was activated.
- ⑫ This line is printed in response to the `-p` option entered in line ⑩. It verifies that printer `dqp10_2` has been enabled since Nov 26 at 13:56.
- ⑬ This line is printed in response to the `-v` option entered in line ⑩. It verifies that printer `dqp10_2` is associated with device file `/dev/tty13`, which is the file for port `tty13`.

The new `dqp10_2` printer has now been added to the Line Printer System.

DELETING A PRINTER FROM THE LINE PRINTER SYSTEM

- ① # /usr/lib/lpshut<cr>
- ② scheduler stopped
- ③ # /usr/lib/lpadmin -xdqp10_1<cr>
- ④ # lpstat -pdqp10_1<cr>
- ⑤ lpstat: printer "dqp10_1" non-existent
- ⑥ # /usr/lib/lpsched<cr>
- ⑦ scheduler running

DELETING A PRINTER FROM THE LINE PRINTER SYSTEM

The example on the opposite page shows how to delete a printer from the Line Printer System, using the `lpadmin` command. The command inputs are shown in **bold type** and system responses are shown in regular type.

- ① The system prompt (`#`) is displayed to indicate that the system is ready to accept input. The `/usr/lib/lpshut` command is entered to stop the scheduler program. The scheduler must be halted to delete a printer from the system.
- ② This line is printed by the system to verify that the scheduler program has stopped.
- ③ The system prompt (`#`) is returned to indicate that the system is ready for the next input. Command line `/usr/lib/lpadmin -xdqp10_1` is entered to remove the printer from the Line Printer System. The `-x` option with printer name `dqp10_1` tells the system the name of the printer being removed. When the `-x` option is used, no other options can be used.
- ④ The system prompt (`#`) is returned to indicate that the system is ready for the next input. The `lpstat` command should now be used to verify that the system has deleted the printer. Command line `lpstat -pdqp10_1` requests the status of printer `dqp10_1`, which was just deleted.
- ⑤ This line is printed in response to the status request entered in line ④. As you can see, printer `dqp10_1` no longer exists in the system.
- ⑥ The system prompt (`#`) is returned again. The `/usr/lib/lpsched` command is entered to restart the scheduler program.
- ⑦ This line is printed by the system to verify that the scheduler program is now running.

NOTES

EXERCISE 3:

NOTICE - This exercise is written to cause no service impairment on an in-service computer. However, it should not be performed without the knowledge of the system administrator.

Answer the questions and perform the operations listed in the following hands-on application, using the reference documents listed on page 1 of this training package. This exercise changes a printer connected to the contty port to another port. Before proceeding, verify that printer dqp10_1 is connected to the contty port.

1. What command would you use to stop the scheduler program?

Enter the command.

2. List the commands you would enter to have file1 and file2 printed out on line printer dqp10_1.

Enter the commands.

3. Were the print requests entered in question 4 accepted by the system?

4. Are the print requests entered in question 4 being printed on printer dqp10_1?

If you answered yes to the previous question, please ask for help.

5. What command would you enter to have the system reject all print requests directed to destination dqp10_1?

Enter the command.

Enter the commands referenced in question 3 again.

6. Were the print requests entered accepted this time?

If you answered yes to the previous question, please ask for help.

7. What command would you enter to disable printer `dqp10_1`?

Enter the command.

Verify that destination `dqp10_1` is rejecting print requests and that printer `dqp10_1` is disabled, using the `lpstat` command.

8. What commands would you enter to add a DQP-10 line printer to the Line Printer System on I/O port `tty13`?

Verify your answer before you proceed to the next question.

Enter the commands.

9. What command would you enter to restart the scheduler program?

Enter the command.

10. What command would you enter to have the Line Printer System accept print requests directed to the new printer's destination?

Enter the command.

Remove the printer cable from the `contty` port and insert it in port `tty13`.

11. What command would you enter to enable the new printer?

Enter the command.

Verify the status of the Line Printer System before you proceed.

Enter the commands necessary to have `file1` and `file2` printed on printer `dqp10_1`.

Verify that the files are queued in destination `dqp10_1`.

12. What commands would you enter to move the print request(s) queued in destination `dqp10_1` to print at the new printer's destination?

Enter the commands

13. Are the print requests that were queued in destination `dqp10_1` now being printed on the printer you added?

If you answered no to the previous question, please ask for help.

14. What command would you enter to delete printer `dqp10_1`?

15. Enter the command to delete printer `dqp10_1`.

Verify with your instructor that printer `dqp10_1` has been removed from the Line Printer System.

ANSWERS TO APPLICATION EXERCISES

Exercise 1:

1. #
2. shutdown -y<cr>
mount /dev/idsk02 /usr<cr>
sysadm installpkg<cr>
3. init 2<cr>
4. lpstat -r<cr>
5. yes
6. cat file1:lp<cr>
cat file2:lp<cr>
7. lpstat -t<cr>
8. dqpl0_1-l (If you are the only one using the printer)
dqpl0_1-2 (" " " ")
9. disable dqpl0_1<cr>
10. no
11. cancel dqpl0_1-xx<cr> (Where xx is the job number)
12. enable dqpl0_1<cr>

Exercise 2:

1. #
2. shutdown -y<cr>
mount /dev/idsk02 /usr<cr>
sysadm installpkg<cr>
3. init 2<cr>
4. lpstat -r<cr>
5. yes
6. cat file1:lp<cr>
cat file2:lp<cr>
7. lpstat -t<cr>
8. dqpl0_1-l (If you are the only one using the printer)
dqpl0_1-2 (" " " ")
9. disable dqpl0_1<cr>
10. no
11. cancel dqpl0_1-xx<cr> (Where xx is the job number)
12. enable dqpl0_1<cr>

ANSWERS TO APPLICATION EXERCISES (Cont.)

Exercise 3

1. /usr/lib/lpshut <cr>
2. cat file1:lp <cr>
cat file2:lp <cr>
3. yes
4. no
5. /usr/lib/reject dqpl0_1 <cr>
6. no
7. disable dqpl0_1 <cr>
8. /usr/lib/admin -pdqpl0_2 -v/dev/tty13 -edqpl0_1 <cr>
chmod 622 /dev/tty13 <cr>
9. /usr/lib/lpsched <cr>
10. /usr/lib/accept dqpl0_2 <cr>
11. enable dqpl0_2 <cr>
12. /usr/lib/lpshut <cr>
/usr/lib/lpmove dqpl0_1 dqpl0_2 <cr>
/usr/lib/lpsched <cr>
13. yes

**AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE AND SYSTEM ADMINISTRATION
BASIC NETWORKING UTILITIES MODULE**

CAUTIONS

Follow standard electrostatic discharge (ESD) procedures using an approved personal grounding device when handling circuit packs.

This work assignment reflects the software contained in Basic Networking Utilities package #104214754 for release 2.0.

REFERENCE DOCUMENTS

307-100 UNIX* System V User Guide
305-369 SIB - Basic Network Utilities
305-432 Basic Network Utilities

MATERIAL REQUIRED

AT&T 3B2 Computer
Connections to other computers via one of the following:
- Direct Link (serial port to serial port)
- Telephone Network Link (automatic call unit or modem)
- Local Area Network (LAN)

OBJECTIVES

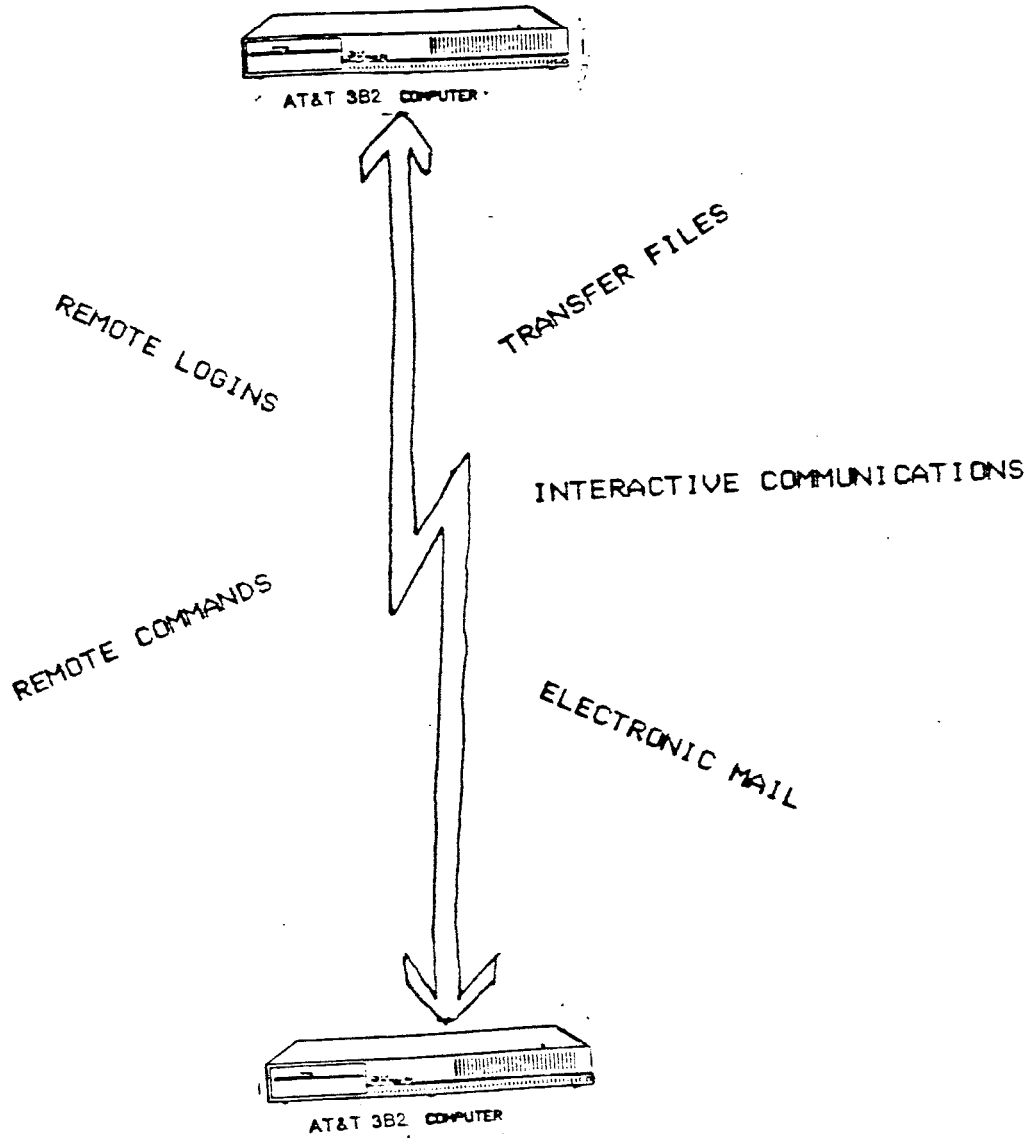
At the end of this lesson you will be able to:

State the purpose of basic networking
Know the type of hardware required for basic networking
State the purposes of the basic networking software
Call another UNIX system
Copy from one UNIX system to another
Execute commands from one UNIX system to another

SEQUENCE

On completion of Application 3, the objectives for this work assignment will have been met.

BASIC NETWORKING CAPABILITIES



BASIC NETWORKING CAPABILITIES

One of the optional software utilities available for the AT&T 3B2 Computer is the Basic Networking Utilities Package. Basic Networking provides the means for computers using the UNIX operating system to communicate with one another. This gives users a great deal of flexibility when working within a computer network or with other computers outside their own network. Capabilities of basic networking include:

- Transfer files
- Interactive communications
- Electronic mail
- Remote commands
- Remote logins

BASIC NETWORKING TERMS

Hardware

Software

Local computer

Remote computer

Active computer

Passive computer

Polling

BASIC NETWORKING TERMS

Some of the terms frequently used in the Basic Networking Utilities are:

hardware	Refers to modems, autodialers, coaxial cable, wired connections, telephone sets, computer, terminals, etc.
software	When referred to in this lesson it refers primarily to the UNIX operating system programs and file structure. The various software utilities are loaded into your 3B2 computer by floppy diskette.
local computer	Refers to the computer on the "near" end of a communication link. (Your 3B2 Computer)
remote computer	Refers to the computer on the "far" end of a communication link; normally, a computer that your 3B2 Computer calls.
active computer	A computer with the Basic Networking Utilities software and the hardware, such as, an Automatic Calling Unit (ACU); Auto Dial Modem, Direct Link, etc., required to establish communication links with other computers.
passive computer	A computer that cannot establish a communication link to other computers. It may, however, have the Basic Network Utilities software which will allow it to queue file transfers. These files would then be transferred when the passive computer is polled by an active computer.
polling	A method which is used by an active computer to call another computer for the purpose of file transfers etc. The active computer has a Poll file that contains a list of computers it is to poll. The time of polling can also be set.

Basic Networking Terms

Hardware

Software

Local computer

Remote computer

Active computer

Passive computer

Polling

→ Network

Node

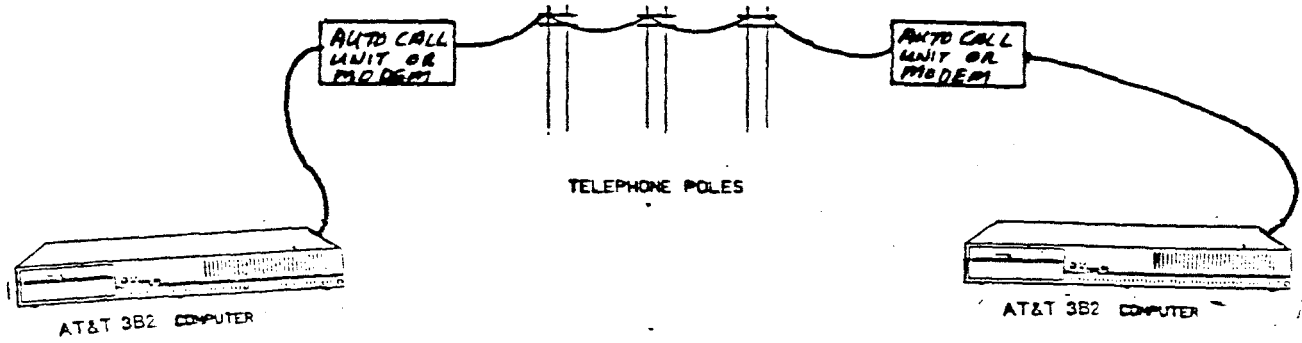
UUCP

getty

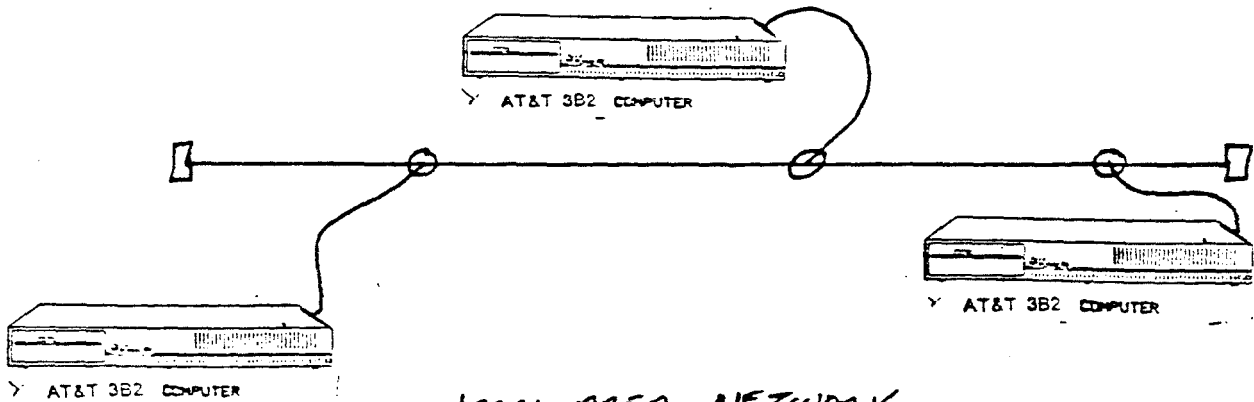
Basic Networking Terms

- network A group of computers that are set up to exchange information and resources.
- node A terminating point (computer) on a network. A node or computer is named during the addition of the software. This enables the user to transfer files, etc., to a particular computer by name. It is also used by a computer for polling another computer (node).
- UUCP This term (all capital letters) is used to indicate a group of programs and files that allow "unix to unix copy" capability between UNIX Systems. It refers to the commands used in the Basic Networking Utilities.
- getty This is a command used by the UNIX Operating System as part of the login process to synchronize your terminal with the system.

COMMUNICATION LINKS HARDWARE



TELEPHONE NETWORK



LOCAL AREA NETWORK



DIRECT LINK

COMMUNICATION LINKS HARDWARE

Before your 3B2 Computer can communicate with other computers, a communication link must be established. There are three types of communication links (hardware) available for communicating with remote computers are:

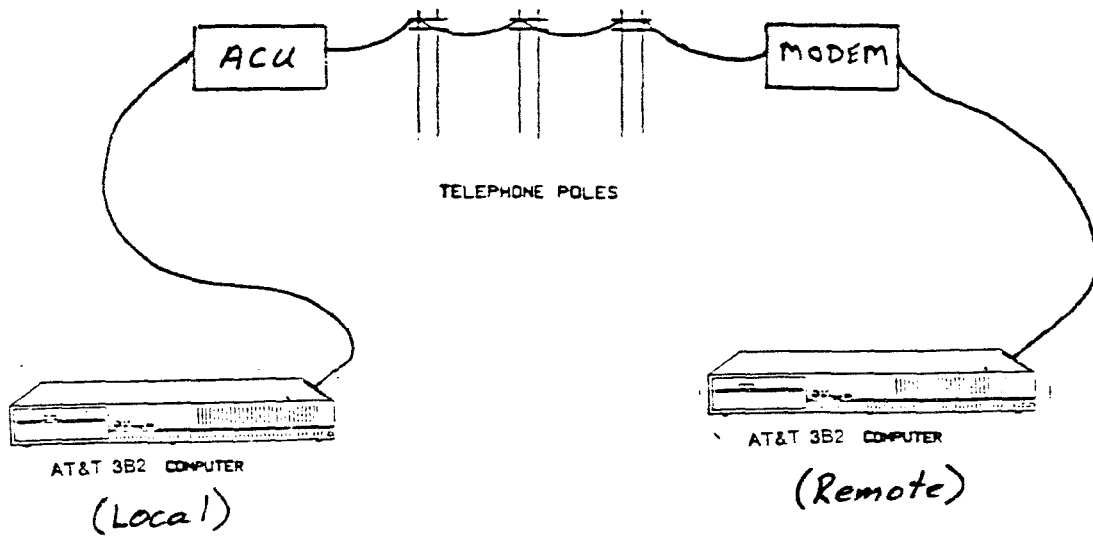
- Telephone network:

- Local Area Network (LAN):

- Direct link:

These communication links are explained on the next several pages.

Telephone Network

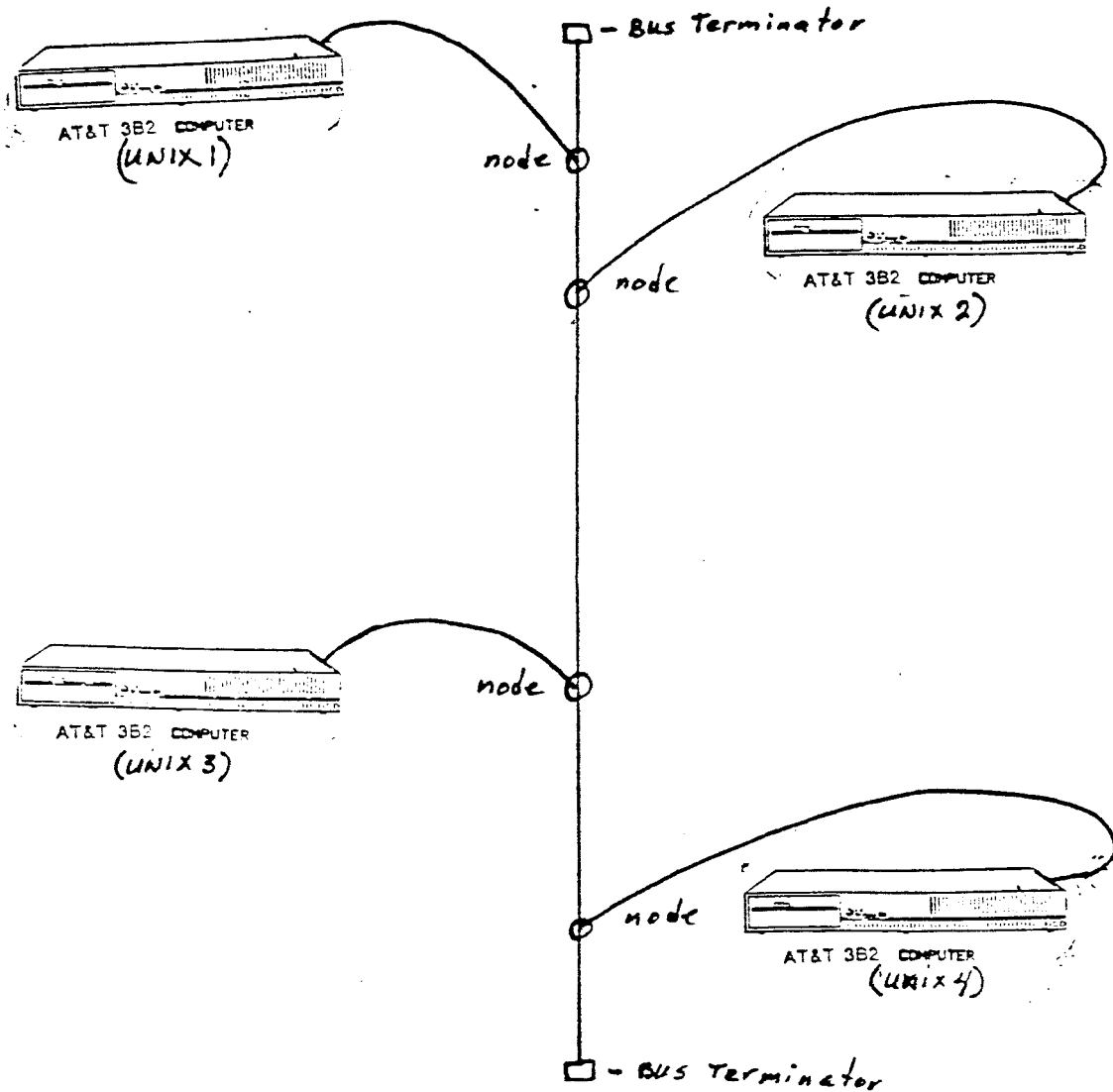


COMMUNICATION LINKS HARDWARE

Telephone network

The telephone network link means, as you might suspect, the computers communicate over normal telephone facilities. In the telephone network link, the computer that establishes the connection (local), must have an automatic call unit (ACU). The ACU dials the specified phone number upon request from the Basic Networking Utilities files. The Basic Networking files are set up when you install the software. (This is covered later in this lesson). The called computer (remote), must have a modem capable of answering incoming calls.

Local Area Network (LAN)

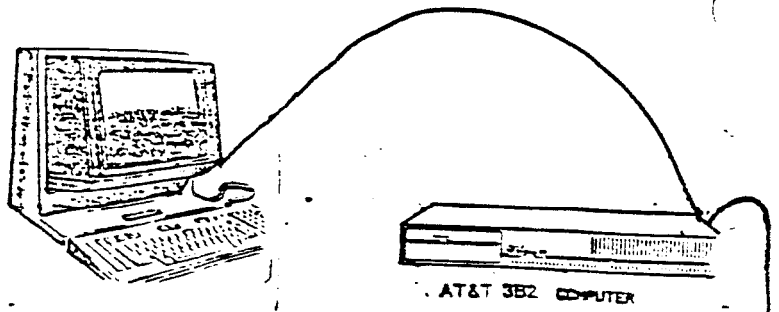


COMMUNICATION LINKS HARDWARE

Local Area Network (LAN)

A Local Area Network (LAN) is normally used to connect several computers to a common bus. Each computer in the LAN has its own unique name, such as, comp1, comp2, comp3, etc. Each computer is connected into the network at a terminating point which is called a "node". A computer's name is sometimes referred to as a "node name". The advantage of a LAN is that all computers connected to the LAN may have the Basic Networking Utilities Package software and hardware which allows them to establish communications with any other computer in the LAN. This eliminates the need for modems and the use of a telephone network.

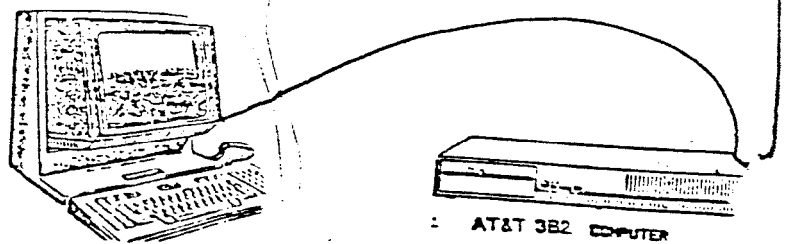
Direct Links



DESCRIPTION	COMCODE NUMBER
7-Foot Shielded Cable	403-60-09-68
14-Foot Shielded Cable	403-60-09-76
25-Foot Shielded Cable	403-60-09-84
50-Foot Shielded Cable	403-60-09-92
ACU/Modem Connector	232-21-25-005
Terminal/Printer Connector	232-22-25-006

- 50 FEET OR LESS AT 19200 BPS
- 100 FEET MAXIMUM FOR STANDARD RS232 CONNECTIONS
- 1000 FEET MAXIMUM RECOMMENDATION AT 9600 BPS

Figure 5-1. Part Numbers for Hardware Used in Directs Links



COMMUNICATION LINKS HARDWARE

Direct Links

Direct links are used to link two computers together via their serial ports.

Direct Links are beneficial only when:

- It is not possible to link the computers together through a LAN
- The two computers transfer large amounts of data on a regular basis
- The two computers are located no more than several hundred cable feet apart

The standard for RS232 connections is 50 feet or less with transmission speeds as high as 19200 bits per second (bps).

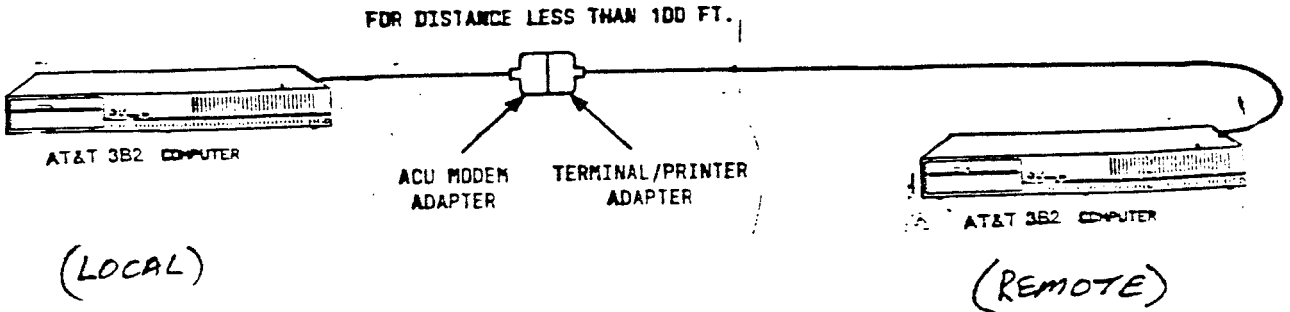
As the cable length increases, noise on the line may become a problem which means that the transmission rate must be decreased or limited distance modems be placed at each end of the line.

From 50 to 100 feet, two standard 50 foot shielded cables are connected together. (50 feet is the maximum length of the standard cables available)

Normally, a direct link should be no more than 1000 feet in length which should allow it to operate comfortably at 9600 bps in a clean (noise free) environment.

For the hardware part numbers used in Direct Links, refer to Figure 5-1 in the Basic Networking Utility Guide.

Direct Link Connections
 (up to 100 feet)



Appendix D

PINOUTS

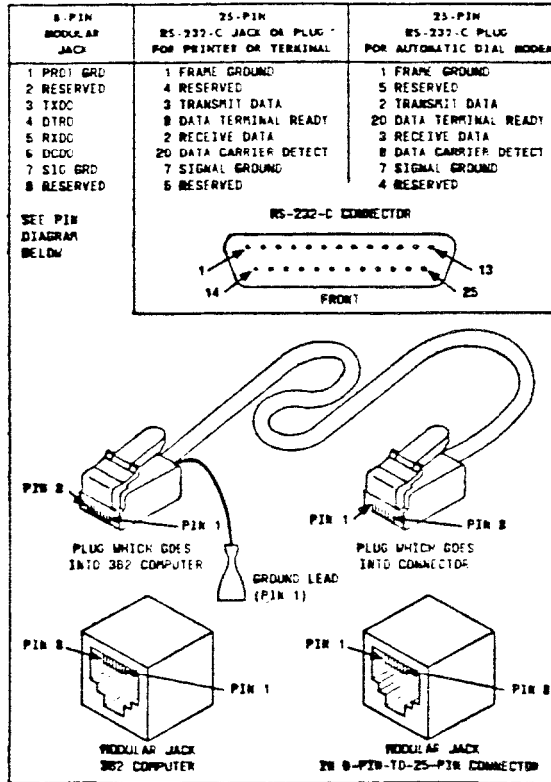


Figure D-1. Pinouts for Serial Ports and RS-232-C Connectors

COMMUNICATION LINKS HARDWARE

There are three types of Direct Link connections which are based on cable length between the computers and the type of computer you are connecting to. They are:

- Connections up to 100 feet
- Connections over 100 feet
- Connections to a 3B5 or 3B20 computer

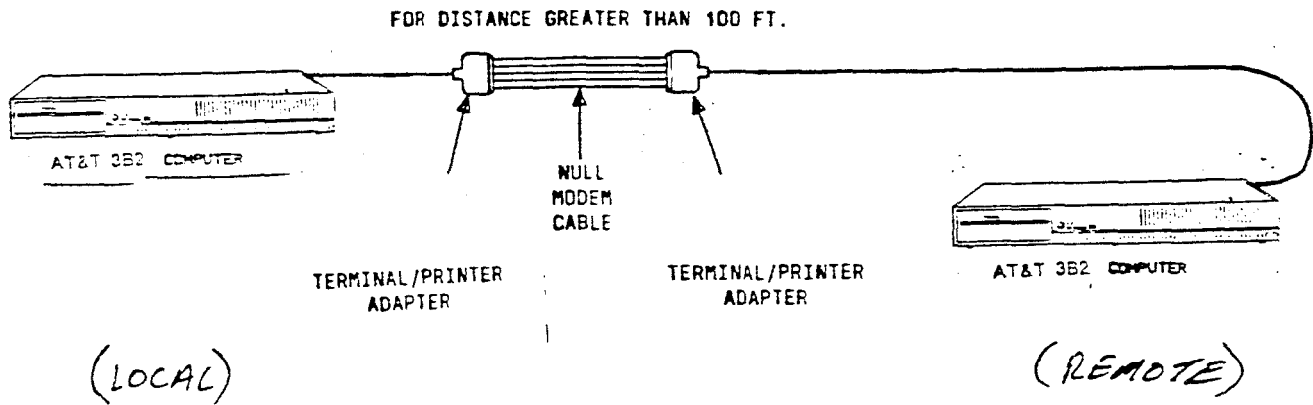
Direct Link Connections (up to 100 feet)

The following steps are used to connect a direct link between 3B2 computers for distances up to 100 cable feet:

1. Connect one end of the first shielded cable and its ground to the selected serial I/O port on the your (local) 3B2 Computer.
2. Connect the other end of the first shielded cable to the ACU/Modem adapter.
3. Connect the Terminal/Printer adapter to the ACU/Modem adapter.
4. Connect the second shielded cable to the Terminal/Printer adapter.
5. Connect the other end of the second shielded cable to the selected serial I/O port on the other (remote) computer.

For pinouts used for serial ports and RS232 connectors, refer to Appendix D in the Owner/Operator Manual.

Direct Link Connections
over 100 feet



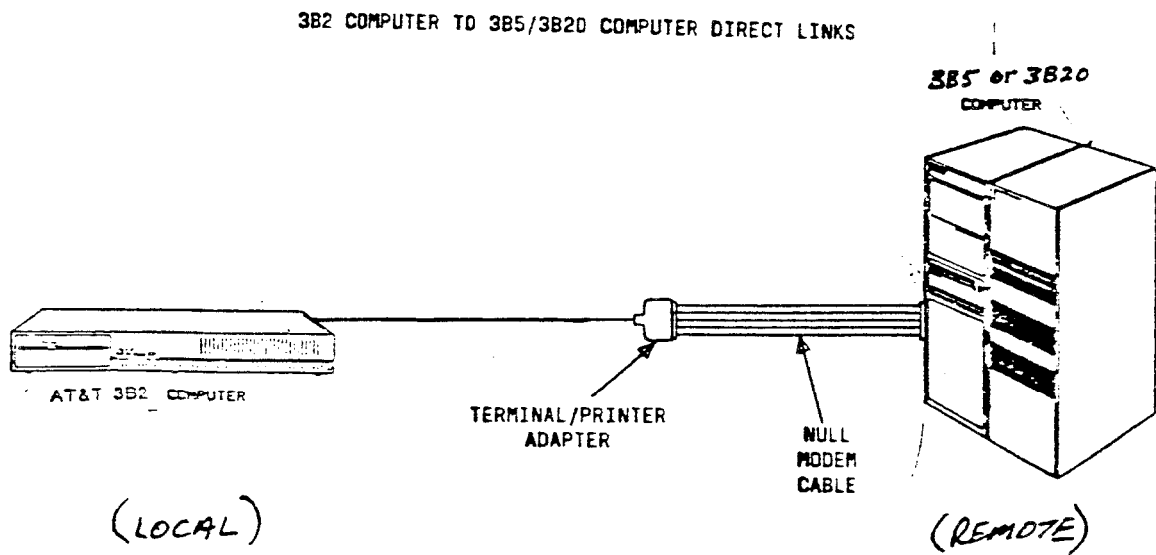
COMMUNICATION LINKS HARDWARE

Direct Link Connections (over 100 feet)

The following steps are used to connect a direct link between 3B2 computers for distances over 100 cable feet:

1. Construct a null modem cable of appropriate length.
(See your Basic Networking Utilities Guide, 305-432, for special pin wiring.)
2. Connect one end of the first shielded cable and its ground to the selected serial I/O port on your (local) 3B2 Computer.
3. Connect the other end of the first shielded cable to a Terminal/Printer adapter and connect it to one end of the null modem cable.
4. Connect another Terminal/Printer adapter to the other end of the null modem cable.
5. Connect the second shielded cable to the Terminal/Printer adapter.
6. Connect the other end of the second shielded cable to the selected serial I/O port on the other (remote) computer.

Direct Link Connections
to 3B5 or 3B20 Computers



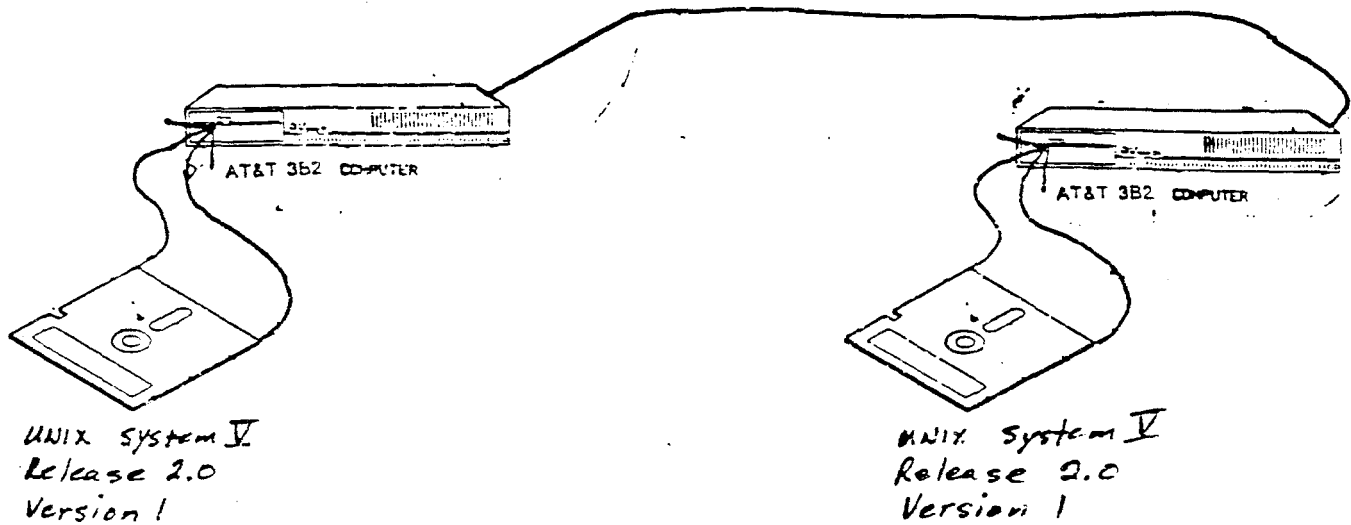
COMMUNICATION LINKS HARDWARE

Direct Link Connections (to 3B5 or 3B20 Computers)

The following steps are used to connect a direct link between 3B2 and 3B5 or 3B20 computers.

1. Construct a null modem cable of appropriate length (See your Basic Networking Utilities Guide, 305-432, for special pin wiring.)
2. Connect one end of the first shielded cable and its ground to the selected serial I/O port on your (local) 3B2 Computer.
3. Connect the other end of the first shielded cable to a Terminal/Printer adapter and connect it to one end of the null modem cable.
4. Connect the other end of the null modem cable to the I/O interface panel in the 3B5 or 3B20 computer.

Direct Link Software



Support Files:

/usr/lib/uucp/Devices

/etc/inittab

/usr/lib/uucp/Systems

BASIC NETWORKING UTILITIES SOFTWARE

Direct Link Software

In order to have a full set of Basic Networking capabilities available, ideally, the two computers should be running on common and current releases of the UNIX System. Bidirectional ports, supported by the "uugetty" program were introduced with UNIX System V, Release 2.0, Version 1. This means that if two computers (both using "uugetty") were connected via a direct link, either could request communication with the other. Documentation provided with your computer should be consulted if you are tying a Direct Link to other than a AT&T 3B2 computer.

For the purpose of this work assignment we will be adding direct link capability to your 3B2 computer.

Support files which must be modified to reflect the presence of a Direct Link are:

- /usr/lib/uucp/Devices
- /etc/inittab
- /usr/lib/uucp/Systems

The next few pages will instruct you in adding the Basic Networking Utilities software.

When installing the software, it is recommended, as in adding other software utility packages, the System Administrator take the system down to the single user mode to prevent the possible corruption to user files.

Adding The Software

sysadm<cr>

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostic menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 5<cr>

No subcommands are in menu 'packagemgmt'

Press the RETURN key to see the system menu [? ,q]: <cr>

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostic menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 6<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Adding The Software

The Basic Networking Utilities software package is loaded from a floppy diskette. Be sure you use a current issue for UNIX System V, Release 2.0 and are logged into the system console as root.

As you recall in the System Administration lesson, most software additions, deletions, and modifications to the 3B2 system are handled by menu driven commands and subcommands. As you become more familiar with the system administration messages you may wish to bypass some of the basic menu functions. For the purpose of this work assignment, we will use all menu driven commands.

The first message to be input is: `sysadm<cr>`.

This will display the nine different menus available in the system. To find out if there are any software utilities packages installed in your computer, enter a `5<cr>` for package management.

NOTE: As stated above, if you were familiar with the package management procedures, you could have displayed this menu by entering "`sysadm packagemgmt<cr>`" and bypass the System Administration menu.

In the example on the facing page, the system responded with:

```
"No subcommands are in menu 'packagemgmt'"
```

This indicates there are none in your computer so we will proceed to add the Basic Networking Utilities software package.

To install a software package we use the software management menu. To return to the System Administration menu list, you would press the **RETURN** (`<cr>`) key as indicated in the prompt. This will display the menu again, after which, you will enter a `6<cr>` for the software management menu.

Adding The Software

SOFTWARE MANAGEMENT

1 installpkg	install new software package onto built-in disk
2 removepkg	remove previously installed package from built-in disk
3 runpkg	run software package without installing it

Enter a number, a name, the initial part of a name, or ? or <number>? for HELP, ^ to GO BACK, q to QUIT: 1<cr>

Insert the removable medium for the package you want to install into the diskette drive.

Press <RETURN> when ready. Type q to quit. <cr>

Installing the Basic Networking Utilities.

Copyright (c) 1984 AT&T Technologies, Inc.

All Rights Reserved

This machine is currently called "unix".

Do you want to change it? [y, n, q] y<cr>

What name do you want to give it? [q] compl<cr>

The following files are being installed:

```
//usr/admin/menu/packagemgmt/uucpmgmt/DESC
//usr/admin/menu/packagemgmt/uucpmgmt/adddevice
//usr/admin/menu/packagemgmt/uucpmgmt/addpoll
//usr/admin/menu/packagemgmt/uucpmgmt/addport
//usr/admin/menu/packagemgmt/uucpmgmt/addsystem
//usr/admin/menu/packagemgmt/uucpmgmt/deldevice
//usr/admin/menu/packagemgmt/uucpmgmt/delpoll
//usr/admin/menu/packagemgmt/uucpmgmt/delport
//usr/admin/menu/packagemgmt/uucpmgmt/delsystem
//usr/admin/menu/packagemgmt/uucpmgmt/devicemgmt
//usr/admin/menu/packagemgmt/uucpmgmt/lsdevice
//usr/admin/menu/packagemgmt/uucpmgmt/lspoll
//usr/admin/menu/packagemgmt/uucpmgmt/lSPORT
//usr/admin/menu/packagemgmt/uucpmgmt/lssystem
//usr/admin/menu/packagemgmt/uucpmgmt/modifyport
//usr/admin/menu/packagemgmt/uucpmgmt/pollmgmt
//usr/admin/menu/packagemgmt/uucpmgmt/portmgmt
//usr/admin/menu/packagemgmt/uucpmgmt/systemmgmt
//usr/admin/menu/packagemgmt/uucpmgmt/trysystem
//usr/admin/menu/packagemgmt/uucpmgmt/initprint
//usr/admin/menu/packagemgmt/uucpmgmt/_delininttab
//usr/admin/menu/packagemgmt/uucpmgmt/_deviceprint
//usr/admin/menu/packagemgmt/uucpmgmt/_systemprint
//usr/bin/ct
//usr/bin/cu
//usr/bin/uucp
//usr/bin/uulog
//usr/bin/uuname
```

BASIC NETWORKING UTILITIES SOFTWARE

Adding the software

The System Management menu is displayed with its three subcommands. At this point you have the option of installing, removing, or running a software package. We want to install the Basic Networking Utilities package so you will enter a l<cr> for "installpkg".

From this point on, the system will prompt you for the inputs. (See example on the facing page)

The first thing the program prompts you to do is install the floppy diskette and enter a return <cr> when you are ready.

Next, you are told the current name of your system and asked if you want to change it. In this example, we have named the node of your computer "compl". This name may vary depending on how you want to name your computers in the network. The only restriction is that all users must be aware of the computer (node) names so they can communicate with other computers as required.

To change the current name, enter y<cr>. The system will then ask you what name you want to give it.

Enter: compl<cr>

The program will then print out a list of the files being installed in this software utilities package. These files are used by the system during Basic Networking setups and when communicating with other computers.

Adding The Software

```
//usr/bin/uupick  
//usr/bin/uustat  
//usr/bin/uuto  
//usr/bin/uux  
//usr/options/uucp.name  
//usr/lib/uucp/SetUp  
//usr/lib/uucp/Uutry  
//usr/lib/uucp/remote.unknown  
//usr/lib/uucp/uucheck  
//usr/lib/uucp/uucico  
//usr/lib/uucp/uucleanup  
//usr/lib/uucp/uudemon.admin  
//usr/lib/uucp/uudemon.cleau  
//usr/lib/uucp/uudemon.hour  
//usr/lib/uucp/uudemon.poll  
//usr/lib/uucp/uugetty  
//usr/lib/uucp/uusched  
//usr/lib/uucp/uuxqt  
//usr/lib/uucp/Poll  
//usr/lib/uucp/Systems  
//usr/lib/uucp/Dialcodes  
//usr/lib/uucp/Dialers  
//usr/lib/uucp/Devices  
//usr/lib/uucp/Permissions  
1208 blocks
```

You can use the installed Basic Networking Utilities management menu by typing 'system packagemgmt' or 'sysadm uucpmgmt'.

As part of the initial installation of Basic Networking Utilities you should execute the following management commands within uucpmgmt. (SEE 'Basic Networking Utilities Guide' for more information).

- devicemgmt: To provide the Basic Networking Utilities package with information about the devices it can use for outgoing traffic.
- portmgmt: To permit incoming calls on the I/O port(s) or set it/them up for outgoing or bidirectional traffic.
- systemmgmt: To provide the Basic Networking Utilities package with the names of the systems you want to contact.
- pollmgmt: To provide polling of other systems by this system, 'compl'.

BASIC NETWORKING UTILITIES SOFTWARE

Adding the software

Once the Basic Networking Utilities software is loaded, the system tells you that you should execute four management subcommands as follows:

- devicemgmt
- portmgmt
- systemmgmt
- pollmgmt

These subcommands help you to maintain the files that control the commands associated with the Basic Networking Utilities. With them, you tell the computer what it needs to know about other computers and its own I/O facilities so it can send and receive mail and files. The subcommands allow the user to add, delete, list, and modify the files that control the Basic Networking Utilities programs. The files involved are listed below with a brief description:

Devices (/usr/lib/uucp/Devices) file:

This file provides information for the communication program, specifying the available devices for connecting to remote computers.

The Devices file contains information such as, the device type, speed, and port name.

This file is managed using the 'devicemgmt' subcommand.

Ports (/etc/inittab) file:

Information in this file controls the direction of the ports needed by the communication package. Ports can be designated as incoming, outgoing. For special applications, bidirectional is also available.

This file is managed using the 'portmgmt' subcommand.

Adding The Software

As part of the initial installation of Basic Networking Utilities should execute the following management commands within uucpmgmt. (SEE 'Basic Networking Utilities Guide' for more information).

- devicemgmt: To provide the Basic Networking Utilities package with information about the devices it can use for outgoing traffic.
- portmgmt: To permit incoming calls on the I/O port(s) or set it/them up for outgoing or bidirectional traffic.
- systemmgmt: To provide the Basic Networking Utilities package with the names of systems you want to contact.
- pollmgmt: To initiate polling of other systems by this system, 'compl'

Installation of the Basic Networking Utilities is complete. You may now remove the medium from the diskette drive.

Insert the removable medium for the package you want to install into the diskette drive.

Press <RETURN> when ready. Type q to quit. q<cr>

Press the RETURN key to see the softwaremgmt menu [?, ^, q]: q<cr>

#

BASIC NETWORKING UTILITIES SOFTWARE

Adding the software

Systems (/usr/lib/uucp/Systems) file:

This file contains the names and calling information for the communication program, permitting it to call and converse with remote systems (computers). This file is managed using the 'systemmgmt' subcommand.

Poll (/usr/lib/uucp/Poll) file:

The computer can be told to call remote computers periodically to check for work destined for local computer. The 'Poll' file has the information that permits this polling operation. This file is managed using the 'portmgmt' subcommand.

Placing information into these files are also handled by menu driven commands, prompting you for inputs, and are explained on the following pages.

The system now asks if you want to install another software utilities package. There is only one floppy diskette to install for the Basic Networking Utilities package so you will now enter a q<cr> to quit the "installpkg" program. The system will tell you to press the RETURN (<cr>) key to see the softwaremgmt menu (installpkg), "?" for help, "^" to go back or "q" for quit.

We are through with the "installpkg" program so Enter a q,cr> to quit this operation. The system will respond with the root prompt (#).

NOTE: We could go back to the System Administration menu to start adding information to the files that support the Basic Networking Utilities package but for the purposes of this work assignment, we will do that later in this lesson.

APPLICATION 1

At this time, you will perform Application 1 which is a combination of questions and answers concluded by a hands-on exercise. Follow the work assignment and do not proceed further than the installation of the Basic Networking Utilities diskette.

NOTES

APPLICATION 1

Answer the questions and perform the operations listed in the following hands-on application, using your student guide and the reference documents listed on the first page of this work assignment.

1. What are the five capabilities of the Basic Networking Utilities package?

2. In a Telephone Network Link the local or originating computer must have an _____ to dial the other computer's telephone number.

3. In order to answer a call from another computer over a Telephone Network Link, a computer must have a _____ capable of answering incoming calls.

4. A computers name within a Local Area Network may also be referred to as a _____ name.

5. The maximum recommended distance for a Direct Link is approximately _____ cable feet at a baud rate of _____ bps.

6. There are two types of adapter plugs which must be used when connecting two 3B2 computers together up to 100 cable feet apart. They are:

and

7. For Direct Link connections over 100 feet a _____ cable must be constructed.

8. When adding the Basic Networking Utilities package, what is the first message you use to start the menu driven instructions? _____

9. Which of the nine System Administration menus would you use when adding the software package?

10. This portion of this application will be a practical exercise to add the necessary software to allow you to communicate over a direct link to another computer.

Fill in the following statements as you install the software.

a. The input message to access the System Administration menu is _____.

b. The input message to select the software management menu is _____.

c. The input message to install a software package is _____.

d. What key do you press after you insert the floppy diskette? _____

e. The system will prompt you to remove the floppy diskette when it is through loading. (True/False)

Check with your instructor to be sure you have successfully installed the Basic Networking Utilities software.

Remove the floppy diskette and store in its proper container.

This concludes Application 1 and this portion of the hands-on exercise.

Adding The Software

sysadm<cr>

SYSTEM ADMINISTRATION

1	diagnostics	system diagnostic menu
2	diskmgmt	disk management menu
3	filemgmt	file management menu
4	machinmgmt	machine management menu
5	packagemgmt	package management menu
6	softwaremgmt	software management menu
7	syssetup	system setup menu
8	ttymgmt	tty management menu
9	usermgmt	user management menu

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 5<cr>

PACKAGE MANAGEMENT

1	uucpmgmt	basic networking utilities menu
---	----------	---------------------------------

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 1<cr>

	BASIC	NETWORKING	UTILITIES
MANAGEMENT			

1	devicemgmt	manage devices (list, add, delete)
2	pollmgmt	manage poll entries (list, add, delete)
3	portmgmt	manage I/O ports (list, add, delete, modify)
4	systemmgmt	manage remote systems entries (list, add, delete, call)

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 1<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Adding The Software

To add the entries to the files that support Basic Networking Utilities package, enter `sysadm<cr>`

The System Administration menu is displayed again and you are prompted for the operation you want to perform. Enter a `5<cr>` for package management.

The package management menu is displayed, listing its one entry for "uucpmgmt" for the basic networking utilities. Enter a `1<cr>` for "uucpmgmt".

The next to be displayed is the Basic Networking Utilities Management menu with its four subcommands.

The first thing we want to do is add the devices to the Devices file. Enter a `1<cr>` for devicemgmt.

Entries in the Devices file

Example:

This procedure is used to list, add, and delete entries in the Basic Networking Utilities '/usr/lib/uucp/Devices' file. This file contains information about devices available for calling out using the commands: uucp, cu, and ct.

Type 'q' at any time to quit the present operation. If a '?' appears as a choice, type '?' for help.

If a default appears in the question type <RETURN> for the default.

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete

(default list)[q]: 2<cr>

This procedure is used to add entries to the Basic Networking Utilities '/usr/lib/uucp/Devices' file.

Enter the port name (for /dev/contty enter- contty).

(default contty)[q]: tty11<cr>

Enter the device type to call on.

Select one from the list:

- 1 801
- 2 direct
- 3 develcon
- 4 hayes
- 5 micom
- 6 penril
- 7 rixon
- 8 ventil

(default penril)[q]: 2<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Devices file

The program will interactively prompt you for the required information. See the facing page for an example. (Bolded letters will be your inputs)

The first prompt asks what operation you want to perform. We are going to add a device to the Devices (/usr/lib/uucp/Devices) file so you will type a **2**<cr> for the add operation.

The system then asks you for the port name. This will depend on where you are connecting your Networking hardware device. We are adding a Direct Link to serial port ll so at this point you will input **ttyll**<cr>

Next is type of device you are adding. We are adding a direct link in this example so you will input a **2**<cr> for "direct".

Entries in the Devices file

Example

Enter the speed at which you want to call:
1200 300 1800 2400 4800 9600 19200
(default 1200): 19200

This is the Device entry generated for device 'ttyll':

CALLER TYPE: Direct
PORT NAME: ttyll
SPEED: 19200

Do you want to add this entry to the Devices file? [y, n, q]

y<cr>

** Device 'ttyll' has been added to the '/usr/lib/uucp/Devices' file **

Add another entry to the Devices file? [y, n, q] n<cr>

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete

(default list)[q]: q<cr>

Press the RETURN key to see the uucpnmgt menu [?, ^, 1]:
<cr>

1 devicemgmt manage devices (list, add, delete)
2 pollmgmt manage poll entries (list, add, delete)
3 portmgmt manage I/O ports (list, add, delete,
modify)
4 systemmgmt manage remote systems entries (list, add,
delete, call)

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT:

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Devices file

The next prompt is for the baud rate of the link you are adding. The direct link we are adding in this example is very short so a high speed link should work very well. Enter **19200<cr>** for 19,200 bits per second (bps).

The system will then tell you what you have generated before adding it to the Devices file. In this case it tell you the the Caller type (link) is **direct** the port name is **ttyll** the speed (baud rate) is **19200**

After checking the entry you can add it by entering a **y<cr>** for "yes".

The system informs you that it has added device **ttyll** to the Devices file and asks if you have any other devices to add at this time. We are only adding one device at this time so you will input a **n<cr>** for "no".

The next prompt is asking you what operation you wish to perform. We are through with the "devicemgmt" subcommand so you will now enter a **q<cr>** to quit this operation.

Enter a **<cr>** to redisplay the **uuspmgmt** menu and continue assigning our direct link.

Entries in the inittab file

Example:

	BASIC	NETWORKING	UTILITIES
MANAGEMENT			
1 devicemgmt	manage devices (list, add, delete)		
2 pollmgmt	manage poll entries (list, add, delete)		
3 portmgmt	manage I/O ports (list, add, delete, modify)		
4 systemmgmt	manage remote systems entries (list, add, delete, call)		

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 3<cr>

This procedure is used to list, add, delete, and modify
the entries that control the direction of traffic
on the Basic Networking Utilities I/O ports used by uucp, cu, and ct
commands.

Type 'q' at any time to quit the present operation.
If a '?' appears as a choice, type '?' for help.

If a default appears in the operation, type <RETURN> for the default.

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete
- 4 modify

(default list)[q]: 1<cr>

This is the current list of ports available to the Basic Networking
Utilities:
ttyll

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the inittab file

The "uucpmgmt" menu is displayed again. The next thing we want to assign is the entries in the "inittab" file through the "portmgmt" subcommand. Enter a 3<cr> for portmgmt.

The program will interactively prompt you for the required information. See the facing page for an example. (Bolded letters will be your inputs)

This subcommand will allow changes to the '/etc/inittab' file. Normally, when you install a I/O circuit pack, the '/etc/inittab' file will automatically be built to include the I/O ports available on that circuit pack. This means that you would only have to modify this file as necessary depending on what information you added to the '/usr/lib/uucp/Devices' file with the 'sysadm devicemgmt' subcommand.

For the purpose of this work assignment, we are going to assume that you do not know what is in the '/etc/inittab' file. When the system prompts you to enter the operation you want to perform, you will enter: 1<cr> for list.

The system will search the '/usr/lib/uucp/Devices' file and print out a list of the ports which match in the '/etc/inittab' file. In this case port ttyll is available.

Entries in the inittab file

Example

Enter device name you want to see in detail [q]: ttyll<cr>
Found the following entry in '/etc/inittab':

```
PORT:          ttyll
SPEED:         9600
DIRECTION:     outgoing
```

Do you want to see another port? [y, n, q] n<cr>

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete
- 4 modify

(default list)[q]: 4<cr>

This procedure is used to modify the entries in the Basic Networking Utilities '/etc/inittab' file which controls the direction of traffic on system I/O ports. It will only access those ports known by the Basic Networking Utilities, namely those that appear in the '/usr/lib/uucp/Devices' file.

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the inittab file

If there were no ports assigned in the '/etc/inittab' file, the system would have told you that no ports existed and ask if you wanted to add them at this time. You would then be prompted to answer yes (y) or no (n).

The next prompt asks which of the listed ports you want to see in detail. We are working with ttyll so you will enter: `ttyll<cr>`

The system shows the current configuration for port ttyll:

- PORT
- SPEED
- DIRECTION

You are then asked if you wish to see another port. Enter `n<cr>` for no.

The next prompt is for the operation you want to perform. If the configuration is already what we want you need not take any further action to change the '/etc/inittab' file. As you can see, the SPEED (baud rate) and the DIRECTION are different than what we added to the '/usr/lib/uucp/Devices' file when we performed the subcommand "sysadm devicemgmt". To change the assignments, enter a `4<cr>` for modify.

Entries in the inittab file

Example

This is the current list of the ports available to the
Basic Networking Utilities:

ttyl1

Enter the port name you want to modify detail [q]:

ttyl1<cr>

Found the following entry in '/etc/inittab':

PORT:	ttyl1
SPEED	9600
DIRECTION	outgoing

Do you want port ttyl1 to be for
incoming, outgoing, or bidirectional traffic
Enter:

- 1 incoming
- 2 outgoing
- 3 bidirectional

(default remain the same): 1<cr>

The current speed is 9600.

If you want to change the speed, enter speed:

300 1200 1800 2400 4800 9600 19200

(default '9600'): 19200<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the inittab file

The system responds with a list of the ports available. In this case tty11.

You are then asked to enter the port name you want to modify. Enter: `tty11<cr>`

The response is the current configuration in the '/etc/inittab' file for the port name you specified (tty11).

The next prompt is for the direction of traffic. In the '/usr/lib/uucp/Devices' file, we assigned tty11 for bidirectional traffic, so you will enter `1<cr>` for incoming.

The system next asks if you want to change the speed. You will enter `19200<cr>` to match the entry you placed in the '/usr/lib/uucp/Devices' file.

Entries in the inittab file

Example

*** the entry for ttyl1 is now:

PORT: ttyl1
SPEED: 19200
DIRECTION: incoming

Do you want to modify another port entry? [y, n, q] n<cr>

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete
- 4 modify

(default list)[q]: q<cr>

Press the RETURN key to see the uucpgmt menu [?, ^, q]:
<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the inittab file

The system will now respond with the current entry for port ttyll in the '/etc/inittab' file. If the entries are what you want, we can now modify another port or quit the operation. The system will respond by asking if you want to modify another port entry. The only port we are working with is ttyll so you will enter n<cr> for no.

The system will then ask for the operation you want to perform. We are through at this point with the "portmgmt" program so you will enter q<cr> to quit this operation.

The next prompt is to press the RETURN (<cr>) key to see the uucpnmgt menu. The next management program we want to make changes in is "systemmgmt" so you will enter a <cr> to display the uucpnmgt menu.

Entries in the Systems file

Example:

BASIC NETWORKING UTILITIES MANAGEMENT

```
1 devicemgmt      manage devices (list, add, delete)
2 pollmgmt       manage poll entries (list, add, delete)
3 portmgmt       manage I/O ports (list, add, delete, modify)
4 systemmgmt     manage remote systems entries (list, add, delete, c )
```

Enter a number, a name, the initial part of a name, or ? or
<number>? for help, q to QUIT: 4<cr>

This procedure is used to list, add, and delete entries in the
Basic Networking Utilities '/usr/lib/uucp/Systems' file.

This file contains information about what remote systems
can be called by cu and uucp commands.

You can also try to call a remote system that appears
in the '/usr/lib/uucp/Systems' file.

Type 'q' at any time to quit the current operation.

If a '?' appears as a choice, type '?' for help.

If a default appears in the question, type <RETURN> for the default.

Enter the operation you want to perform:

```
1 list
2 add
3 delete
4 call
```

(default list)[q]: 1<cr>

This is the current list of systems known to the Basic Networking
Utilities:

nwuxd

Enter system name you want to see in detail [q]: q<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Systems file

The "uucpnmgt" menu is displayed showing the four subcommands. To access the systemnmgt subcommand to modify the Systems file, enter a **4<cr>** for systemnmgt.

The program will interactively prompt you for the required information. See the facing page for an example. (Bolded letters will be your inputs)

If you are unsure what may already be assigned, enter a **l<cr>** to get a list of the '/usr/lib/uucp/Systems' file. The example shows a typical entry "nwuxd" in the list. This is the name of a computer (node) that is known to this computer. If the Systems file were empty, we would be so informed and told to use "systemnmgt" to add entries. If we do not want to see the node "nwuxd" in detail, you would insert a **q<cr>** for quit.

Entries in the Systems file

Example:

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete
- 4 call

(default list)[q]: 2<cr>

This procedure is used to create entries in the Basic Networking Utilities '/usr/lib/uucp/Systems' file. This file contains information which this machine, 'compl', uses to contact remote systems.

Enter the node name of the system you want to call:
comp2<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Systems file

The list of the four operations for the Systems file is displayed and you are again asked what operation you want to perform. We are adding an entry so enter a 2<cr> for add.

The next prompt you receive is to enter the node name of the system you want to call. Enter comp2<cr> (or the appropriate name) for the computer you are connecting to the other end of the direct link.

Entries in the Systems file

Example

Select one of these devices to call on:

- 1 acu
- 2 direct
- 3 develcon
- 4 micom

(default acu): 2<cr>

Enter the speed at which you want to call:

1200 300 1800 2400 4800 9600 19200

(default 1200): 19200<cr>

Enter the device port that will be used for the connection to machine 'comp2'.

(e.g. tty03) Device: [?] tty11<cr>

Enter the login id that is to be used when calling comp2 (e.g. nuucp)

Login: nuucp<cr>

Enter the passwd used by login (login-name) (default is no password): <cr>

Here is the Systems file entry for machine 'comp2.'

```
SYSTEM NAME:    comp2
DEVICE TYPE:    Direct
SPEED:         19200
LOGIN:         (login-name)
```

Should this be entered into the '/usr/lib/uucp/Systems' file? [y, n, q] y<cr>

```
**** System comp2' has been added to '/usr/lib/uucp/Systems'
****
```

Add another entry to the Systems file? [y, n, q] n<cr>

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Systems file

The system next prompts you for the type of device to call on. Enter a **2**`<cr>` for the direct link device we are adding.

The next prompt is for the speed (baud rate) to be used on the direct link. Enter **19200**`<cr>` to match the speed you set in the 'Devices' and 'inittab' files.

The next prompt is for the device port used to connect to the 'comp2' computer. Enter **ttyll**`<cr>` for the port (ttyll) we are using.

Enter **nuucp**`<cr>`.

NOTE: Passwords are very important in all on-line computers and should be used at all times. For the purpose of this work assignment, when you are prompted for a password, take the default for no password by entering "`<cr>`".

The system will now print out the configuration you built to be added to the Systems file for communicating with the 'comp2' computer. It will then ask you if you want to add it to the '/usr/lib/uucp/Systems' file. Enter a **y**`<cr>` for yes. An acknowledgment to your add request follows.

The system will then ask if you want to add another entry to the Systems file. Enter a **n**`<cr>` for no.

Handwritten notes:
The system will now print out the configuration you built to be added to the Systems file for communicating with the 'comp2' computer. It will then ask you if you want to add it to the '/usr/lib/uucp/Systems' file. Enter a y for yes. An acknowledgment to your add request follows.
The system will then ask if you want to add another entry to the Systems file. Enter a n for no.

Entries in the Systems file

Example

Enter the operation you want to perform:

- 1 list
- 2 add
- 3 delete
- 4 call

(default list)[q]: q<cr>

Press the RETURN key to see the uucpmgmt menu [?, ^, q]:
q<cr>

#

BASIC NETWORKING UTILITIES SOFTWARE

Entries in the Systems file

Next you will be asked what operation you want to perform. We are finished with this transaction so you will enter **q<cr>** to quit this operation. You are now prompted to press the RETURN key to see the uucpmgmt menu.

We are finished adding the software to enable your computer to communicate over a direct link so enter **q<cr>** for quit. The system will respond with the root prompt (#).

NOTE: You can also set up your computer to POLL (call) another computer at specified times. The Poll file is built in the same menu driven manner as we have just completed for direct links. You would use the uucpmgmt subcommand 2 for pollmgmt and follow the menu driven instructions. Due to time restraints in this course we will not install the polling feature.

APPLICATION 2

At this time, you will perform Application 2 which is a combination of questions, answers, and a hands-on exercise. Pages 64 and 65 lay out a typical direct link network with three nodes (computers).

Follow the work assignment and do not proceed further than adding software entries in the various files and the hardware for the Basic Networking Utilities.

NOTES

APPLICATION 2

Your Instructor will assign your computer a node name; comp1, comp2, etc. Your login identification to the other machine will be assigned in a similar manner; student1, student2, etc. Using the previously explained System Administration menus, add the necessary entries to the "devicemgmt", "portmgmt" and "systemmgmt" files as shown on page 63 titled "Software Assignments".

In addition to these files, you will add the three user logins to your computer so you and the other users in the network may have login privileges in your computer. This may be accomplished by using menu number "9" of the System Management menu and number "2" of the User Management menu.

When prompted for passwords during the adding of menus, take the default value <cr> This will avoid possible confusion due to forgotten passwords etc.

The diagram on page 64, titled "Hardware Assignments" contains the hardware configuration you are to use when installing your direct links. Answer the following questions and fill in the following statements as you install the software.

1. What is the System Administration menu you would use to modify information in a software utilities package?

2. What is the subcommand you would use to see the menu for the basic networking utilities?

3. The four subcommands in the Basic Networking Utilities Management menu are:

4. Enter the number representing the management of devices. How many subcommands are in the device management menu?

_____.

What are they?

Enter the subcommand for the "add" function.

5. Enter the port name you are adding (tty11, 12, 13, or 14). If there are any entries currently listed, delete them before continuing.

6. What is the number you will enter from the call list for a "direct link" (The system gives you a choice of eight)

7. What is the highest speed listed for a direct link?

Enter this speed. Add the entry to the Devices file when asked by the system and proceed to add the next device until you have ports tty11, 12, 13, and 14 assigned, then quit this operation and go back to the uucpmgmt menu.

ls2 8. The uucpmgmt subcommand for managing I./O ports is

_____.

9. What is the next subcommand you would use to perform the "modify" operation for a port?

10. What is the file name that is modified while using the "portmgmt" menu?

11. Look at the port entries when prompted to do so and see if they match the entries you placed in the Devices file. If they are different, modify them to agree.

12. What is the operation number in the menu to perform a modification to a port?

13. During a modification to a port in the portmgmt menu, what does the system ask for first? _____
Second? _____
Third? _____

14. When you are finished adding the ports, quit this operation and return to the uucpmtg menu.

15. You are going to add entries for a remote system. What management subcommand will you use?

16. Enter the number for this subcommand and then the subcommand for the "add" operation. What is the first thing the system prompts you for?

17. What is the subcommand for the type of device we adding?

18. The system prompts you for the next.

19. Enter the device ports that you will use for the connecting to the remote machines. (See page XX for assignments). Enter the standard login identification "nuucp" and take the default for the password when prompted to do so.

Enter this into the uucpmgmt system when prompted to do so.

20. Return to the System Administration menu and enter the information into the usermgmt (User menu) for the logins of the yours and the other users in the network.

NOTE: There will be three logins required to completely allow all users in your network to have access to your file system (you and two others). (See page XX for assignments).

At this time you should have the proper entries in you computer to perform the Basic Networking functions.

Add the hardware shown on page 65.

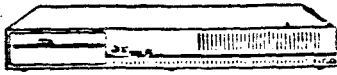
To test if you can call the other computers you are linked to, type `cu compx<cr>` (Where "x" is the number of the computer you are calling). You should get the response "CONNECTED" and a "login" from the other computer. If you do not get a "login" displayed on your screen in a few seconds, try pressing the RETURN (<cr>) key. Do not do any more direct link communications at this time.

Check with your instructor to make sure you have properly set up your computer to communicate with the other computer via direct linking.

NOTE: Operate the "CTRL" and "d" keys simultaneously to break the connection to the other computer. We will use this direct link later in this lesson to transfer information and login to the remote computer.

This concludes Application 2 and this portion of the hands-on exercise.

APPLICATION 2
 Software Assignments



AT&T 3B2 COMPUTER

COMP1
 STUDENT1

PORT: tty11 tty13
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: outgoing outgoing

PORT: tty12 tty14
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: incoming incoming

SYSTEM NAME: comp2
 LOGIN: nuucp
 SYSTEM NAME: comp3
 LOGIN: nuucp

USER IDENTIFICATIONS:
 LOGIN: student1
 LOGIN: student2
 LOGIN: student3

/usr/lib/uucp/Devices

/etc/inittab

/usr/lib/uucp/Systems

/usr



AT&T 3B2 COMPUTER

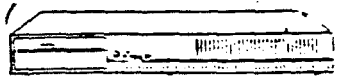
COMP2
 STUDENT2

PORT: tty11 tty13
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: outgoing outgoing

PORT: tty12 tty14
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: incoming incoming

SYSTEM NAME: comp1
 LOGIN: nuucp
 SYSTEM NAME: comp3
 LOGIN: nuucp

USER IDENTIFICATIONS:
 LOGIN: student1
 LOGIN: student2
 LOGIN: student3



AT&T 3B2 COMPUTER

COMP3
 STUDENT3

PORT: tty11 tty13
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: outgoing outgoing

PORT: tty12 tty14
 CALLER TYPE: direct direct
 SPEED: 19200 19200
 DIRECTION: incoming incoming

SYSTEM NAME: comp1
 LOGIN: nuucp
 SYSTEM NAME: comp2
 LOGIN: nuucp

USER IDENTIFICATIONS:
 LOGIN: student1
 LOGIN: student2
 LOGIN: student3

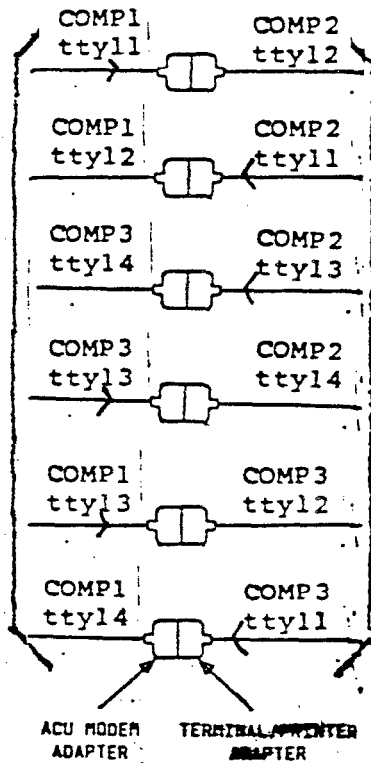
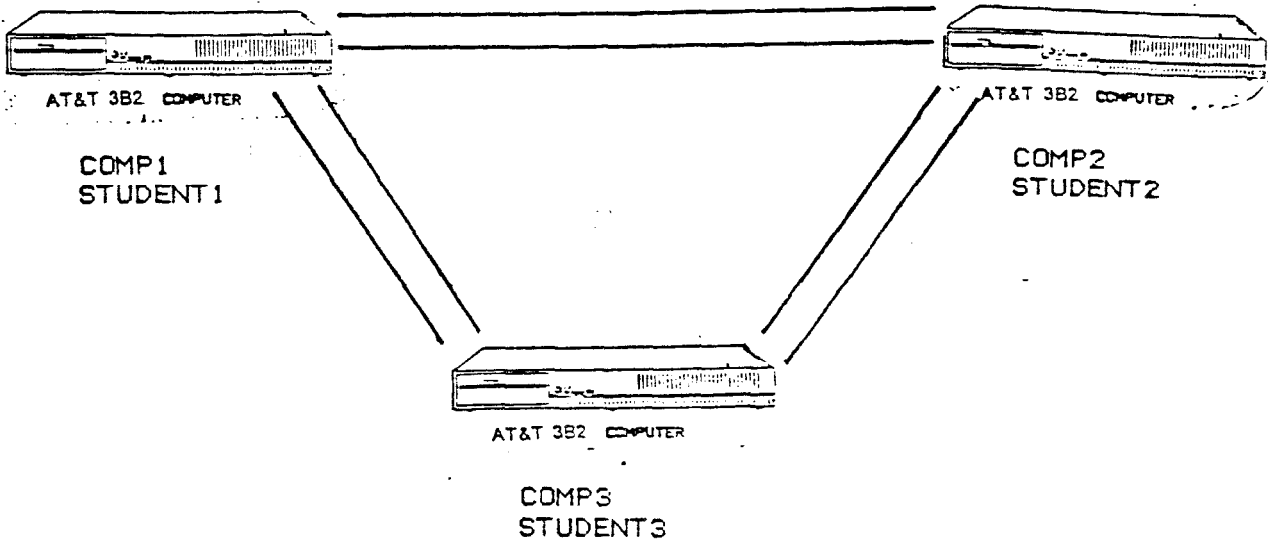
/usr/lib/uucp/Devices

/etc/inittab

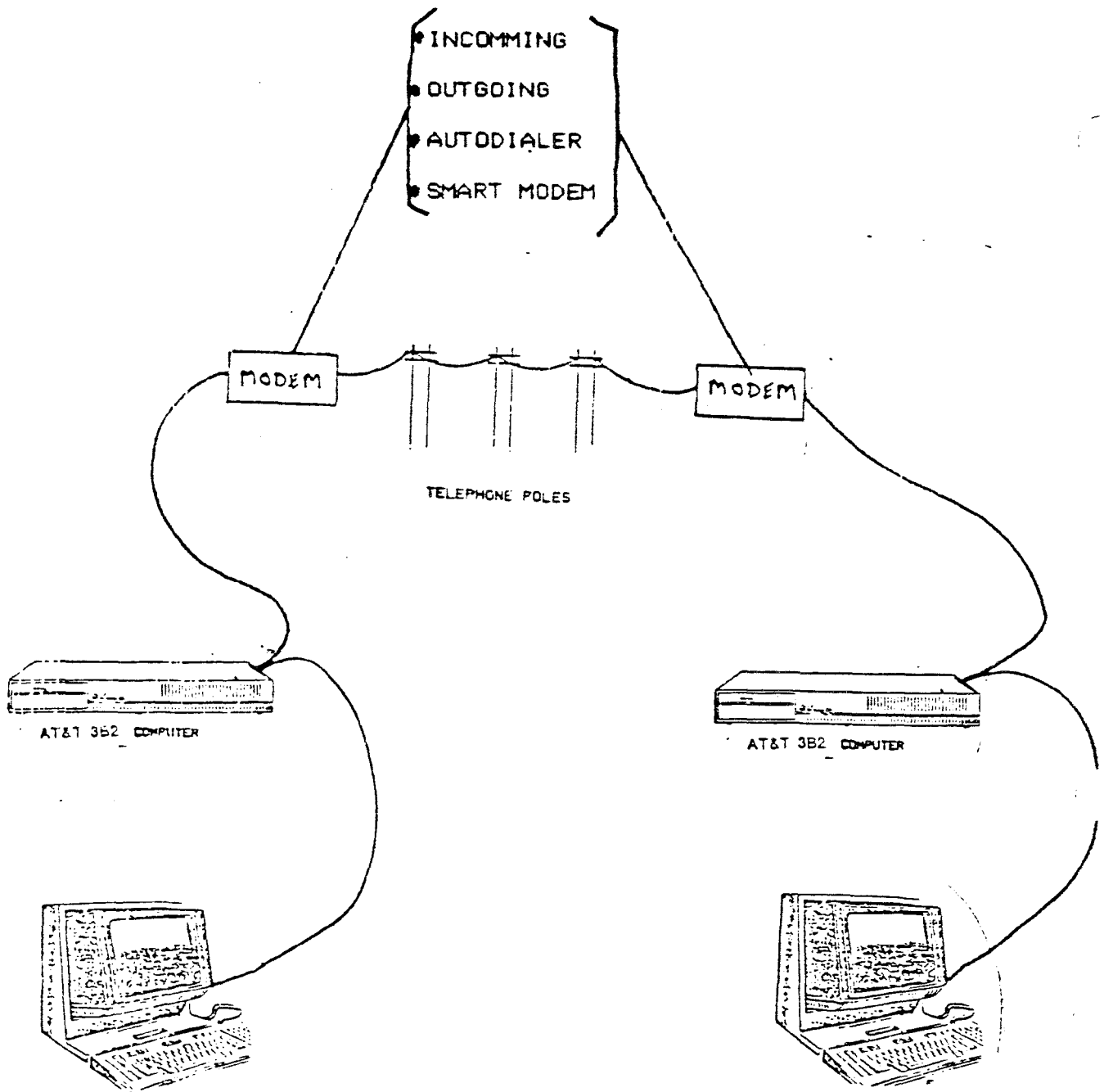
/usr/lib/uucp/Systems

/usr

APPLICATION 2
Hardware Assignments



TELEPHONE NETWORK CONNECTIONS



TELEPHONE NETWORK CONNECTIONS

Basic Networking via the telephone network requires the computer be connected to it through a modem. There are several types of modems available from different manufacturers. The basic types are:

- Incoming

Allows incoming calls to be automatically answered and provides access into the called computer

- Outgoing

Allows a call to be originated to another computer (must have the Basic Networking Utilities Package software installed in the originating computer)

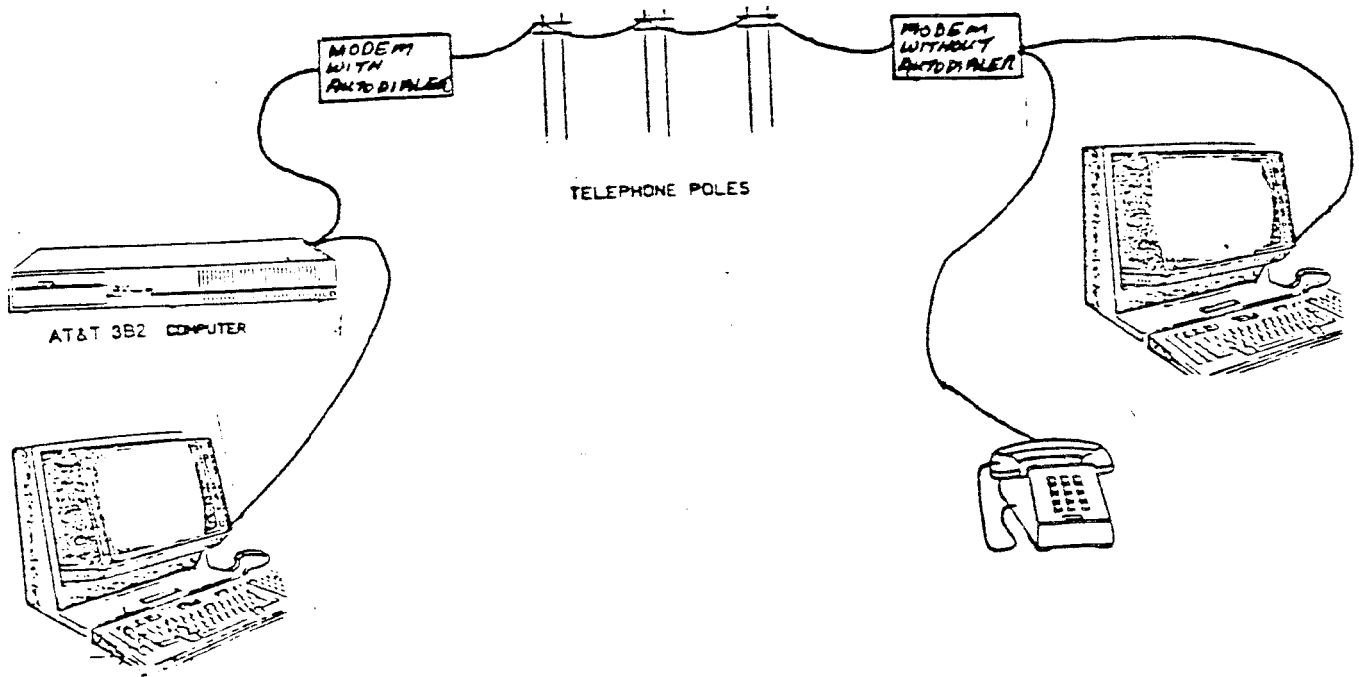
- Autodialer

Able to generate touch-tone or dial pulse signals into the telephone network to call another computer

- Smart Modem

Able to originate and automatically answer calls and can be programmed for repetitive dialing or dialing a second number if a busy tone is received

Modem without autodialer



TELEPHONE NETWORK CONNECTIONS

Modem without autodialer

If a modem is not equipped with an autodialer, it must have a telephone set connected to it.

The drawing on the facing page shows typical layout of a telephone network using a modem with an autodialer on one end and a modem without an autodialer on the other.

The modems used in the classroom are of the Autodialer type and will be covered in a later lesson.

System deamon programs

- uucico
- uuxqt
- uusched

BASIC NETWORKING COMMANDS

System daemon programs

Exhibit 3

The Basic Networking Utilities is composed of programs called "daemons". These programs are background routines that handle file transfers and command executions and are activated by a request from a user or system administrator. There are three daemons that are part of the Basic Networking Utilities. They are:

- **uucico**

This is the transport program that transfers data and execute files and notifies the users of the results via mail.

- **uuxqt**

This is the execution program for remote execution requests.

- **uusched**

This program schedules the queued work in the spool directory.

SECURITY FILES

- Dialcodes File
- Permissions File

SYSTEM SECURITY

SECURITY FILES

For security measures and the protection of your computer's file system, there are files and options controlled by the System Administrator. The ones listed on the facing page are used for the Basic Networking Utilities.

Dialcodes file (/usr/lib/uucp/Dialcodes)

This file contains dialcode abbreviations used in the Phone field of the Systems file. It is not supported by Simple Administration. Changes to it must be done by the System Administrator using one of the editors (ed or vi).

Permissions file (/usr/lib/uucp/Permissions)

This file is used to specify the permissions available to a remote computer with respect to login, file access, and command execution. It is not supported by Simple Administration. Changes to it must be done by the System Administrator using one of the editors (ed or vi).

SECURITY OPTIONS

- REQUEST
- SENDFILES
- READ/NOREAD
- WRITE/NOWRITE
- CALLBACK

SYSTEM SECURITY

SECURITY OPTIONS

REQUEST

This option is used to grant or deny a request from a remote computer to receive a file from your computer.

SENDFILE

This option is used to allow your computer to send files to a remote computer when that computer calls your computer. When it a remote computer completes its work, it may attempt to take work queued for it in your computer.

READ and WRITE

These options are used to specify the various parts of the file system that the "uucic" daemon program can read from or write to. They can be used with either the MACHINE or LOGNAME entries.

NOREAD and NOWRITE

These options specify exceptions to the READ and WRITE options.

CALLBACK

This option is used in LOGNAME entries to specify that no transaction will take place until the calling system is called back.

SECURITY OPTIONS


REQUEST

SENDFILES

READ/NOREAD

WRITE/NOWRITE

CALLBACK

- 
- COMMANDS
 - VALIDATE
 - MACHINE
 - LOGNAME

SYSTEM SECURITY

SECURITY OPTIONS

COMMANDS

WARNING!!!: The COMMANDS option can be hazardous to the security of your system. Use it with extreme care.

The "uux" program will generate remote execution requests and queue them to be transferred to the remote computer. Files and a "command" are sent to the target computer for remote execution. The COMMANDS option can be used in the MACHINE entries to specify the commands that a remote computer is allowed to execute in you computer.

VALIDATE

This option is used with the COMMANDS option when specifying potentially dangerous commands. It is used to provide a certain degree of verification of the caller's identity.

MACHINE

This option allows you to set up different option values for different computers.

LOGNAME

This option is used to set up login entry names for remote computers calling in to your computer.

User Programs

Example:

```
$ cu comp2<cr> (comp2 would be the node name of the computer  
you  
want to connect with).
```

CONNECTED

login: (yourlogin)<cr>

password: (yourpassword)<cr>

\$ "(system prompt of remote computer)"

BASIC NETWORKING COMMANDS

There are several UNIX programs used in Basic Networking to communicate with remote computers. Some are used by the user to transfer data and request status information and others are used by the system administrator for administrative functions.

User Programs:

- cu

This connects your 3B2 Computer to a remote computer and allows you to be logged in on both computers at the same time. It allows you to transfer files or execute commands on either computer without dropping the communication link.

For example, to login on a remote computer, you would follow the procedure on the facing page.

To login, use the **cu** command with the name of the computer you wish to login to.

A connection will be established with the computer you called and "CONNECTED" will appear on your screen. You will then be prompted for your login identification and password.

Enter your login identification and password.

After a successful search for your identification and password, the called computer will give you a system prompt.

At this time you are logged in to your computer and the remote computer at the same time. You will now be able to access the file system in the remote computer in any manner you wish, limited only by the permissions of your user identification.

User Programs

Example:

\$ ct -sl200 5659<cr>

*~% file filename) send file
~% take filename) receive file*

User Programs:

- ct

This connects your 3B2 Computer to a remote terminal and allows the user of that terminal to login to your computer.

A remote terminal may also call into your 3B2 Computer and request that it call the remote terminal back. The 3B2 computer, in this case, would drop the initial communication link to make the modem available to be called back.

For example:

1. A user in your computer may input:

```
ct -s1200 5659 (Baud rate of 1200 and telephone  
extension of the remote terminal's modem)
```

Your computer will

- Dial 5659
- Allow login access to the remote terminal

or

2. A remote terminal logged into your computer will input:

```
ct -s1200 5659 (Baud rate of 1200 and the telephone  
extension of its own modem)
```

Your computer will:

- Drop the telephone connection
- Dial 5659
- Allow the remote terminal login access to your computer

User Programs

Example 1:

```
uucp /usr/student1/letter comp21/usr/student2<cr>
```

Example 2:

```
uucp /usr/student1/letter comp21~/
```

User Programs:

- uucp

This creates files in your 3B2 Computer called work or data files. These files are then queued for file transfer to a remote computer. The uucico daemon discussed earlier, will then attempt to contact the remote computer to transfer the file(s). One of the options available with this program allows the user to specify a pathname where you want to place the data in the remote computer. The computer's System Administrator must set up the computer to allow a remote user to specify a path name in your computer. Otherwise, all incoming files sent with the uucp command will default to the /usr/spool/uucppublic directory.

Example 1:
"Student1" logged in on computer "comp1", enters the message in Example 1 on the facing page.

The message will send the file "letter" located in "student1's" directory to the computer named "comp2" and place it in the file "/usr/student2" if the System Administrator has allowed remote access to student2's files. If not, the system will place "letter" in the file /usr/spool/uucppublic/usr/student2.

Example 2:
Another way to use the "uucp" message is shown in the Example 2 on the facing page. This will place the file "letter" in the file /usr/spool/uucppublic/letter.

There are several options available for use in the uucp message such as:

- s Reports to you the status of the transfer
- C Copies the source file to the spool directory
- j Displays the job identification number
- n Notifies "student1" via mail, that a file was sent

User Programs

Example:

```
uuto -m -p letter comp2\student2<cr>
```

User Programs:

- uuto

This program is very similar to uucp except all transferred files are placed in /usr/spool/uucppublic/receive in the remote computer.

For example, "student1" logged in on computer "comp1", enters the message on the facing page.

The message will send the file "letter" located in "student1's" directory to the computer named "comp2" and place it in the file "/usr/spool uucppublic/receive/student2/comp1/letter".

The options used in the message are:

-m Sends mail to the sender when the transfer is complete

-p Copies the source file to the spool directory in the sender's computer before sending it to the remote computer

The "uupick" command can then be used to retrieve the files destined for the user. The "uupick" command is explained on the next page.

User Programs

Example:

```
uupick -s compl<cr>
```

User Programs

- uupick

This program is used to retrieve files placed in the directory /usr/spool/uucppublic/receive by the uuto program.

Refer to the example on the facing page.

You are "student2" on computer "comp2". You have just logged in to your computer and are notified via mail that you have received a file from computer "compl".

You can enter the message shown on the facing page (uupick....).

The uucppublic is searched for files destined for student2 from compl.

You will be told of a message from compl and the file name. It will also prompt you with a "?" asking you what you want to do with the file.

You can do one of several things such as, print the file, move the file to your choice of directory, or delete the file.

Remember, if you delete the file, it is removed from the file system.

If you enter the command "uupick" without any options, the system will search the uucppublic directory and display all the files destined to you from any source sent to you with the "uuto" command.

User Programs

Example:

```
uux |diffcomp1|/usr/student1/file1comp2|/usr/student2/file2<cr
```

Example:

```
uustat<cr>
```

User Programs:

- **uux**

Refer to example on the facing page.

This program creates work, data, and execute files for executing commands in a remote computer. The work file contains the same information as those created by a uucp or uuto programs. The execute file contains the command string to be executed on the remote computer. The data file contains the files necessary for the command execution.

- **uustat**

Refer to the example on the facing page.

This program gives status information for requested transfers and by using various options, can be used to control queued transfers.

System Administrator Programs:

- uulog
- uucleanup
- Uutry
- uucheck

System Administrator Programs:

- **uulog**

This will display the contents of a specified computer's log file. Each machine will have log files for the uucico and uuxqt daemons which have been attempted when networking to another computer.

- **uucleanup**

This is used for the cleanup of the spool directory and is usually performed automatically by using a shell script which is started by the system clock (cron).

- **Uutry**

This is a shell script used for testing call processing capabilities. It invokes the uucico daemon to establish the communication link between your 3B2 Computer and the specified remote computer.

- **uucheck**

This is used to check for the presents of Basic Networking directories, programs, and support files.

System Administrator Programs:

- **uugetty**

System Administrator Programs:

- **uugetty**

This is very similar to the getty program except it allows a serial port to be used in both directions. It allow users to login on your 3B2 Computer and if the line is not in use, allows the cu, ct, or uucico programs to use it to dial out. If the line is busy, uugetty will notify the requester that the device is unavailable.

NOTES

APPLICATION 3

For this application you will use the same computer assignments and login identifications as you used in the previous application (2).

The part one of this work assignment is in question and answer format and part two is a hands on application.

PART 1

Answer the following questions and fill in the statements.

1. The four basic types of telephone modems are:

2. A modem that is not equipped with an autodialer must have a _____ connected to it.

3. The System Administrator must set up _____ files and options to allow a remote computer access to various directories and files in your computer's file system.

4. What is the security option that allows your computer to send a file to another computer after it calls your computer? _____

5. What is the security option that provides a remote computer a login to your computer? _____

6. What are the two commands you can use to send a file to another computer?

7. The command used to connect to another computer and allow you login privileges is _____.

8. A command that you can use to retrieve a file sent to you from a remote computer which is in your computer's /usr/spool/uucppublic/receive directory is _____.

9. If the System Administrator has not allowed permissions to a remote computer to place files directly into your personal files, where will they be placed when they arrive? (Assume that the user in the remote computer used the "uuto" command).

10. Answer the questions about the following message:
"uuto -m -p file1 compl1student1<cr>",

Computer name: _____

File sent: _____

Sent to (user): _____

Send mail to: _____

Copy source file to: _____

PART 2:

This portion of the application will give you some practical experience in communicating with another computer through a direct link network. You will use the connections set up in the previous application.

These exercises will have the following restrictions:

- A. You will not have permission to send files directly to another user's home directory.
- B. The files you send will go to the other computer's public directory.
- C. The only networking commands used in these exercises are:
 - cu
 - uucp
 - uuto
 - uupick

1. Using the editor "ed" command, create a file called letter. In this file, write a short message which you will use to sent to the other computers in your direct link network. The information you put in this file does not matter except that it be kept short and that it identifies you in some manner.

Example:

This is a letter to be sent to other computers from student1.

2. Using the "uucp" command, send your "letter" to the other computers in your network.

3. Verify that you have received "letters" from the other computers in your network.

Verify with your instructor that this command is working properly. After you verify the "uucp" command is working correctly, remove the files under the /usr/spool/uucppublic directory.

4. Using the "uuto" command, send the letter you used in question 2 to the other computers in your network.

5. Verify that you have received "letters" from the other computers in your network.

Verify with your instructor that this command is working properly. After you verify the "uuto" command is working correctly, remove the files under the /usr/spool/uucppublic directory.

6. Using the "cu" command, connect to another computer in your network. You should get the reply "CONNECTED login:".

NOTE: If "login:" does not appear, try pressing the RETURN (<cr>) key.

Login to the remote computer with your login identification. You now may perform any function, limited only by the permissions of your login directory.

Some suggestions of the commands you might try after you are logged into the other computer are on the following page.

Suggested Commands:

- Use the "who" command to find out who is logged in
- Create a file in your remote computer home directory
- use the "mail" command to others on the remote computer
- use the "write" command to communicate with another user

This concludes this Application exercise.

COURSE CT3601
AT&T 3B2 MODEL 300 COMPUTER
OPERATIONS, MAINTENANCE, AND SYSTEM ADMINISTRATION
STUDENT GUIDE

WORK ASSIGNMENT 11.0
SYSTEM EXPANSION
AUTOMATIC DIAL MODEM

SYSTEM EXPANSION - AUTOMATIC DIAL MODEM

CAUTION

Follow standard electrostatic discharge (ESD) procedures as covered in the student guide.

REFERENCE DOCUMENTS

- 305-458 Automatic Dial Modem Manual
305-432 Basic Networking Utilities Guide

MATERIALS REQUIRED

- 3B2 computer and terminal
- Automatic dial modem
- Power, interface, and telephone cables with connectors
- Basic Networking Utilities Package

OBJECTIVES

On completion of this work assignment, you will be able to:

- Install an automatic dial modem onto a 3B2 computer.
- Test the modem for correct operation.

MODEMS - WHAT ARE THEY?

ANALOG

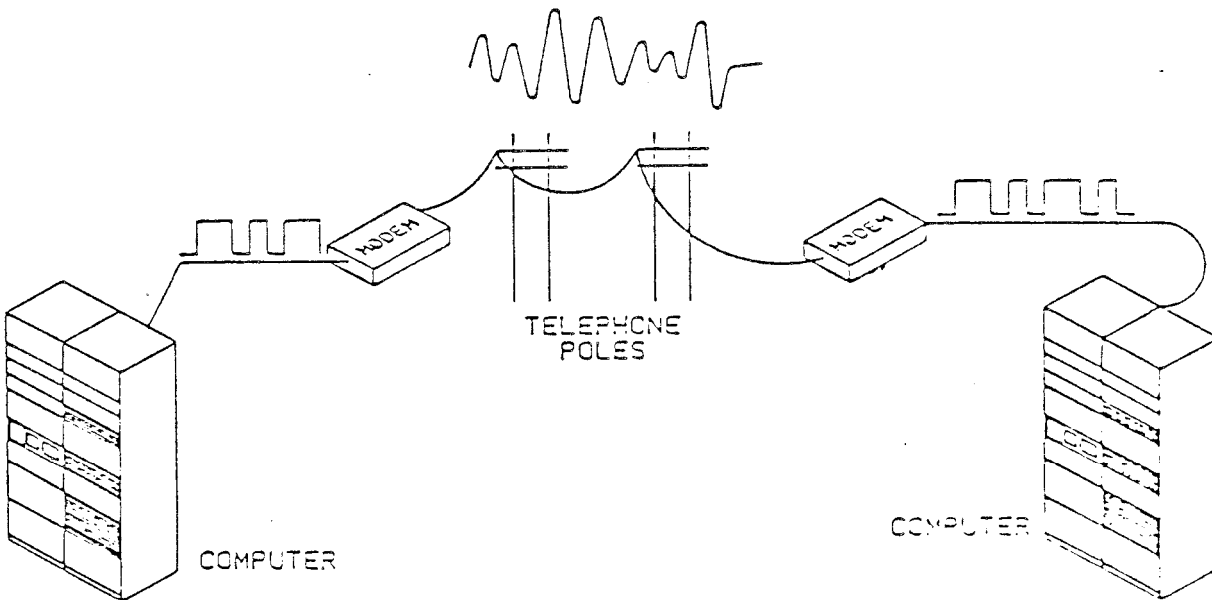
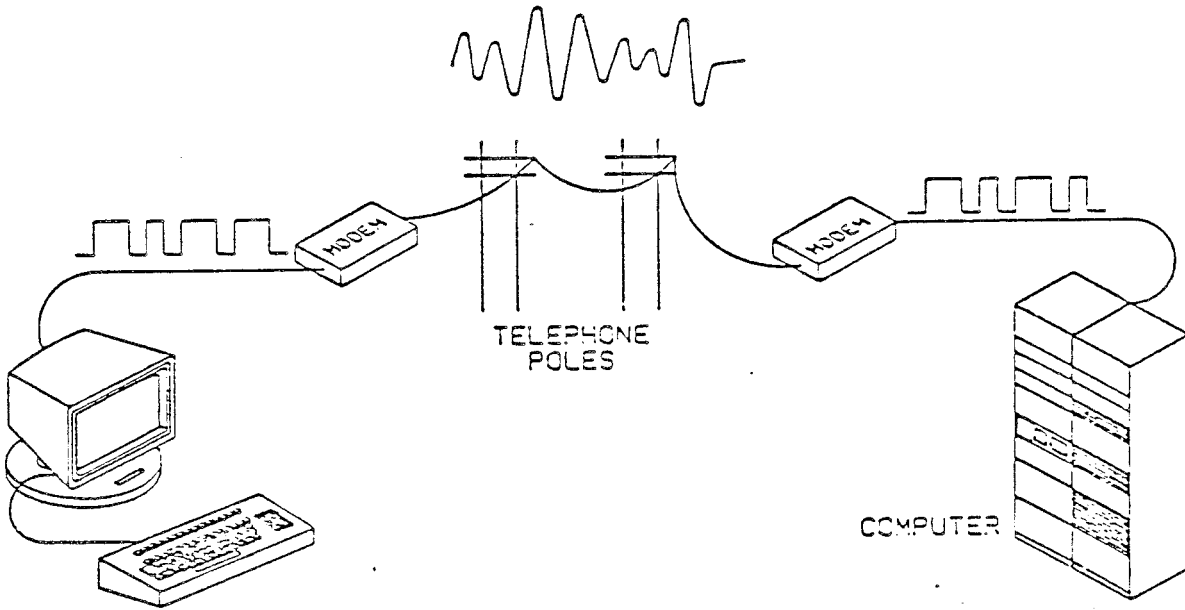


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MODEMS - WHAT ARE THEY?

Most terminals and computers operate in a digital environment - 1's and 0's, on and off, highs and lows. Ordinary telephone lines carry analog signals. In order to permit physically distant terminals and computers to communicate over telephone lines, a device was developed that is both a modulator (changes digital data to analog signals) and a demodulator (changes analog signals to digital data). This MODulator/DEMODulator is called a modem, which is also referred to as a data set.

MODEMS - WHEN ARE THEY USED?

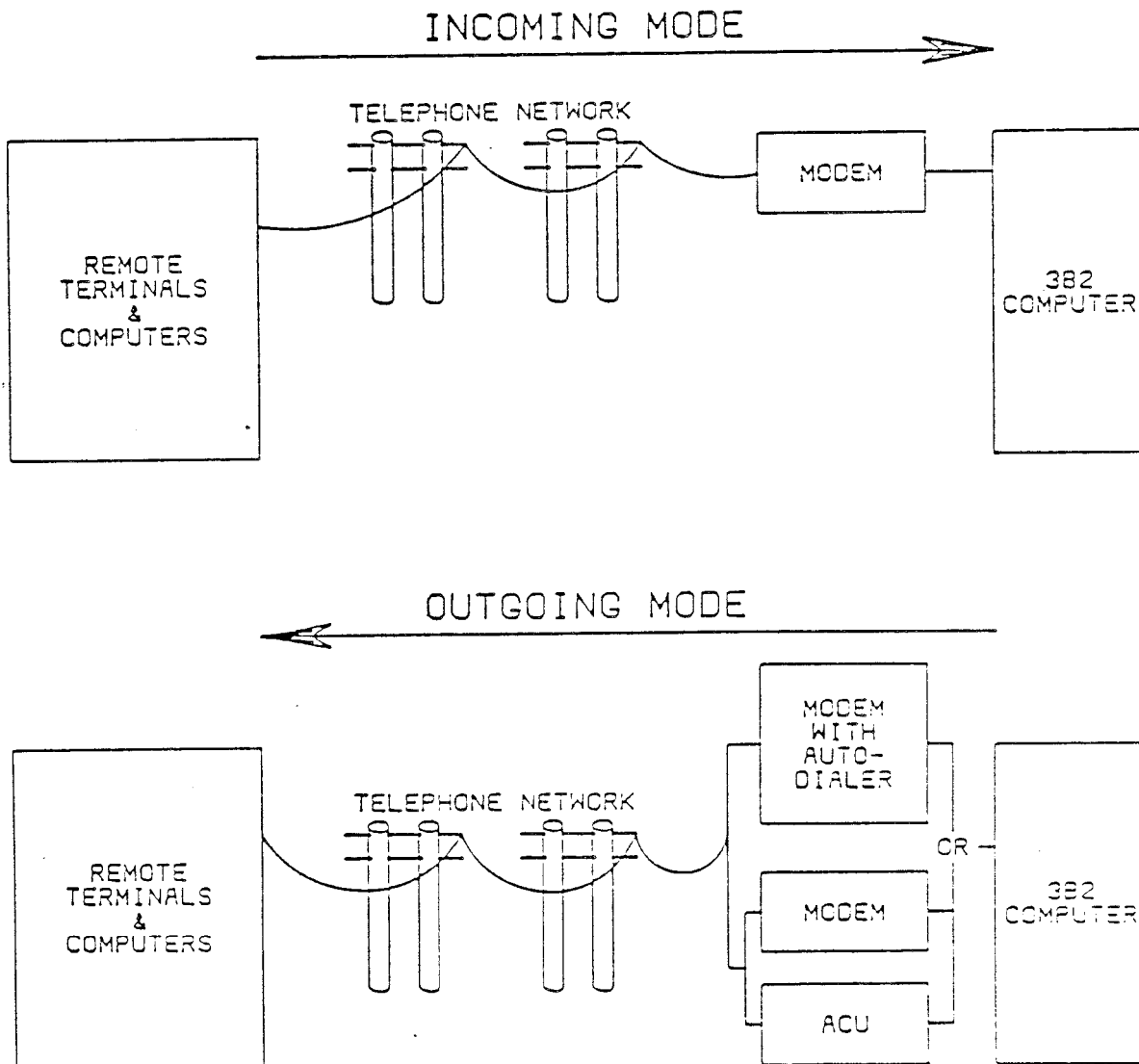


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MODEMS - WHEN ARE THEY USED?

Modems provide the ability to economically transmit data between a terminal and a computer OR between two computers when it is impractical to cable the terminals and computers together.

MODEM OPERATING MODES



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MODEM OPERATING MODES

Modems can receive data from and transmit data onto the telephone network. Consequently, it can be said that modems have two operating modes: incoming and outgoing.

Incoming Mode

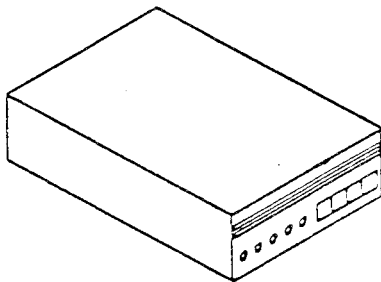
In this mode, remote terminals and computers have access to the modem and its computer through the telephone network. The modem can automatically answer the incoming call, establish a connection, and inform the 3B2 computer that a caller wishes to log in.

Outgoing Mode

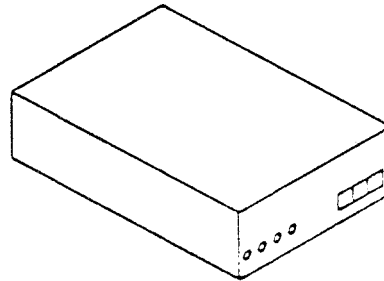
For the 3B2 computer to initiate an outgoing call through a modem, the computer must have the proper software (called the Basic Networking Utilities Package) and the ability to dial a phone number into the telephone network. When the modem has the ability to do the dialing, the modem is said to have an autodialer. If the modem does not have an autodialer, the computer must be equipped with another device, in addition to the modem, to do the dialing called an automatic calling unit (ACU). In the outgoing mode, the autodialer (or ACU) will dial the number of a remote computer, and the Basic Networking Utilities software provides the modem with the information needed to link the two computers together.

MODEMS - RELATED TERMINOLOGY

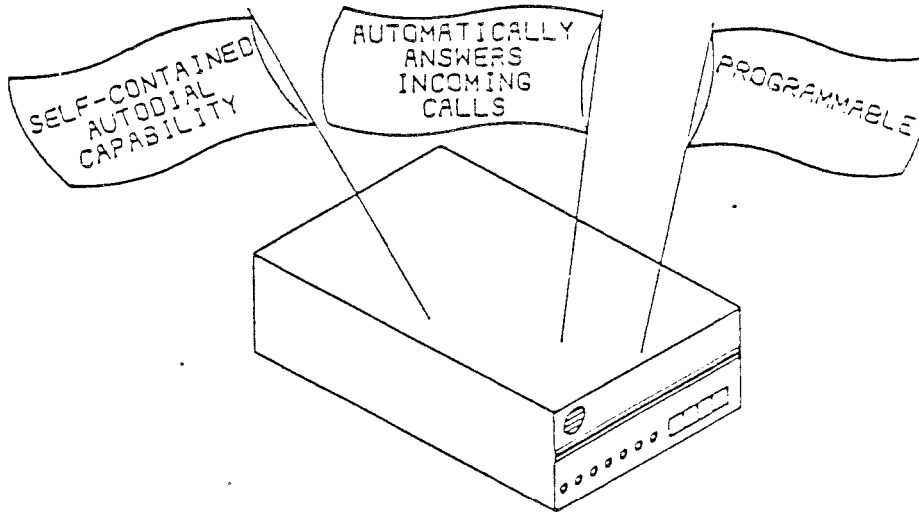
AUTODIALERS



PENRIL
MODEL 8216
AUTO-DATA MODEM



801-TYPE
AUTOMATIC
CALLING UNIT



SMART MODEM

3601-10-1371095 :

MODEMS - RELATED TERMINOLOGY

Autodialers

Autodialers are devices capable of generating signals (usually both Touch-Tone and key-pulse) for transmission over telephone lines when a call to another computer is being originated. An autodialer may be a separate unit, as in an 301-type automatic calling unit, or it may be incorporated into the same physical package as the modem, such as in the Penril autodata modem.

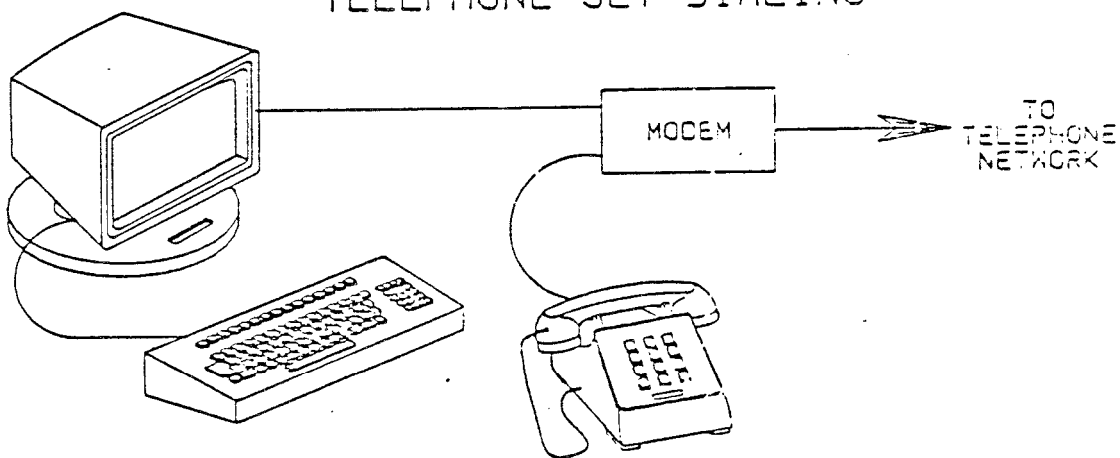
Smart Modem

Smart modem is a term used to describe a modem that:

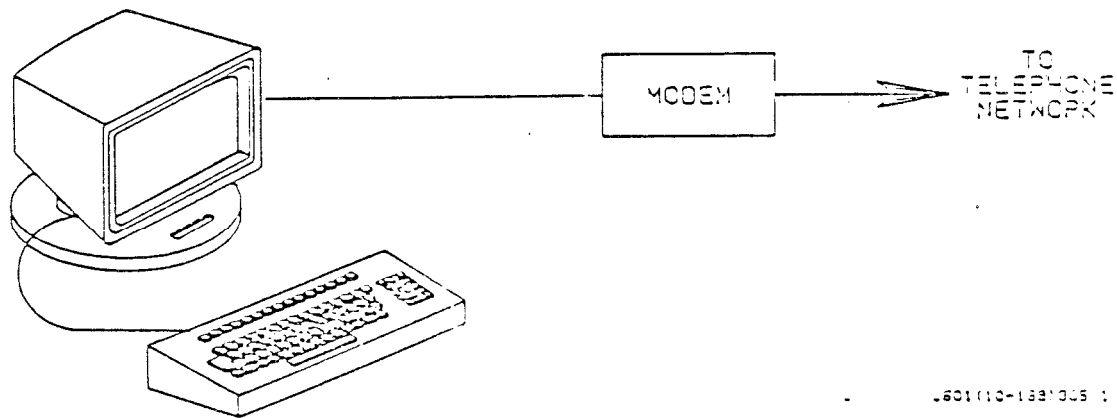
- Is equipped with an autodialer and can therefore dial up other computers
- Can automatically answer incoming calls and establish a connection
- Can be programmed to provide features such as:
 - Repetitive dialing of the same number when a busy tone is received
 - A secondary number to dial if the first number is busy

MODEMS - RELATED TERMINOLOGY (CONT.)

TELEPHONE SET DIALING



KEYBOARD DIALING



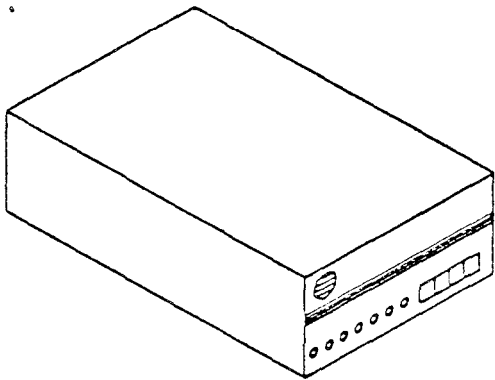
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Telephone Set Dialing vs Keyboard Dialing

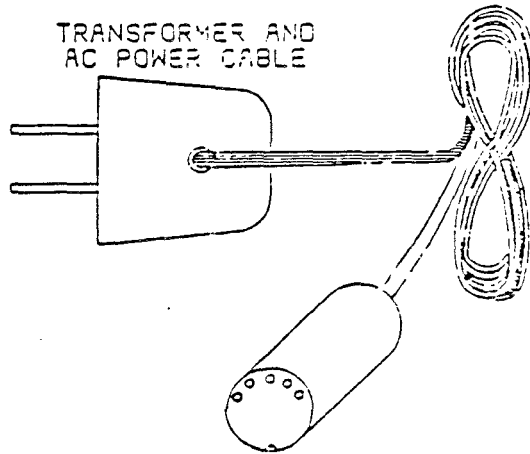
If a modem is not equipped with an autodialer, it must have a telephone set connected to it. The phone is used to originate calls and to manually answer incoming calls.

Modems equipped with autodialers do not require a telephone set, as the called number is input through a terminal keyboard and incoming calls are answered automatically by the modem.

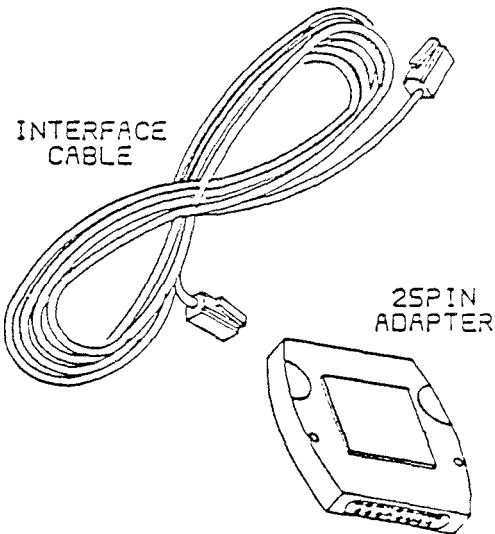
AUTOMATIC DIAL MODEM - COMPONENTS



AUTOMATIC
DIAL
MODEM

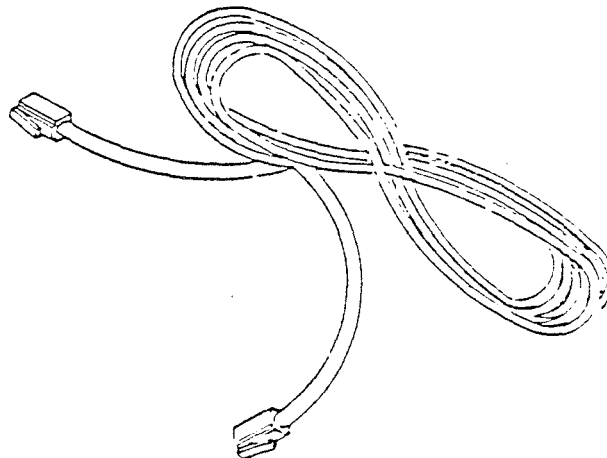


TRANSFORMER AND
AC POWER CABLE



INTERFACE
CABLE

25PIN
ADAPTER



TELEPHONE
CABLE

0621 (10-180) 3-85

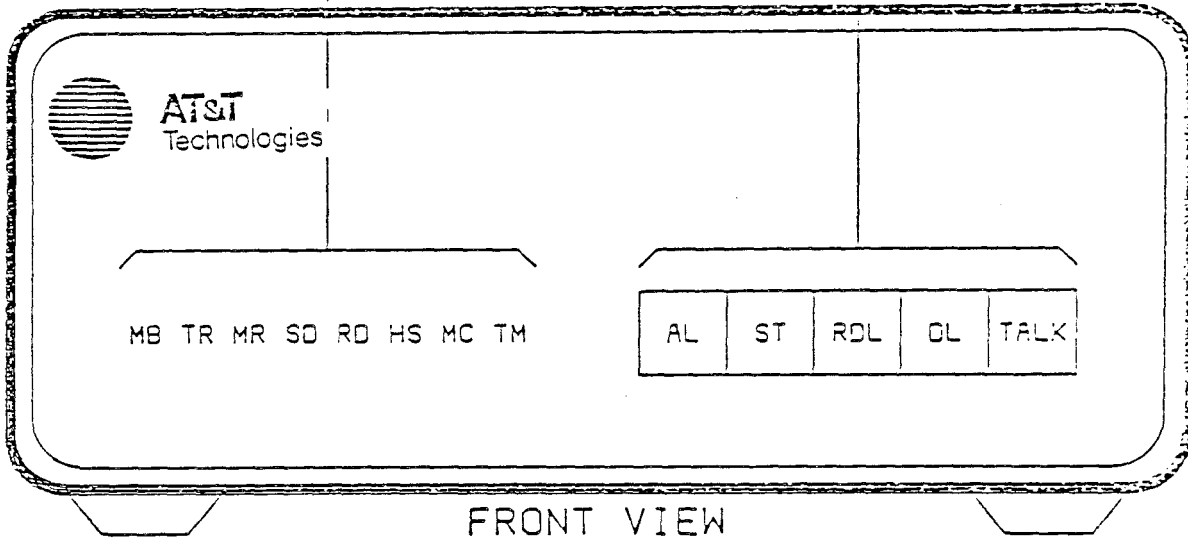
AUTOMATIC DIAL MODEM - COMPONENTS

- Automatic dial modem
- Transformer and AC power cable
- Interface cable (7-foot cable with 3-pin modular connectors on each end)
- Male 25-pin adapter
- Telephone cable (7-foot cable with 5-pin modular connectors on each end)

AUTOMATIC DIAL MODEM - GENERAL DESCRIPTION

STATUS LAMPS

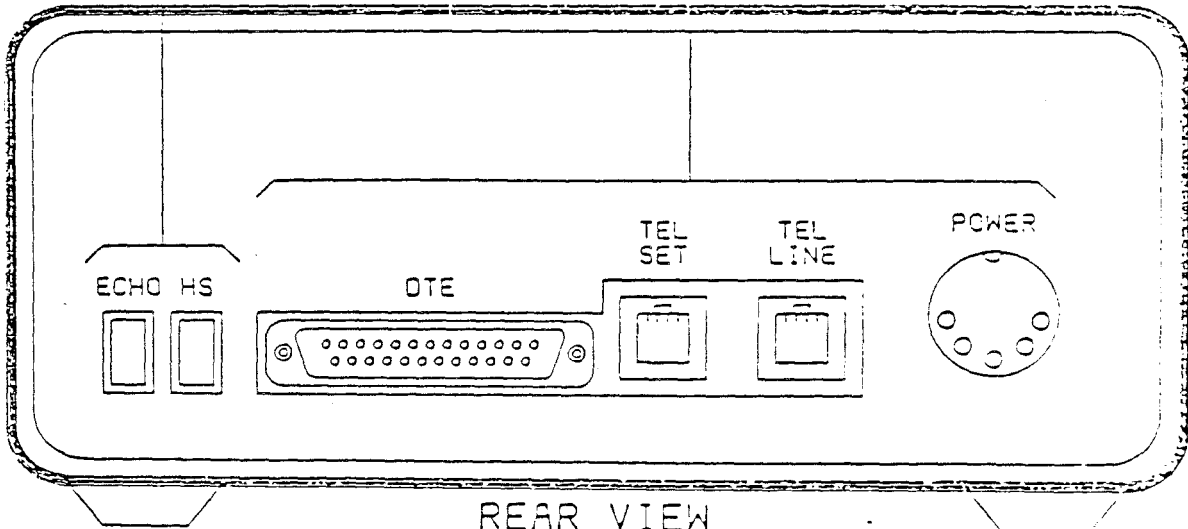
PUSHBUTTON SWITCHES



FRONT VIEW

PUSHBUTTON SWITCHES

CONNECTORS



REAR VIEW

3601 (10-201) 395 :

AUTOMATIC DIAL MODEM - GENERAL DESCRIPTION

An automatic dial modem is manufactured by Penril for use with AT&T's 3B2 computer. The modem, Model 8216, is capable of operating at either 300 or 1200 baud.

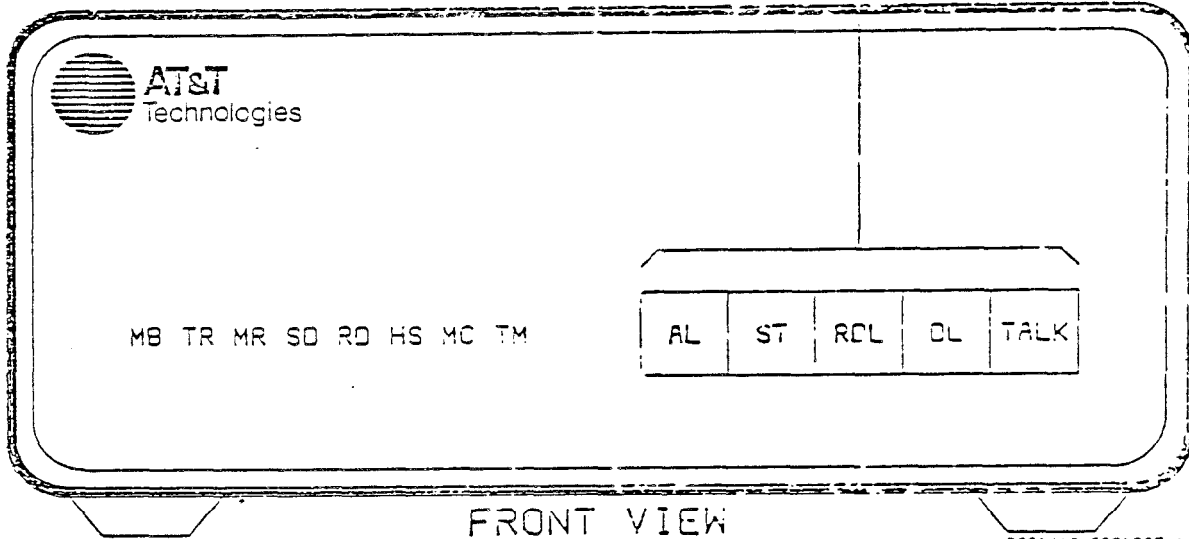
This modem is considered intelligent because it is programmable and contains an automatic dial unit.

The front panel of the modem has eight status lamps (MB, TR, MR, SD, RD, HS, MC, TM) that indicate the operational status of the modem, and five pushbuttons (AL, ST, RDL, DL, TALK) that control the modem's operation, speed selection, and diagnostic execution.

On the rear panel of the modem are two more pushbuttons (ECHO, HS) and connectors for a terminal (DTE), telephone set (TEL SET), telephone line (TEL LINE), and power.

AUTOMATIC DIAL MODEM - FRONT PANEL PUSHBUTTON SWITCHES

PUSHBUTTON SWITCHES



FRONT VIEW

3601 (10-202) 035 1

AUTOMATIC DIAL MODEM - FRONT PANEL, PUSHBUTTON SWITCHES

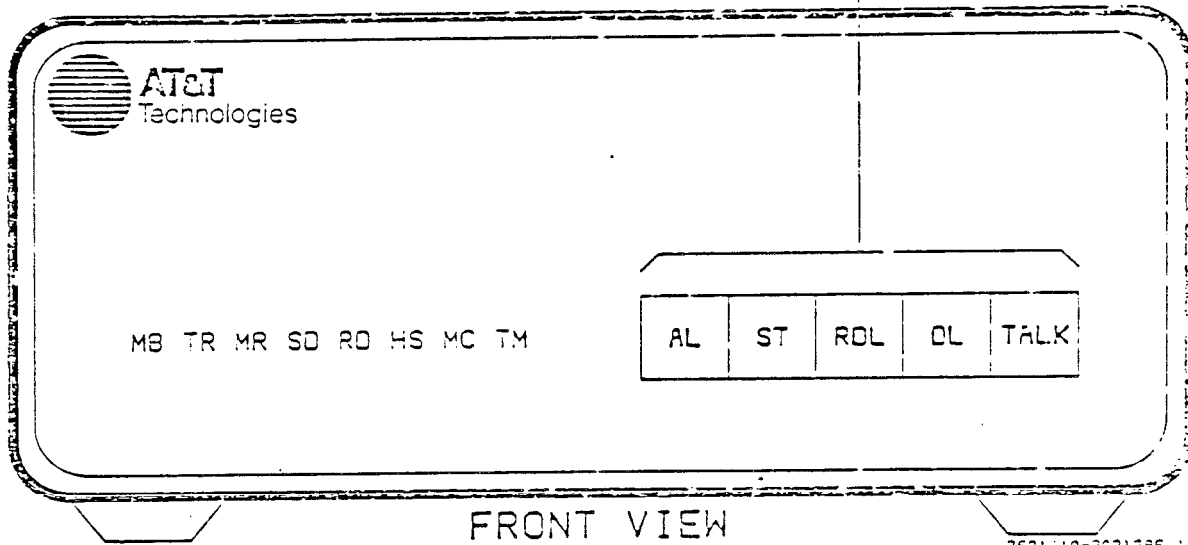
Five of the modem's seven pushbutton switches are on the front panel. They are all 2-position switches: press to operate (the pushbutton remains pressed) and press again to release.

The front panel pushbuttons are as follows:

AL (analog loop)	Operating this switch connects the modem's output to its input to permit local testing through the customer interface.
ST (self-test)	Operating this switch disconnects the 3B2 computer and activates the modem's self-test circuits.
RDL (remote digital loopback)	Operating this switch places an unattended remote modem into the digital loopback mode. This switch can be used only when the modem is in the high-speed mode.

AUTOMATIC DIAL MODEM - FRONT PANEL PUSHBUTTON SWITCHES (CONT.)

PUSHBUTTON SWITCHES



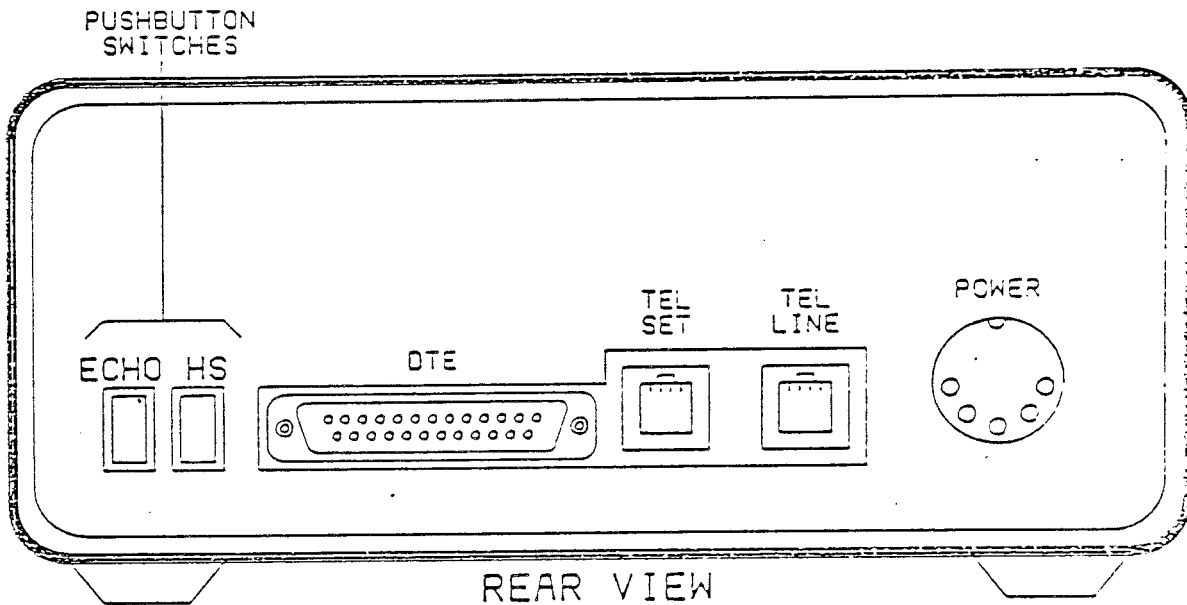
FRONT VIEW

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AUTOMATIC DIAL MODEM - FRONT PANEL, PUSHBUTTON SWITCHES (CONT.)

- DL (digital loopback) Operating this switch disconnects the 382 computer from the modem and loops the modem's receiver to the transmitter. This allows testing of the local modem from a distant location.
- TALK This switch is used only when the modem does not have an internal automatic dialer board. Since the Pentil AD modem has a dialer board, this switch should always be released.

AUTOMATIC DIAL MODEM - REAR PANEL PUSHBUTTON SWITCHES



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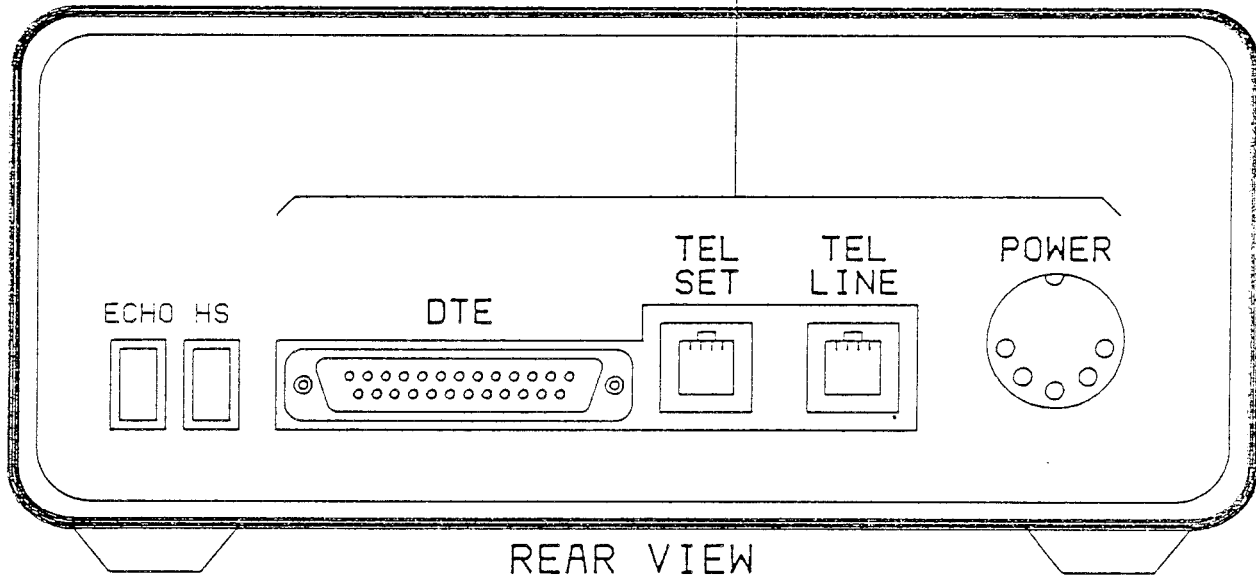
AUTOMATIC DIAL MODEM - REAR PANEL, PUSHBUTTON SWITCHES

ECHO Used only when the modem is connected to a terminal, this switch echoes characters back to the terminal. This allows full-duplex terminals to be connected to half-duplex computers. This switch should be released when the modem is used with a 3B2 computer.

HS (high speed) This switch controls the speed of calls originated by the 3B2 computer. When pressed, the modem operates at high speed (1200 baud); when released, the modem operates at low speed (300 baud). The switch has no effect on incoming calls.

AUTOMATIC DIAL MODEM - REAR PANEL CONNECTORS

CONNECTORS



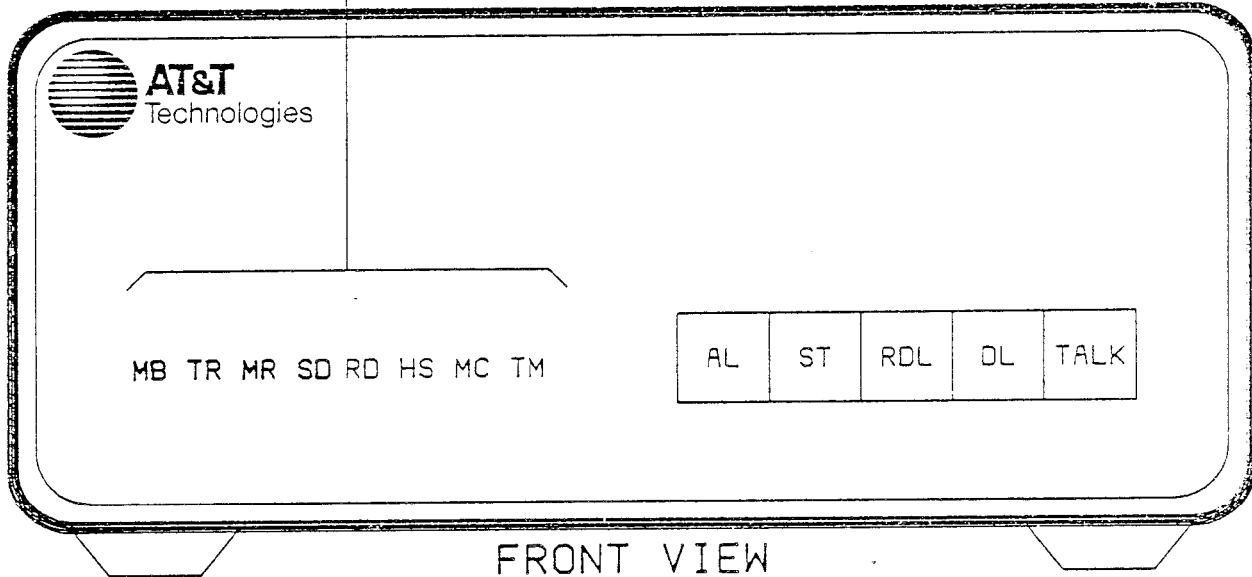
3601 (10-205) 385 1

AUTOMATIC DIAL MODEM - REAR PANEL, CONNECTORS

- DTE** The DTE (data terminal equipment) connector is where the terminal or computer port associated with the modem is connected.
- TEL SET** If the modem requires a telephone for dialing, the telephone is connected here. The Penril modem used with the 3B2 computer contains an autodialer that performs the dialing function. Therefore, a telephone set is not required with the Penril modem, leaving this connector unused.
- TEL LINE** In order to be able to call other computers and terminals, the modem must be able to access the telephone switching network. This is done the same way that a telephone set is connected to the network: via a cable to a modular telephone jack. Since a telephone set is not used with this modem, the cable from the modular telephone jack is connected to the modem at the TEL LINE connector.
- POWER** The cable from the AC power receptacle is connected to the modem here.

AUTOMATIC DIAL MODEM - FRONT PANEL STATUS LAMPS

STATUS LAMPS



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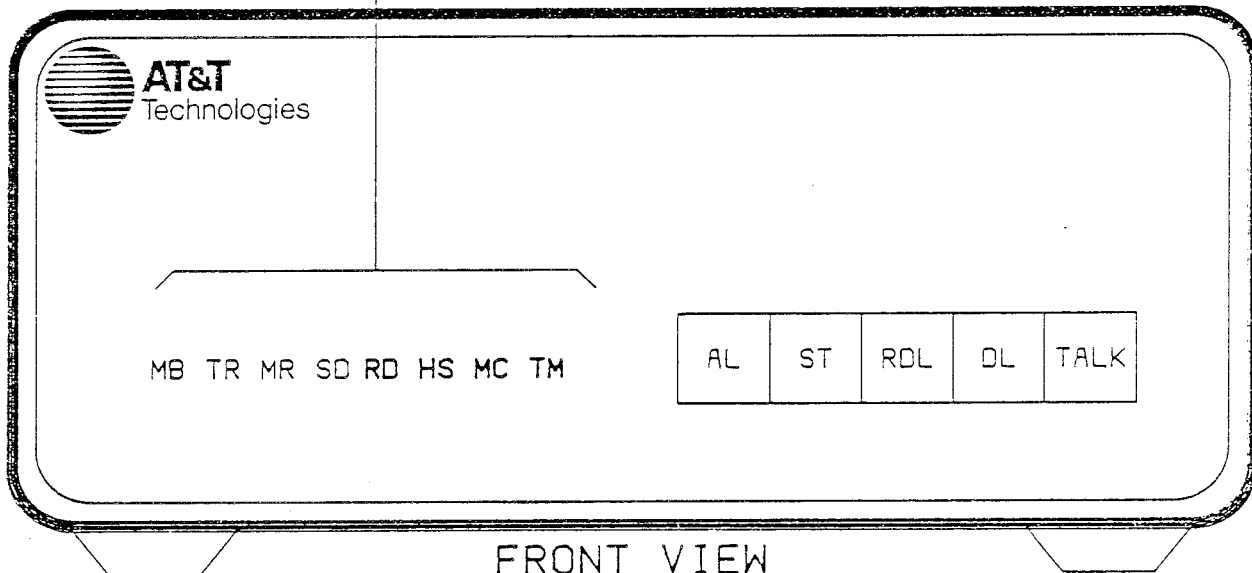
AUTOMATIC DIAL MODEM - FRONT PANEL, STATUS LAMPS

Each status lamp is identified by a 2-character designation. The lamps and what they indicate are as follows:

MB (make busy)	This lamp is lit when the AL pushbutton is pressed or when the modem's make-busy circuitry is activated by the 3B2 computer.
TR (terminal ready)	This lamp is lit when the 3B2 computer is ready to originate or receive a call. When lit, it also indicates that the 3B2 computer is in the multiuser mode.
MR (modem ready)	This lamp is lit when the modem is in the data mode, which occurs whenever the modem is transmitting or receiving data.
SD (send data)	This lamp is lit whenever a space signal is transmitted. During transmission of data, this lamp will flicker.

AUTOMATIC DIAL MODEM - FRONT PANEL STATUS LAMPS (CONT.)

STATUS LAMPS



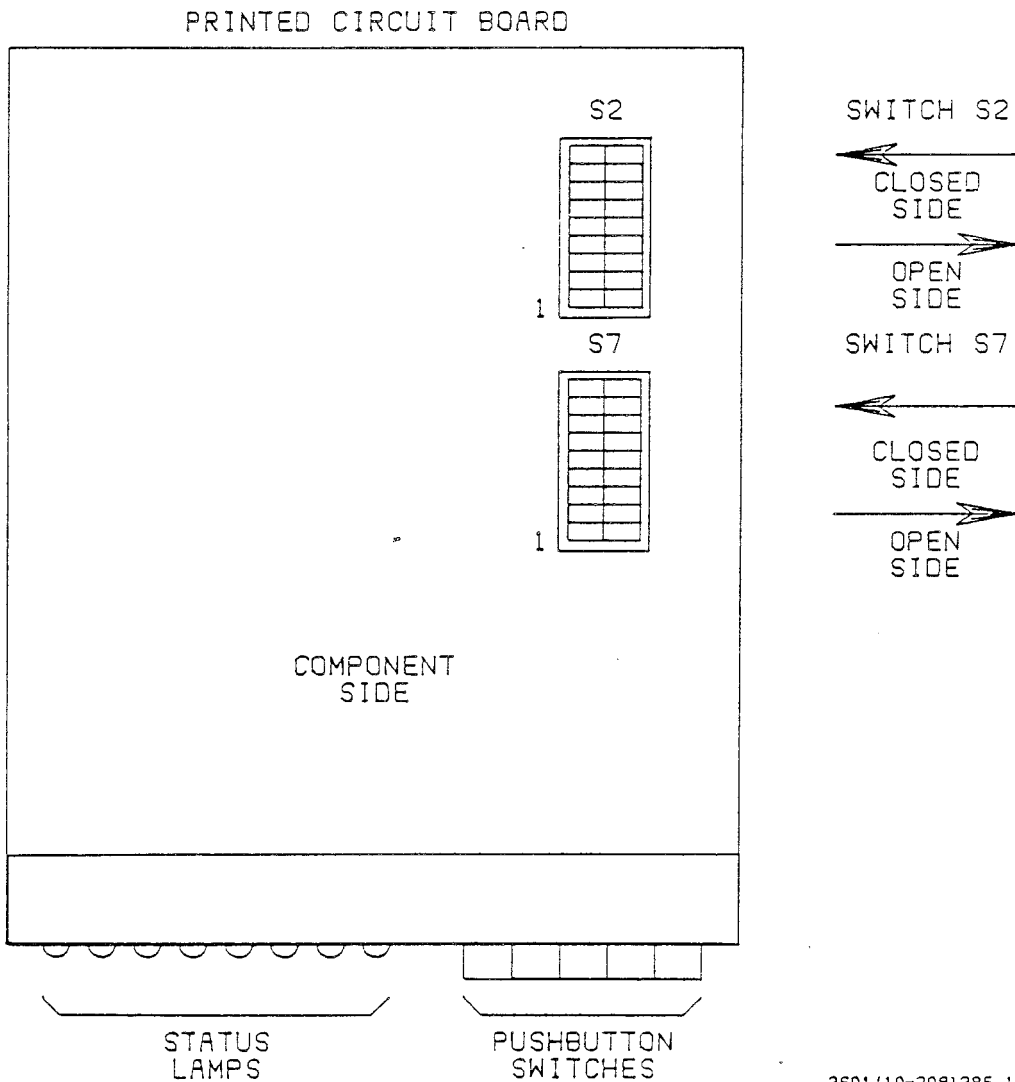
FRONT VIEW

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AUTOMATIC DIAL MODEM - FRONT PANEL, STATUS LAMPS (CONT.)

RD (received data)	This lamp is lit whenever a space signal is received. During reception of data, this lamp will flicker.
HS (high speed)	This lamp is lit when the modem is operating in the high-speed (1200-baud) mode.
MC (modem check)	This lamp is lit when the modem is in an idle state. If the modem is in the data mode, the lamp goes off when a valid carrier signal is received.
TM (test mode)	This lamp is lit when the modem is in a test mode.

USER-SELECTABLE OPTIONS (INTERNAL VIEW OF AUTODIAL MODEM)



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USER-SELECTABLE OPTIONS (INTERNAL VIEW OF AUTODIAL MODEM)

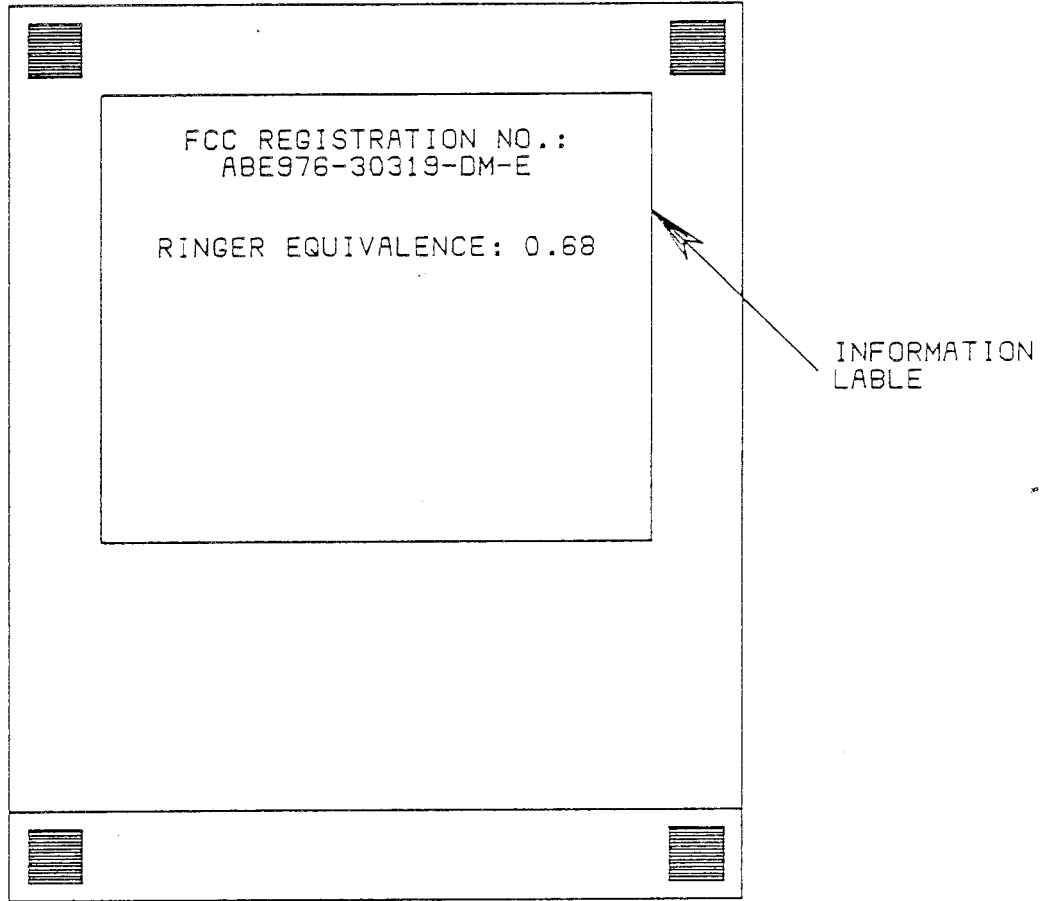
The operating functions of the autodial modem are determined by internal option switches (switches S2 and S7 on the printed circuit board). Switches S2 and S7 each consist of nine 2-position rocker switches. Each rocker switch is set to either the open or the closed position, i.e., pushing the closed side of the rocker switch down closes the switch. These switches are set at the factory for optimum performance with the 3B2 computer and should not be changed.

The Following Is For Information Only

The instruction manual included with the autodial modem contains detailed information describing the available options and their associated switch settings. Some examples of these options are:

- **Automatic answer** - Should an incoming call be answered automatically or manually?
- **Loss of carrier disconnect** - How should the modem respond to a loss of carrier: hang up or stay connected?
- **Character length** - Should the character length be 9 bits or 10 bits?

AUTOMATIC DIAL MODEM FCC REQUIREMENTS



UNDERSIDE OF MODEM

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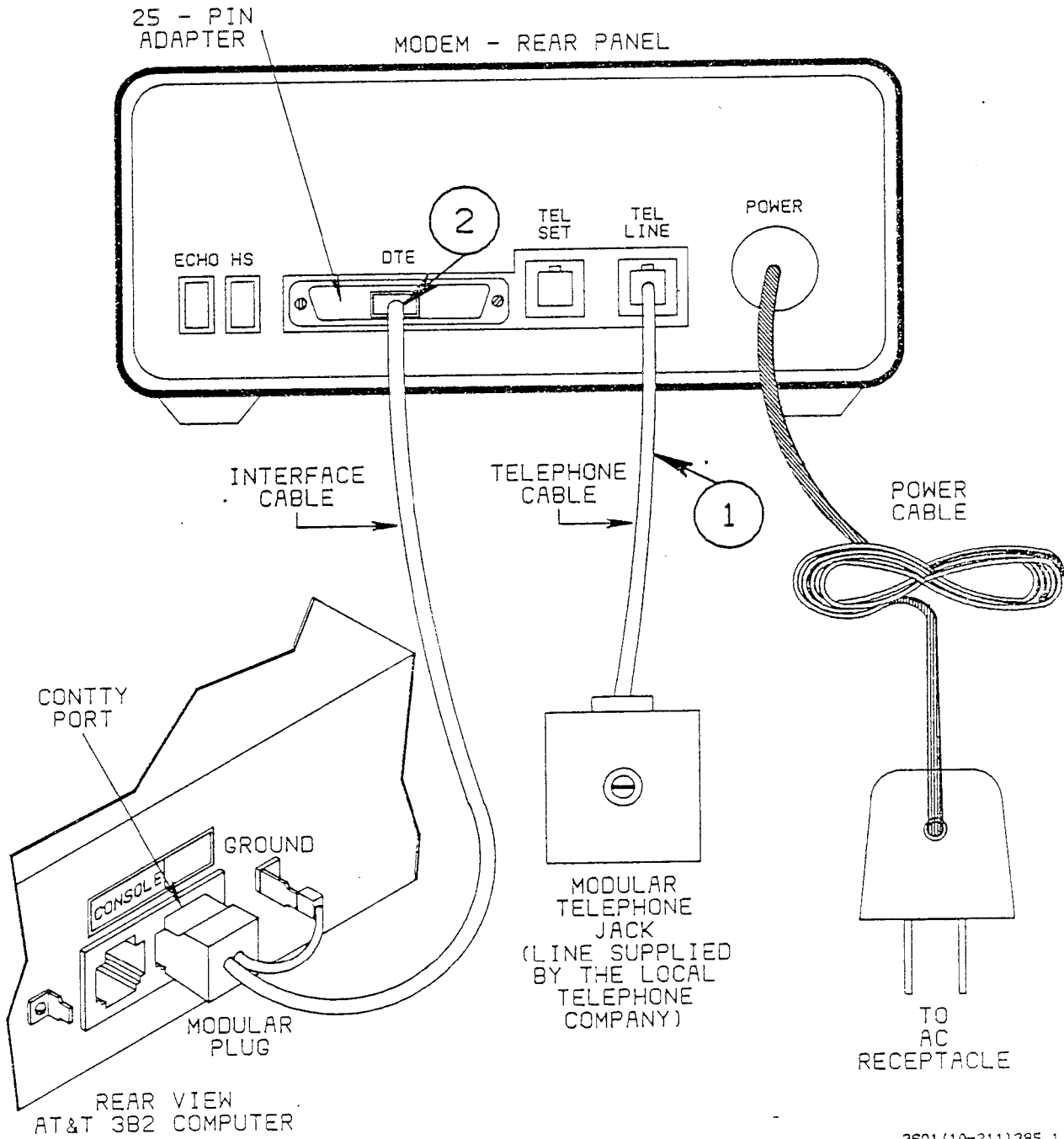
AUTOMATIC DIAL MODEM - FCC REQUIREMENTS

The Federal Communication Commission (FCC) regulates the connection of computer equipment to the public telephone network so that optimum service is available to all users of the network. Before the modem is installed, the following FCC requirements must be satisfied:

- Notify the local telephone company of the line that is to be used with the modem.
- Provide the local telephone company with these numbers, which are located on the underside of the modem:
 - FCC Registration Number ABE976-70719-DM-E
 - Ringer Equivalence Number 0.6B

If trouble should arise with the modem, disconnect the modem from the line and do not use the modem until the trouble has been fixed.

AUTOMATIC DIAL MODEM INSTALLATION



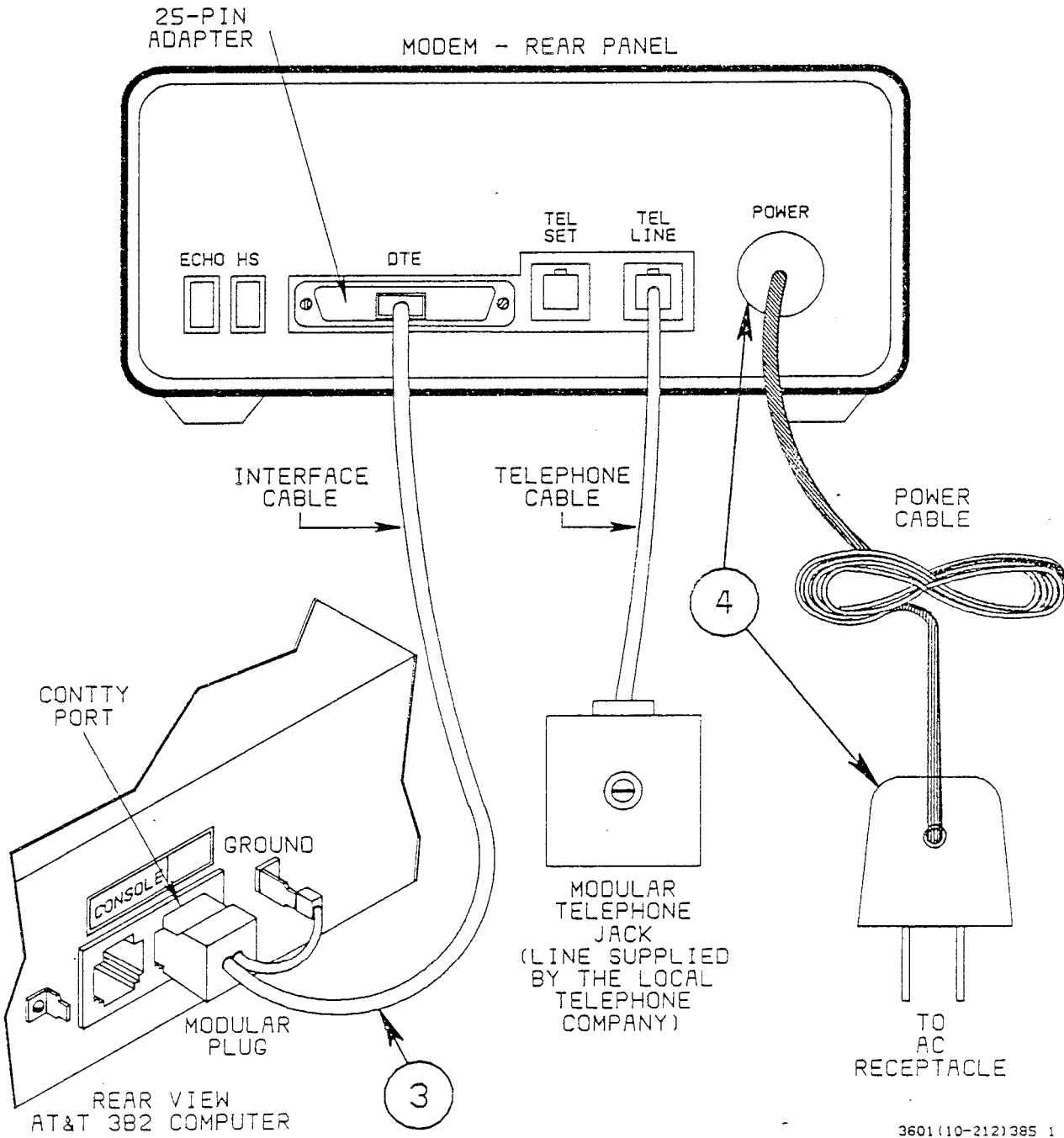
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AUTOMATIC DIAL MODEM INSTALLATION

Physical installation of the autodial modem is done in the following manner:

1. The telephone cable has 5-pin modular connectors on each end. Connect one end of this cable to the modular telephone jack; connect the other end of the cable to the **TEL LINE** connector on the rear of the modem.
2. The interface cable has 8-pin modular connectors on each end. Connect one end of this cable into the 25-pin adapter, and connect the 25-pin adapter to the connector marked **DTE** on the rear of the modem.

AUTOMATIC DIAL MODEM INSTALLATION



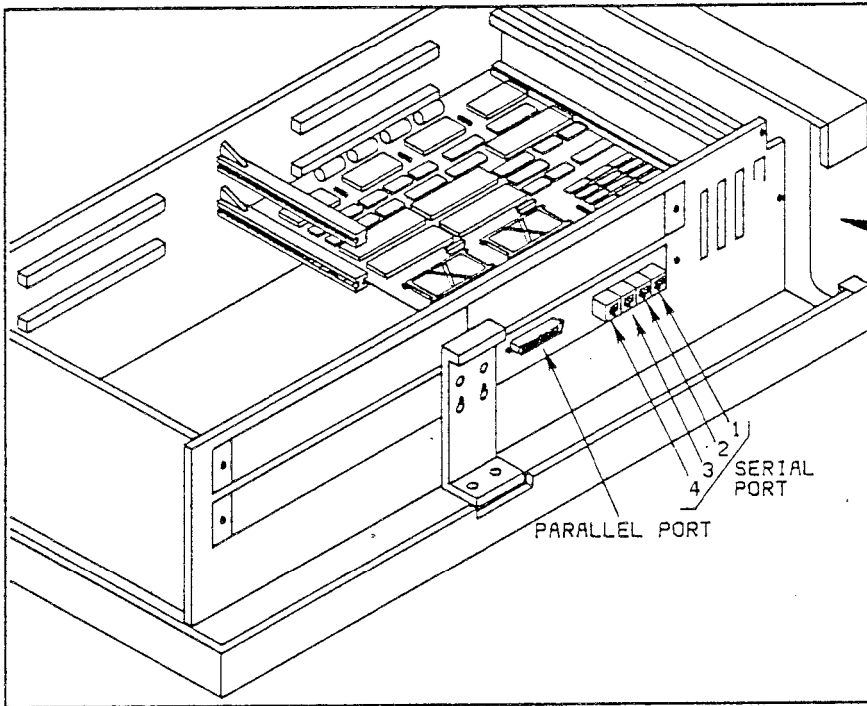
AUTOMATIC DIAL MODEM INSTALLATION (CONT.)

3. The other end of the interface cable should be connected to the back of the 3B2 computer. There are two modular connectors on the rear of the 3B2 computer. One connector is marked **CONSOLE** and is to be used for the 3B2 computer's console terminal. The other is adjacent to the **CONSOLE** connector and is unmarked. This unmarked connector is the 3B2 computer **CONTTY** port and is the recommended port for use with a modem. In some instances, this **CONTTY** port may not be available, forcing the connection of the modem to a different port.

4. Connect the AC power cable to the connector marked **POWER** on the rear of the modem. The other end of this cable terminates in a transformer. Plug the transformer into a standard 110-volt, 60-cycle, AC power receptacle.

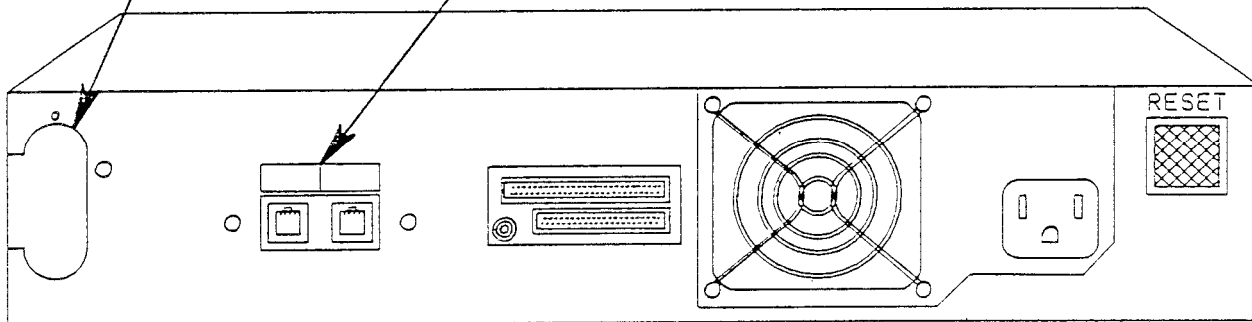
AUTOMATIC DIAL MODEM PORT SELECTION

AT&T 382 COMPUTER SIDE VIEW



CABLE
ACCESS
OPENING

CONSOLE/CONTTY CONNECTORS



382 COMPUTER - REAR VIEW

3601 (10-213) 395 1

AUTOMATIC DIAL MODEM PORT SELECTION

The CONTTY port on the rear of the 3B2 computer is referred to in the 3B2 computer basic networking documentation as the standard or default port for the connection of an automatic dial modem.

However, the preferred CONTTY port may not always be available. In this situation, a serial port on an input/output expansion board may be used with the modem. The serial port connector can be found on the side of the 3B2 computer and is accessible through the cable access opening at the rear of the machine.

Whichever port is used for the modem, the computer must be told, through the proper software entries, where the modem is connected. These software entries are the next topic presented.

AUTOMATIC DIAL MODEM SOFTWARE

① Console Login: root<CR>
Password:
UNIX System V Release 2.0 3B2 Version 1
comp5
Copyright (c) 1984 AT&T Technologies, Inc.
All Rights Reserved

②A # shutdown -y<CR>

Shutdown started. Mon Dec 17 12:02:39 EST 1984

Broadcast Message from root (console) Mon Dec 17 12:02:41...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

The system is coming down. Please wait.
System services are now being stopped.

The system is down.

**** SYSCON CHANGED TO /dev/console ****

INIT: New run level: S

INIT: SINGLE USER MODE
②B # mount /dev/dsk/c1d0s2 /user <CR>
②C # sysadm installpkg<CR>

Running subcommand 'installpkg' from menu 'softwaremgmt',
SOFTWARE MANAGEMENT

Insert the removable medium for the package you want to install
into the diskette1 drive.
Press <RETURN> when ready. Type q to quit.<CR>

AUTOMATIC DIAL MODEM SOFTWARE

Modems are physical devices that enable one computer to communicate with another computer. In addition to a physical device, there must also be appropriate software to enable communication. In the 3B2 computer, the Basic Networking Package contains the software programs and supporting files necessary for this function.

To install the Basic Networking software (which is contained on one floppy disk) into the 3B2 computer, follow these directions.

- ① Log in as root.
Logging in as root gives you unlimited access to all parts of the UNIX* operating system with the power to make changes. Being logged in as root is also known as being logged in as "super-user".
- ② Enter the following commands (follow each command with a carriage return, <CR>, and wait for the prompt, #, before entering the next command):
 - Ⓐ # shutdown -y<CR>
This turns off all access to the computer (from terminals, etc.) except for the system console. After a shutdown, the computer is in the single-user mode.
 - Ⓑ # mount /dev/dsk/c1d0e2 /usr <CR>
This gives the super-user access to the usr file system.
 - Ⓒ # sysadm installpkg<CR>
This calls up an interactive routine that loads a software utility package into the computer's disk drive.

*Trademark of AT&T Bell Laboratories

AUTOMATIC DIAL MODEM SOFTWARE (CONT.)

Installing Basic Networking Utility

You have requested the installation of the Basic Networking Utility. This package requires certain support files to be setup by the installer before the Basic Networking Utility can be used. Please carefully read the "Basic Networking Manual For 3B2 Computer Family" to see what files must be populated and what the correct format is for each file.

The automated part of the installation will now begin.

The following files are being installed:

```
-----  
//etc/cgetty  
//usr/bin/cu  
//usr/bin/uucp  
//usr/bin/uulog  
//usr/bin/uuname  
//usr/bin/uupick  
//usr/bin/uustat  
//usr/bin/uuto  
//usr/bin/uux  
//usr/lib/uucp/L-dialers  
//usr/lib/uucp/L-devices  
//usr/lib/uucp/L-dialcodes  
//usr/lib/uucp/L.cmds  
//usr/lib/uucp/L.sys  
//usr/lib/uucp/L_stat  
//usr/lib/uucp/L_sub  
//usr/lib/uucp/R_stat  
//usr/lib/uucp/R_sub  
//usr/lib/uucp/USERFILE  
//usr/lib/uucp/uucico  
//usr/lib/uucp/uuclean  
//usr/lib/uucp/uudemon.day  
//usr/lib/uucp/uudemon.hr  
//usr/lib/uucp/uudemon.wk  
//usr/lib/uucp/uusub  
//usr/lib/uucp/uuxqt  
//usr/lib/uucp/SEQF  
//usr/options/uucp.name  
1050 blocks
```

Installation of Basic Networking Utility Complete.

You may now remove the medium from the diskette drive.

Insert the removable medium for the package you want to install into the diskette drive.

Press <RETURN> when ready. Type q to quit. q<CR>

#

AUTOMATIC DIAL MODEM SOFTWARE (CONT.)

The system will then install the Basic Networking Utilities Package into the computer's disk drive and provide a listing of the files that were installed.

AUTOMATIC DIAL MODEM SOFTWARE (CONT.)

②C # sysadm removepkg<CR>

Running subcommand 'removepkg' from menu 'softwaremgmt',
SOFTWARE MANAGEMENT

The following software packages have been installed:

Basic Networking Utility

Insert the removable medium for the package you wish to remove
into the diskette1 drive.

Press <RETURN> when ready. Type q to quit.

Removing the Basic Networking Utility.

The following files are being removed:

```
//usr/bin/cu
//usr/bin/uucp
//usr/bin/uulog
//usr/bin/uuname
//usr/bin/uupick
//usr/bin/uustat
//usr/bin/uuto
//usr/bin/uux
//usr/lib/uucp/L-dialers
//usr/lib/uucp/L-devices
//usr/lib/uucp/L-dialcodes
//usr/lib/uucp/L.cmds
//usr/lib/uucp/L.sys
//usr/lib/uucp/L_stat
//usr/lib/uucp/L_sub
//usr/lib/uucp/R_stat
//usr/lib/uucp/R_sub
//usr/lib/uucp/USERFILE
//usr/lib/uucp/uucico
//usr/lib/uucp/uuclean
//usr/lib/uucp/uudemon.day
//usr/lib/uucp/uudemon.hr
//usr/lib/uucp/uudemon.wk
//usr/lib/uucp/uusub
//usr/lib/uucp/uuxqt
//usr/options/uucp.name
```

The Basic Networking Utility has been uninstalled.

You may now remove the medium from the diskette1 drive.

Insert the removable medium for the package you wish to remove
into the diskette1 drive.

Press <RETURN> when ready. Type q to quit. q<CR>

#

AUTOMATIC DIAL MODEM SOFTWARE (CONT.)

If use of the modem is to be discontinued for a time, the Basic Networking software can be removed from memory to free up memory space for other things. Follow these directions and the system will lead you through this operation.

- ① Log in as root.
You now have "super-user" powers.

- ② Enter these commands:
 - Ⓐ # shutdown -y<CR>
Puts the computer into the single-user mode.

 - Ⓑ # mount /dev/dsk/c1d0s2 /usr <CR>
Gives access to the usr file system.

 - Ⓒ # sysadm installpkg<CR>
This calls up an interactive routine that removes a software utility package from the computer's disk drive. While this is being done, a listing is produced of the files that are being removed.

Additional information regarding these operations can be found in the Basic Networking Manual.

AUTOMATIC DIAL MODEM SUPPORT FILES


```

① # /usr/lib/uucp/L-devices<CR>
# ed L-devices<CR>
0
a<CR>
ACU contty PENRIL 1200<CR>
.<CR>
w<CR>
23
q<CR>
② # cd /etc<CR>
# ed inittab<CR>
1175
lp<CR>
zu::sysinit:/etc/bzapunix </dev/console >/dev/console 2>&1
<CR>
fs::sysinit:/etc/bcheckrc </dev/console >/dev/console 2>&1
<CR>
mt::sysinit:/etc/brc >/dev/console 2>&1
<CR>
ck::sysinit:/etc/setclk </dev/console >/dev/console 2>&1
<CR>
su:1:wait:/etc/shutdown -is -y -g0 </dev/console >/dev/console 2>&1
<CR>
ls:2:initdefault:
<CR>
lt:s:once:/etc/led -o # turn on green LED
<CR>
pl:s1234:powerfail:/etc/led -f # start green LED flashing
<CR>
p3:s1234:powerfail:/etc/shutdown -y -p9 -i0 -g0 >/dev/console 2>&1
<CR>
s2:2:wait:/etc/rc2 >/dev/console 2>&1 </dev/console
<CR>
fl:056:wait:/etc/led -f >/dev/console 2>&1 </dev/console
<CR>
s0:056:wait:/etc/rc0 >/dev/console 2>&1 </dev/console
<CR>
of:0:wait:/etc/uadmin 2 0 >/dev/console 2>&1 </dev/console
<CR>
fw:5:wait:/etc/uadmin 2 2 >/dev/console 2>&1 </dev/console
<CR>
RB:6:wait:echo Automatic Reboot >/dev/console 2>&1
<CR>
rb:6:wait:/etc/uadmin 2 1 >/dev/console 2>&1 </dev/console
<CR>
co:1234:respawn:/etc/getty console console
<CR>
ct:2:respawn:/etc/getty contty contty
s/getty/cgetty/p<CR>
ct:2:respawn:/etc/cgetty contty contty
w<CR>
1176
q<CR>
#

```


AUTOMATIC DIAL MODEM SUPPORT FILES

In order to verify that the modem is functioning properly, a number of file must be modified. These files, their path names, and what they should contain are as follows:

① # /usr/lib/uucp/L-devices

As loaded, this file is empty. Edit the file to contain:

```
ACU contty PENRIL 1200
```

This tells the system that a PENRIL automatic calling unit is set up to originate calls at 1200 baud and the modem is physically connected to the `contty` port.

② # /etc/inittab

Assuming the modem is connected to the preferred `contty` port, change the line for this port in the `/etc/inittab` file to read:

```
ct:2:respawn:/etc/cgetty contty contty
```

This causes the `cgetty` program to run at 9600 baud instead of 1200 baud, thus eliminating some problems encountered previously.

AUTOMATIC DIAL MODEM SUPPORT FILES (CONT.)

Check ownership and modes of:

`/dev/contty`

`/usr/bin/cu`

`/usr/lib/uucp/uucico`

AUTOMATIC DIAL MODEM SUPPORT FILES (CONT.)

Verify that the following three files have the indicated ownership and permissions:

```
/dev/contty  
crw-rw--w- 1 uucp sys 0,1 Aug 7 08:40 contty
```

```
/usr/bin/cu  
-rwsrwsr-x 1 root bin 29152 Dec 17 1983 cu
```

```
/usr/lib/uucp/uucico  
---s---s---x 1 root bin 120604 Dec 17 1983 uucico
```

These file modifications are the minimum required to verify the operation of the Penril automatic dial modems. Additional file editing is necessary to fully implement the Basic Networking Package. (This will be covered in the next lesson.)

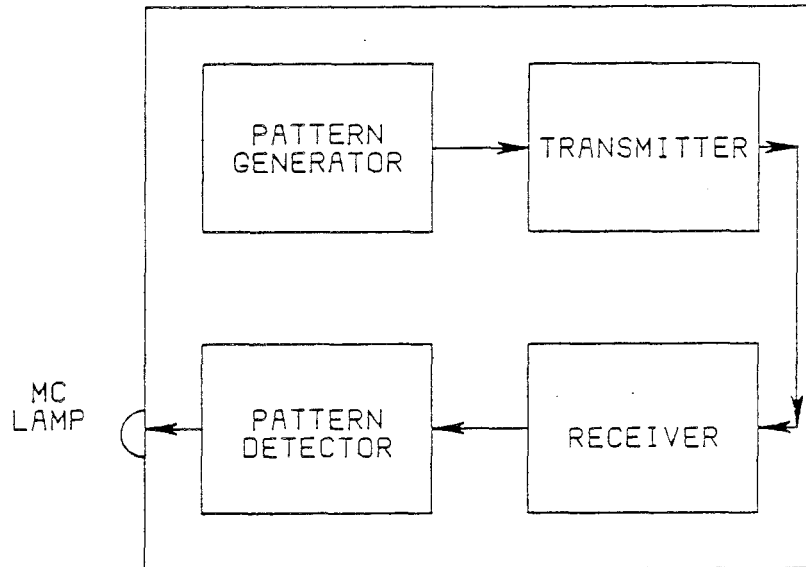
Once the Basic Networking Package is loaded and the proper files are edited, enter these commands:

```
# cd /<CR>  
# umount /dev/dsk/c1d0s2 <CR>  
# init 2<CR>
```

This brings the 3B2 computer up to the multiuser state so that all the computer's ports become active - including the `contty` port, where the modem is connected.

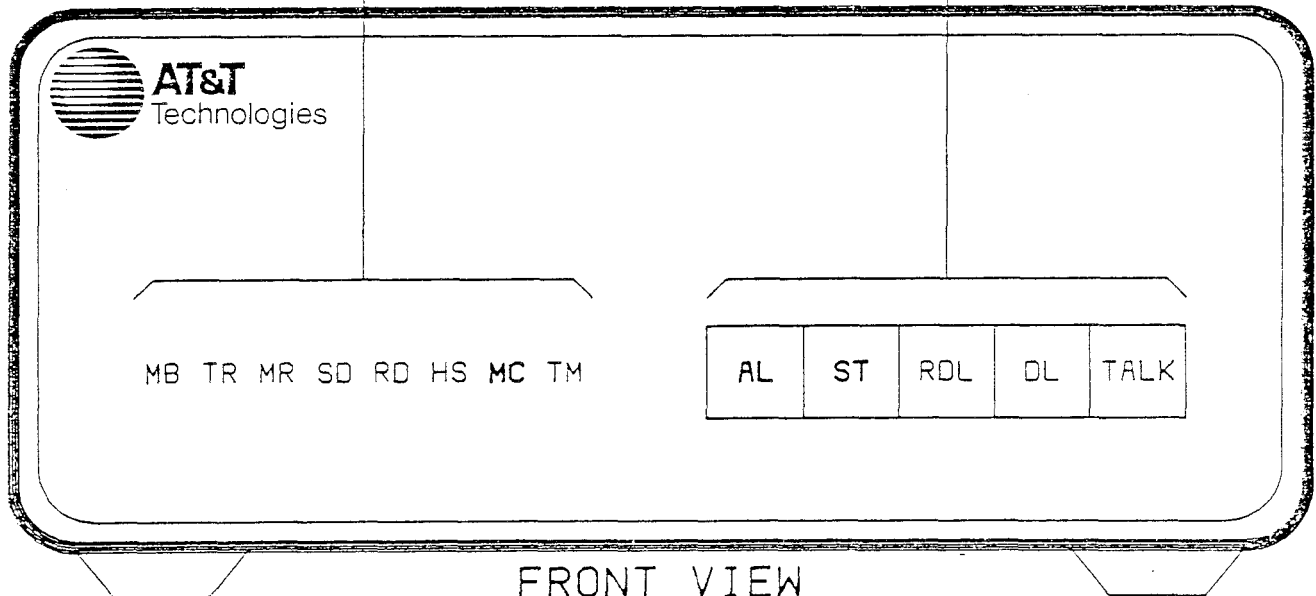
ANALOG LOOPBACK SELF-TEST

MODEM - BLOCK DIAGRAM



STATUS LAMPS

PUSHBUTTON SWITCHES



FRONT VIEW

3601 (10-215) 385 1

ANALOG LOOPBACK SELF-TEST

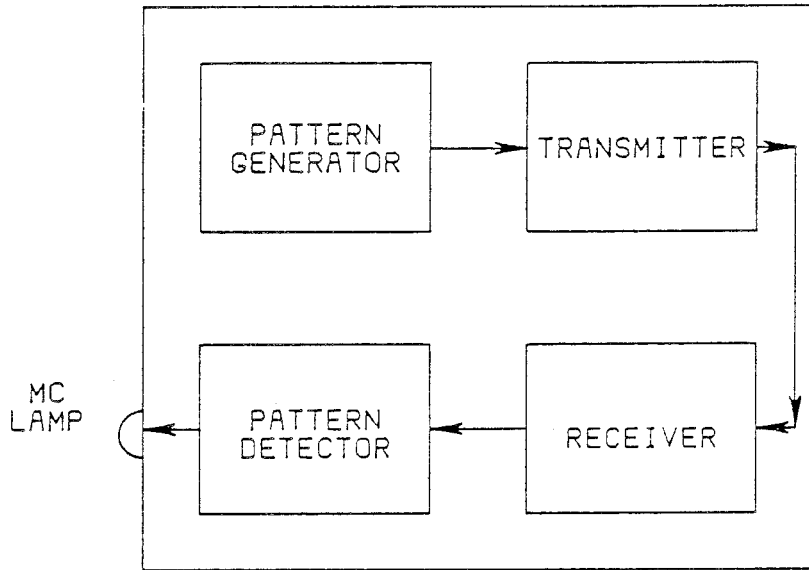
The analog loopback self-test isolates the modem from its associated terminal or computer and the telephone network and then uses circuits inside the modem to generate and compare test data to check the operation of the modem's transmit and receive circuits. If, during the test, the MC lamp does not light or flicker for 1 minute, the modem has passed the test. If the MC lamp lights, the modem's transmit or receive circuits are probably defective.

Analog Loopback Self-Test Procedure

1. Press both the AL and ST switches on the modem to begin the test. The AL switch connects the modem's output to its input, the loopback, and the ST switch disconnects the modem from its computer or terminal and activates the modem's self-test circuits.
 - The following lamp conditions should be observed:
 - OFF: MC
 - ON: MB, TR, MR, SD, RD, HS (if modem is in the high-speed mode, TM)
 - If the MC lamp is off and does not flash for a period of 1 minute, the modem has passed the test.

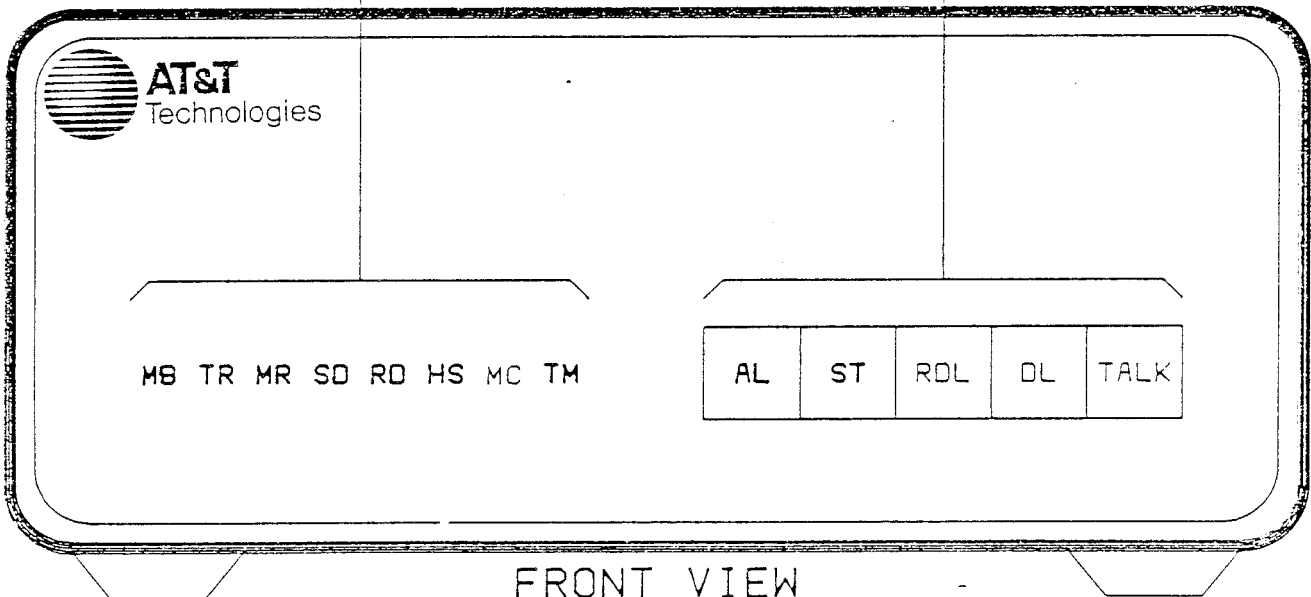
ANALOG LOOPBACK SELF-TEST

MODEM - BLOCK DIAGRAM



STATUS LAMPS

PUSHBUTTON SWITCHES

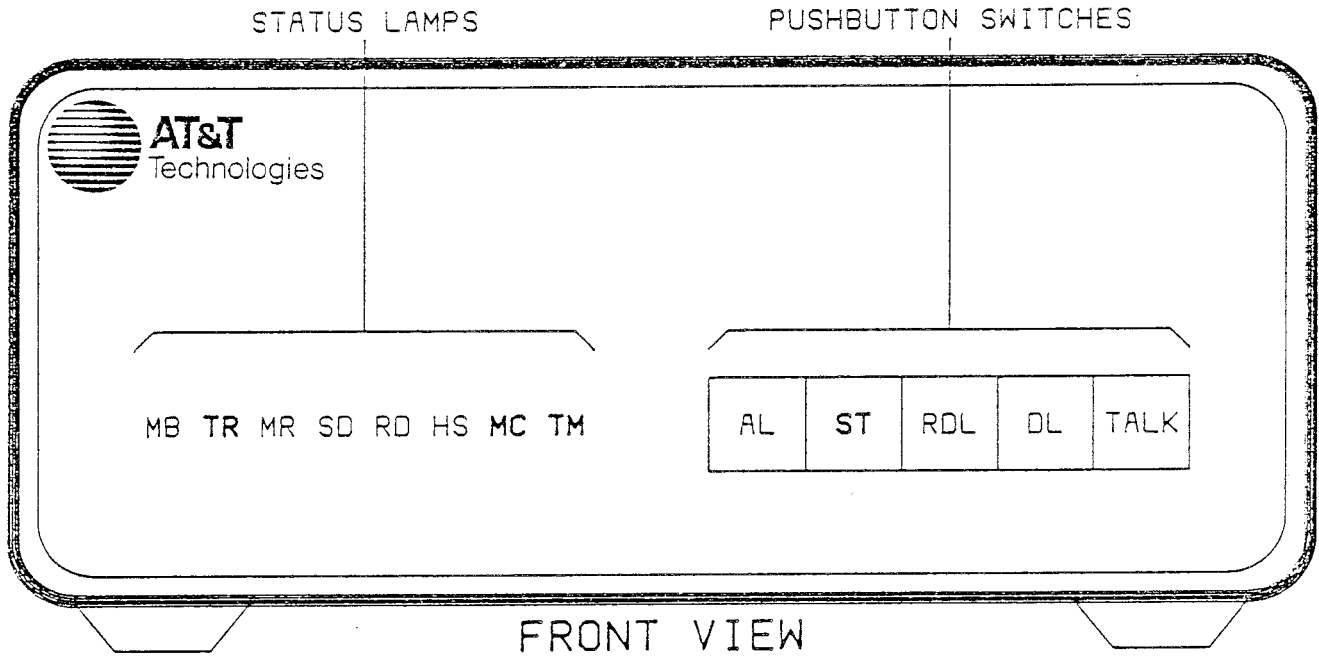


FRONT VIEW

3601 (10-214)395 1

Analog Loopback Self-Test Procedure (Cont.)

2. Release the AL and ST switches to return the modem to the idle condition.
 - In the idle condition the MC (and possibly the TR) lamp will be lit. The TR lamp will be lit if the 3B2 computer is in the multiuser mode. The MC lamp being lit is the normal indication of an idle modem.



FRONT VIEW

3601 (10-216) 385 1

AUTOMATIC ANSWER TEST

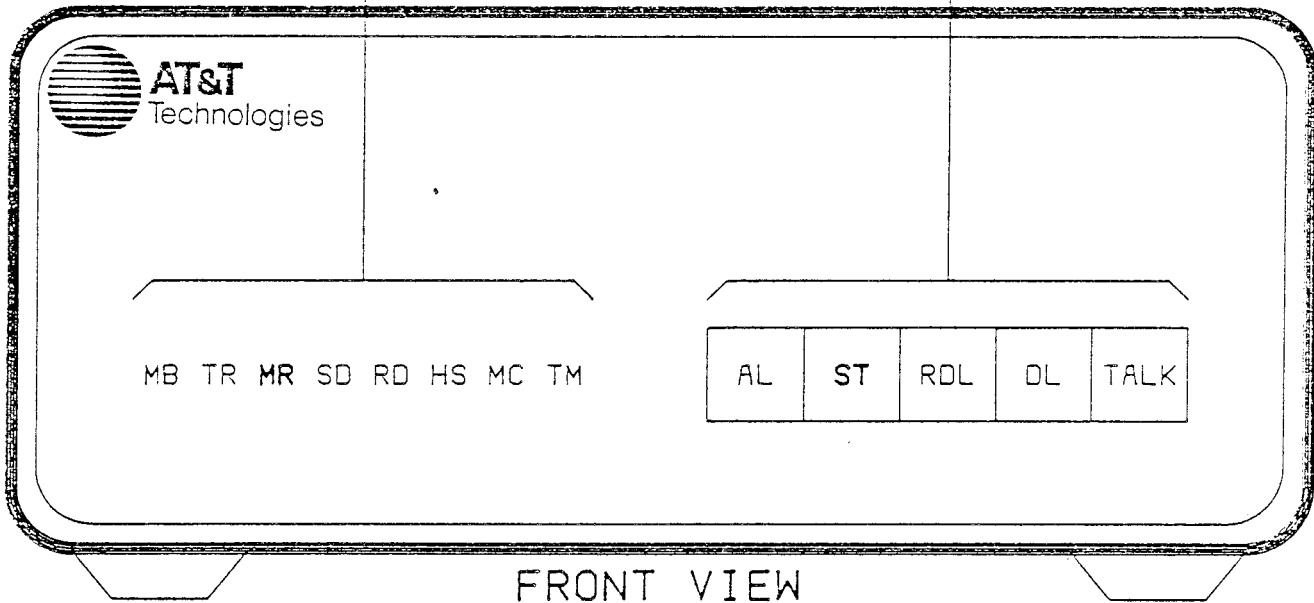
The automatic answer test checks the ability of the modem to automatically answer an incoming call.

Automatic Answer Test Procedure

1. Press the **ST** switch on the front of the modem. This disconnects the modem from its computer or terminal but leaves it connected to the telephone network and also activates the modem's self-test circuits.
2. The **MR** lamp should be off. If it is on, press and release the **AL** switch to clear the modem and place the modem into an idle condition. Only the **MC**, **TM**, and possibly the **TR** lamps should be lit. The **MC** lamp lit indicates the modem is idle; the **TM** lamp lit indicates the modem is in the test mode. The **TR** lamp will be lit if the test is being done while the 3B2 computer is in the multiuser mode. (Which mode the 3B2 computer is in, single or multiuser, has no effect on the outcome of the test.)
3. From another phone, dial the number of the line the modem is connected to.

STATUS LAMPS

PUSHBUTTON SWITCHES



FRONT VIEW

3601(10-217)385 1

Automatic Answer Test Procedure (Cont.)

- The modem should answer the call after the first ring and return a high-pitched answer tone. The MR lamp should light, indicating that the modem is no longer idle and is in the data mode ready to transmit and receive data. When this sequence of events happens, the modem has successfully answered an incoming call automatically.
 - Within 15 seconds of giving the answer tone, the modem should time out (since the ST switch disconnected the modem from the 3B2 computer, the incoming call cannot be completed), automatically disconnect, and extinguish the MR lamp, putting the modem back into the idle condition.
4. This completes the automatic answer test. Release the ST switch.

This completes the lesson on installing and testing an automatic dial modem used with a 3B2 computer.

Proceed to the hands-on application.

APPLICATION

In the classroom there will be two 3B2 computers located near modular telephone jacks, two modems, and two copies of the Basic Networking Utilities software. Consequently, this hands-on exercise can be done in one of two ways: either split the class into two teams with one team on each machine or, if the work station concept is used, have one student on each machine doing this exercise while the other students complete other work assignments (such as I/O expansion, line printer spooling, etc.).

Procedures

Before starting this work assignment, obtain the following from the instructor:

- 3B2 computer equipped with a console terminal
 - Login ID and password information for the 3B2 computer you will be using
 - Telephone line numbers used with each of the two 3B2 computers
 - Automatic dial modem along with an AC power cable, telephone cable, interface cable, and a 25-pin adapter
 - Floppy disk containing the 3B2 computer Basic Networking Utility Package
1. Connect the automatic dial modem to the 3B2 computer. **Verify your connections with your instructor prior to plugging the wall-mounted transformer into the AC receptacle.**
 2. Install the Basic Networking Utility Package software by logging in and properly using the `shutdown`, `mount`, and `sysadm installpkg` commands. A successful installation will be rewarded by a listing of the files installed and the message "Installation of Basic Networking Utility Complete".

Procedures (Cont.)

3. Edit the `/usr/lib/uucp/L-devices` and the `/etc/inittab` files to contain the data necessary for operation of the modem. (Refer to the lesson material for details on the correct data to enter.)

Verify that the following files have the proper ownerships and permissions as given in the lesson material:

```
/dev/contty  
/usr/bin/cu  
/usr/lib/uucp/uucico
```

Verify with your instructor that your file changes are correct BEFORE you write these changes to the files.

4. To determine if the modem hardware is functioning properly, perform the analog loopback self-test and the automatic answer test. The analog loopback self-test will show if the modem's transmit and receive circuits are functioning properly. The automatic answer test will test the modem's ability to recognize an incoming call and return answer tone. Refer to the lesson material for the specific observations to be made during each test. If a modem should fail either test, notify your instructor.
5. With two 3B2 computers in the classroom equipped with functioning automatic dial modems and both computers in the multiuser mode, each modem should have only the TR and MC lamps lit.

At this time, the installation and testing of the automatic dial modem is complete. However, to try out the modems, you will use a command from the next lesson, "Basic Networking Utilities". Exercise the automatic dial and automatic answer capabilities of the modems by calling from one 3B2 computer to the other by using the `cu` command, which is a basic networking command that calls up another UNIX system.

Procedures (Cont.)

With one computer idle, enter this command at the other 3B2 computer:

```
# cu xxxx
```

where `xxxx` is the extension number of the line connected to the called computer's modem. The called 3B2 computer will respond with a `Login:` message.

6. Log in as `uucp`. Enter this command:

```
# uname -a
```

The response will include the name of the called 3B2 computer, the network node name of the called computer, the release number of the UNIX operating system running on the called computer, the version of that operating system, and the hardware the operating system is running on. This will confirm that a link has been established between the two 3B2 computers through the two modems and the telephone network.

7. The communication link is terminated by entering `~..`.
8. Remove the Basic Networking Utility software from the 3B2 computer, using the `sysadm removepkg` command.
9. Disconnect the modem and all of its cables and return them to the instructor.

