2 Introduction

With a Network Control System, you can switch as many as 64 channels to backup lines in an emergency, and automate your routine switching. A single Network Control System gives you emergency fallback switching through front-panel switches or a PC. And you can monitor, access, and test lines, and automate your routine switching chores from your PC or terminal.

PC control also lets you subdivide all of your lines into groups. You can arrange your lines into up to ten predefined groups, and switch according to those definitions. When trouble strikes, you can switch only the lines that are threatened, instead of all the lines connected to your System.

You can request traditional AB switching as well as a more sophisticated alternative—toggle switching—through your PC. A/B switching ignores the current configuration of your lines, and sets them uniformly to a single channel—all to "A" or all to "B." With toggle switching, you'll reverse your line settings—"A" lines move to "B," and "B" lines to "A."

To manage more lines, you can daisychain up to 64 Switch Systems together, and bring as many as 1024 lines under the control of a single PC.

Switch cards make building or expanding your System easy. These modular units slide into the open bays of your Switching System Chassis, and are available in RS-232, V.35, coax, twinax, and various modular versions.

3 Installation

3.1 Introduction

Each System was designed to set up quickly and with a minimum of trouble, whether the chassis is mounted within a rack or used as a standalone. For installation, you'll need an open AC outlet for every chassis (two outlets, if you've purchased the Redundant Power Supply) and a small standard screwdriver. If you plan to use the DB25 monitoring port to check your lines immediately after installation, you'll want your breakout boxes and other test equipment at hand.

If you plan to connect a controlling terminal or PC, you should have already run enough cable to reach the location of your master Network Control System.

After you have unpacked, check to make sure that all the components you have ordered have arrived in good condition. You may then want to skim this manual once before you begin installation, to familiarize yourself with all of the charts, diagrams, and functions you'll encounter.

3.2 Setting up the Chassis

Each Network Control System depends on three types of cards—control cards, extension cards, and power-supply cards—to communicate with your terminal, to switch, and to regulate power to the unit (see Fig. 3.1). The cards slide easily into the bays of the chassis, and lock into place with screws. Installation consists of fitting the cards into the

chassis, cabling and adding options, and supplying power to the unit.

Before you begin you should mount the unit in a standard rack, or lay it on the shelf or desk space you've set aside.

3.2.1 CARD INSTALLATION

A solitary Switching System, or the primary System in a chain of systems, requires a master control card. (If you have several unconnected Switching Systems, each will require its own master control card.)

The rest of the Systems within a daisychain will use extension control cards. You'll follow the same procedure to set up both master and extension systems: Steps 1 through 4, below.

1. Identify all of your Systems. Every Network Control System must be given a unique identifying number, from 00 to 63. The master System always receives the number 00, and extension systems are designated in consecutive order from 1 to 63. The master control card has already been identified at the factory, but you will need to change your extension cards by setting DIP switches.

The DIP-switch bank is located on the face of each extension card. If you're having difficulty finding it, check Fig. 3.2. Appendix A gives the DIP settings for the System ID numbers.
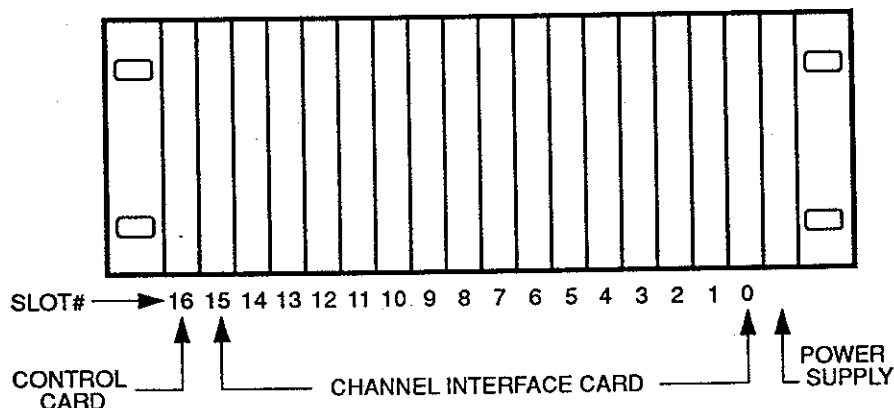
When you set the DIP switches, keep in mind

SLOT# ➤ 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

CONTROL CARD   CHANNEL INTERFACE CARD   POWER SUPPLY

Figure 3.1: Chassis Rear View

that all of your Systems must be numbered *in consecutive order*, starting with the master switch (00), and running from your first extension switch, Number 01, to your final one.

2. Set the speed. Your control terminal can communicate with your System at speeds up to 9600 bps. You control the speed with the bank of shunt jumpers located on the face of the master control card.

If you're having difficulty finding the jumpers, check Fig. 3.3. The highest speed is 9600 bps, and it corresponds with the pair of jumpers nearest the center of the card. The pairs regulate speeds in descending order as follows: 9600 bps, 4800 bps, 2400 bps, 1200 bps, and 300 bps (set by the pair nearest the edge of the card).

3. Insert your control cards. Each chassis has seventeen slots, numbered from 0 to 16, with slot 16 reserved for the control card. After you've slipped each card into its slot within its chassis, secure it with the screws provided.

4. Insert your switch cards. None of the switch cards require you to set DIP switches, and they may be inserted in slots 0 through 15 in any order. Affix them to the case with the screws provided. Appendix D lists all the switch cards available.

3.2.2 CABLING AND ADDING OPTIONS

Once you have created your master and extension racks, you're ready to add the optional Printer Interface, to connect a control terminal, and to set up your daisychain. The diagrams in Appendix B give cable configurations for each of these applications.

To add the Printer Interface:

1. Set the speed. You'll need to match the speed of the Interface with the speed of the master control card. Unscrew the four screws at the rear of the unit, remove the case lid, locate the bank of jumpers (see Fig. 3.4), and set the jumper on the correct pair. Replace the lid.

2. Connect your System. Connect the COMM IN port of the master System to the SYSTEM port of the Interface.

3. Connect your printer to the PRINTER port. For the correct RS-232 cable configuration, see is Appendix B.

To connect a control terminal:

The Network Control System will work with the following terminals, or a PC running a suitable terminal-emulation program:

Televideo PT®: 910, 920, 925
Digital™: VT100™, VT102™
Lear Siegler®: ADM3, ADM5
Hewlett Packard®

If you have added the Printer Interface, connect the terminal to the TERMINAL A or TERMINAL B port on the interface. If you are not adding the interface, connect the terminal to the COMM IN port.
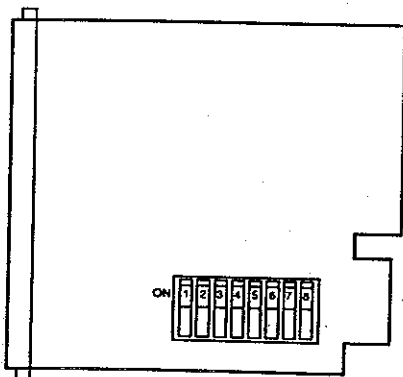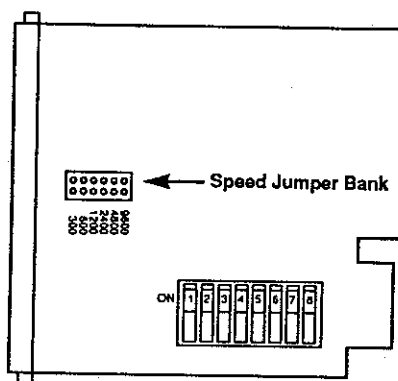

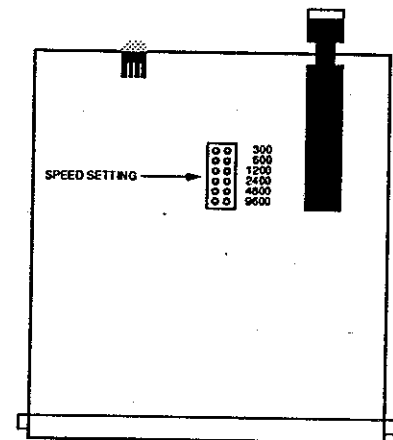Fig. 3.2 Extension card DIP switch bank.

Fig. 3.3 Master control card.

Fig. 3.4 Circuit board, Printer Interface.

To set up a daisychain:

Connect the COMM OUT port of the master System to the COMM IN port of the extension System you've identified as 01. Connect the COMM OUT port of extension System 01 to the COMM IN port of extension System 02. Connect the COMM OUT and COMM IN ports of succeeding extension Systems, in order.

3.2.3 CONNECTING A POWER SUPPLY

You have two options for the power supply: a Power Supply Module, and the Redundant Power Supply. The Redundant Power Supply provides main and backup power for up to 5 Systems.

To use the Power Supply Module:

1. Connect the Power Supply Module for each rack to the power connector on the rear of the Power Supply Card. Plug the module into an AC outlet.

Note: The Power Module must be connected to the system before it is plugged into the outlet. If you plug it into the outlet first, it won't work.

2. The "A" and "B" LEDs throughout the System should now be lit.

3. Press the button labeled "Lamp Test.." All LEDs should now light.

4. Using the "Gang Switch" and "Gang Enable Switch," switch the System first to the "A," and then to the "B" position. All of the "A" and "B" indicators should follow the gang-switching action This procedure ensures that all latched relays are in the same initial position.

5. Connect all cables to the switch cards.

Repeat these steps for all of the Power Modules you install.

To use the Redundant Power Supply:

Note: Before you begin installation, read through the instructions below and the Appendix C for information on the Redundant Power Supply.

1. Mount the Power Supply chassis in your rack.

2. Check the sliding switch, on each plug-in Power Unit for proper AC voltage, either 115 V (factory-set) or 230 V. Excessive or insufficient voltage may damage a Power Unit.

3. Slide the two plug-in Power Units into chassis and secure them with the screws provided.

4. Check that the AC power switch (on the back of each Power Unit) is in the OFF position.

5. Connect AC cords to the Power Units.

6. Connect the power cables from the rear of the Redundant Power Supply, labeled "System 1" and "System 2" to the power connectors at the rear of the corresponding rackmounts.

7. Turn on the AC power switch on each plug-in Power Unit. Make sure that all the voltage-indicator LEDS (on the front panel) are lit. The two LEDs marked "Alarm" should stay off.

8. Check the front panel of the System to make sure that only the "A" or "B" LEDs are on.

9. Press the "Lamp Test" button. All the LEDs should now light up.

10. Using the "Gang Switch" and the "Gang Enable Switch," switch the System first to the "A" and then the "B" position. All the "A" and "B" LED indicators should follow the gang-switching. This procedure ensures that all latched relays are in the same initial position.

11. Connect all interface cables to the switch cards.

You have now installed all of the components of your System. Chapter 4 briefly describes the mechanical control of the switch, along with the signals it provides you, while Chapters 5 and 6 explain the initial configuration and terminal control of the switch.

4 Indicators and Toggle Switches

4.1 Introduction

The Network Control System provides visual and audible indications of the state of your lines, and supports mechanical control of the Switch.

4.2 Front-Panel LEDs

Starting at the far left of the System, you'll see a line of 11 Monitoring Bus LEDs between the Lamp Test and the Gang Enable switch, followed by 16 banks of Individual Switch LEDs.

The Monitoring Bus LEDs work in conjunction with the monitoring version of the RS-232 card. They indicate activity on the monitoring bus, which routes 11 leads of a single RS-232 line to the DB25 connector on the front panel of the System chassis.

The banks of Individual Switch LEDs consist of one alarm LED, one monitor LED, an A/B LED, and five lead status indicators. The alarm LED works only with cards that supply the alarm function, and flashes when one of the pins reaches a preset alarm condition. The monitor LED shows the line that is connected to the monitoring bus. The A/B LED shows which line is currently connected to the System, and the lead status indicators (TD, RD, CTS, DCD, and SQD) show activity on RS-232 and V.35 lines.

4.3 Warning Signals from your Terminal

You'll receive additional trouble warnings through your terminal with the optional alarm and monitoring features offered on the RS-232 and V.35 cards.

Communications Error:

The words "communications error" appear in the bottom right-hand corner of your screen if a signal discrepancy has occurred between the master control card in your primary rack and any extension control cards in the system. It will happen when:

1. A COMM port cable is pulled, or a System is disconnected from the chain in some other way.

2. A rack fails.

3. An operator enters an incorrect value for the number of racks in the system.

The words will remain on the screen until you correct the problem and use the System Parameters screen. Check Section 5.3.1 for more information.

Alarm:

The alarm appears only with RS-232 or V.35 switch cards that feature the optional alarm function. An RS-232 or V.35 data line that reaches the Mark state for a prespecified length of time will trigger the alarm. The word "Alarm" appears in the lower right-hand corner of the terminal screen, and a buzzer will sound. (To stop the buzzing, press CTRL-A.) Simultaneously, as explained in section 4.2 above, the Alarm LED on the front panel of the System chassis will flash.

4.4 Mechanical Control of the System

The front panel of the chassis supplies a pair of toggle switches at the extreme left, and 16 individual toggle switches below the LED columns. The pair of toggle switches governs the Lamp Test and the Gang-Switching features of the System, while the individual toggles make switching possible from the front panel.

4.4.1 THE LAMP TEST

To request a Lamp Test, toggle the switch marked "Lamp Test" to the upper position. All LEDs on the panel, with the exception of the LEDs marked "Alarm," should light.

4.4.2 GANG-SWITCHING

You'll use both switches of the left-hand pair to set all of the lines in your System to the "A" or "B" position. The lower setting of the upper switch— the "Lamp Test" switch—enables the gang-switching, while the lower switch designates the gang-switching position —either all to A or all to B. Toggle both the upper and the lower switches simultaneously to gang-switch the System.

5 Initial Configuration

5.1 Introduction

One of the terminals listed below, or another similar model, can act as the control terminal:

Televideo P.T*: 910, 920, 925
Digital™: VT100™, VT102™
Lear Siegler*: ADM 3, ADM 5
Hewlett Packard*.

You may also use a PC with a suitable terminal emulation program to control the switch.

You'll configure your Master System using the steps below only once, unless you change your terminal or the number of systems in your chain. Follow these steps.

5.2 Terminal Setup

Configure your terminal as follows:

protocol: RS-232
character set: ASCII
word size: 7 bits
parity: even
stop bits: 1 or 2
speed: according to the jumper setting on the
       master control card

5.3 Setting up with the System Parameters Menu

The information you supply at this stage is stored in a lithium backup battery, to retain data in case of power outages. You'll change it only when you change your terminal or the number or systems in your chain.

1. Turn on your Network Control System.

2. Select your terminal. Press Ctrl-T for the selection menu of terminals supported by the System. Enter your terminal. After you have entered your choice, the main menu will appear (it's discussed in the chapter on Operations, Chapter 6).

3. Press "P" to select the System Parameters option in the main menu (fig. 5.1).

```
SYSTEM PARAMETERS                              11:05 OCT 17
                                               BUZZER OFF

  <1>  NUMBER OF RACKS IN SYSTEM
  <2>  TIME OF DAY
  <3>  DATE
  <4>  CLEAR COMMUNICATIONS ERROR
  <5>  LOCATION NAME
  <h>  <SELECTION> HELP
SELECTION:

       <CTRL><E>  EXIT TO MAIN MENU              ALARM
  LOCATION: RIDGEFIELD PARK         SCHEDULED SWITCHING ON
```

Fig. 5.1 System Parameters Menu

4. Provide the number of Systems. Press "1" to select the first option, and enter the total number of Network Control Systems in your daisychain.

5. Enter the real time. Press "2" to select the second option, and enter the exact time in military format.

6. Enter the current date. Press "3" to select the third option, and supply the month and day in numerical format: 01/31 for January 31.

7. Enter the location name. Press "5" to select the fifth option, and type in the name of the site where the master System is located. This is useful if you operate from a single remote terminal connected to two or more master Systems.

5.3.1 CLEARING A COMMUNICATIONS ERROR

You may or may not need to use Option 4, Clear Communications Error, at this stage. Your menu screens will register the message "Communications Error" when a System has been disconnected, a System fails, or the number of Systems in the chain does not match the number you type in at Step 4, above. You must correct the problem, and then use Option 4 to eliminate the message.

6 Operation

6.1 Introduction

The menus available at your terminal greatly extend your control of the System, well beyond what the front-panel switches will allow. The sections below explain the options shown in the main menu, as well as terminal operations in general. Before you go further, make sure you have followed the steps in Chapter 5, Initial Configuration.

6.2 Common Features of All Menus

Figure 6.1 shows a screen with all menu options erased, displaying only the information common to all menus.

```
                                              14:05 OCT 17
                                              BUZZER OFF




                        <H>  <SELECTION> HELP



                                              ALARM
LOCATION: RIDGEFIELD PARK      SCHEDULED SWITCHING ON
```
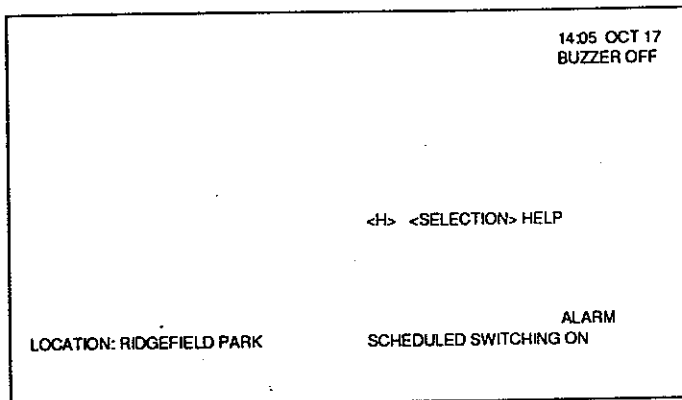
Fig. 6.1. Items Common to all Screens.

The date, time, and buzzer-alarm status appear in the top right corner of the screen and will appear in this position on each succeeding screen, for continuous reference. The location name appears at the bottom left.

"Scheduled switching on" will appear across the bottom of the screen if a switch has been given a program of switch actions (see Section 6.7). "Communications error" will appear in the bottom right-hand corner of the screen when an error occurs (see Section 4.3). These messages will appear on succeeding screens as long as the conditions remain.

The word "Alarm" will appear in the right corner of the screen when at least one monitoring

alarm has been triggered. This message will remain until the alarm has been disabled, and the operator has reviewed the information by using the Display Alarms option (see section 6.10). The buzzer that accompanies the alarm may be shut off by pressing CTRL-A.

The Help function:

Help screens are available for all menus. You request help on the main menu screen by pressing "H" three times in succession, then press the selection number for the option that interests you. In subsequent screens, you call up the screen by pressing "H" once, and then the desired option number.

6.3 The Main Menu

The main menu is shown below, in Fig. 6.2.

```
                                              14:05 OCT 17
                                              BUZZER OFF


                        MAIN MENU

  <1>  AIARM DEFINITION              <5>  DISPLAY RACK CONFIGURATION
  <2>  LINE DEFINITION               <6>  DISPLAY GROUP DEFINITION
  <3>  GROUP DEFINITION/MODIFICATION <7   DISPLAY ALARMS
  <4>  SCHEDULED SWITCHING DEFINITION <8> DISPLAY ALARM DEFINITION
                                     <9>  DISPLAY SCHEDULED SWITCHING
                                          SETTING
  <S>  SWITCHING FUNCTIONS           <P>  SYSTEM PARAMETERS
                                     <H>  SELECTION HELP



LOCATION: RIDGEFIELD PARK      SCHEDULED SWITCHING ON
```

Fig. 6.2 Main Menu.

Options 1 through 4 are used to define the operating characteristics of the various Systems you have; Options 5 through 9 display reference information; and Option S allows you to switch from your terminal. All of these options are discussed below, in Sections 6.4 through 6.13. Option P, System Parameters, has already been covered in Chapter 5, Initial Configuration.

You may return to the Main Menu at any time by pressing CTRL-E.

6.4 Menu Option 1—Alarm Definition

You may use this option only if you have purchased RS-232 and V.35 cards with the alarm option. Each RS-232 card can monitor these three pinouts simultaneously: CTS, DCD, and SQD. Each V.35 card can monitor only two: CTS and DCD. The alarm will go off when one of the pinouts remains in the Mark state longer than the preset period you provide. Figure 6.3 shows the screen:

```
ALARM DEFINITION                              14:05 OCT 17
                                              BUZZER OFF

SELECT TERMS OF LINE IDENTIFICATION:

<1>  NAME
<2>  RACK # AND LINE #
<H>  <SELECTION> HELP

SELECTION:


    <CTRL><E> EXIT TO MAIN MENU                   ALARM
LOCATION: RIDGEFIELD PARK         SCHEDULED SWITCHING ON
```

Fig. 6.3. Alarm-definition menu.

You can designate the common line you wish to monitor in one of two ways, by name or with a combination of System ID (referred to in the menu as Rack #) and line number. Line-naming is covered in section 6.5, while the System ID/line-number combination is self-explanatory.

To set an alarm:

1. Enter the 8-character line name, or the two-digit control-card ID (00 to 63) followed by the two-digit line number (00 to 15). The system will confirm by displaying the rack code, the line number, and the type of interface.

2. If the line you picked has an alarm option, the menu will ask whether the CTS alarm should be set. Enter "Y" or "N" as necessary.

If your line does not have an alarm option, the message "alarm not available" will appear. Press any key to return to the previous screen.

3. Enter the lapse time for the alarm. This is the maximum time the signal may remain in the MARK state without triggering an alarm. Lapse time is measured in tenths of a second, up to a maximum of 999.9 seconds.

4. Follow the same procedure for the DCD and SQD alarms. (Note: V.35 cards omit the SQD check.)

5. After entry, you'll be asked to verify your selections. If the entries you've made are correct, press "Y" to set the alarms. If you've made an error, press "N" and recreate your entries.

If you must disable an alarm you have previously set, follow Steps 1 through 4 until you reach the right pinout. Then answer "N" at the alarm prompt.

6.5 Menu Option 2—Line Definition

This option lets you tag all of the common lines on your system, as well as the A and B ports that are associated with them, with names up to eight characters long. The screen is shown in Fig. 6-4.

```
LINE DEFINITION                               14:05 OCT 17
                                              BUZZER OFF



<1>  ALL LINES IN THE RACK
<2>  INDIVIDUAL LINE #
<H>  <SELECTION> HELP

SELECTION:


    <CTRL><E> EXIT TO MAIN MENU                   ALARM
LOCATION: RIDGEFIELD PARK         SCHEDULED SWITCHING ON
```

Fig. 6.4. Line-definition menu.

Option 1 defines every line in a System. Enter the control-card ID for the system you wish to access, and the menu will supply you with the first line number. Type in up to eight alphanumeric characters, then enter the names for Ports A and B, if you wish. You'll then be asked if the names are correct. A "Y" directs you to the next line number, while an "N" allows you to rekey an entry.

Option 2 lets you select a single line within a System. Enter the control-card ID for the System, the line number, and the eight-character name. You may then name Ports A and B. This option is useful for renaming individual lines.

6.6 Menu Option 3—Group Definition

Groups provide the means to switch a number of selected lines simultaneously. Up to ten separate groups, numbered 0 through 9, may be predefined. Each group may contain as few as 1, or as many as 1024 lines. Figure 6.5 shows the initial definition/modification screen.

```
GROUP DEFINITION/MODIFICATION                    14:05  OCT 17
                                                 BUZZER OFF



<1>  GROUP DEFINITION
<2>  GROUP MODIFICATION
<H>  <SELECTION> HELP

SELECTION:



    <CTRL><E> EXIT TO MAIN MENU              ALARM
LOCATION: RIDGEFIELD PARK        SCHEDULED SWITCHING ON
```

Fig. 6.5. Main menu for group definition.

Option 1 allows you to define an entire group. Option 2 allows you to modify an existing group.

If you select Option 1, you'll see this screen:

```
GROUP DEFINITION                                 14:05  OCT 17
                                                 BUZZER OFF


  GROUP #RACK #          LINES IN GROUP
  1       00             00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15


INCLUDE LINE #15 IN GROUP? <Y/N> Y
CORRECT? <Y/N> Y
    <CTRL><E> EXIT TO MAIN MENU              ALARM
LOCATION: RIDGEFIELD PARK        SCHEDULED SWITCHING ON
```

Fig. 6.6. Group definition screen.

To use it, follow these steps:

1. Identify the group. Use a number from 0 to 9. The menu will ask if the entry is correct. Enter "Y" or "N."

2. Enter the control-card ID for the System connected to the line or lines you wish to group. At this point you may:
   A. Include an entire System in the group. Enter a "Y" at the proper prompt to do so.
   B. Remove a System from the group. Enter a "Y" at the proper prompt to pull a

System, and "N" to retain it.
C. Include the selected line number in the group. You may define your group member by member, line by line, until you have added all members.

If you select Option 2, you can change, add, or remove lines from a single group. As with Option 1, you can include or exclude an entire System from a group, or individual lines. The commands are similar to the commands for Option 1.

6.7 Menu Option 4—Scheduled Switching Definition

You'll use this option to indicate the times and the groups for regular, automated switching. You can define up to ten schedules, numbered 0 through 9, to switch up to ten predefined groups. The screen will appear as shown in Fig. 6.7.

```
SCHEDULED SWITCHING DEFINITION                   14:05  OCT 17
                                                 BUZZER OFF

ENTER SCHEDULE # OR <H> FOR HELP: 0
ENTER GROUP # or <H> FOR HELP: 1

SELECT SWITCHING FUNCTION:
<1>  TOGGLE
<2>  SWITCH TO A
<3>  SWITCH TO B
<H>  <SELECTION> HELP


    <CTRL><E> EXIT TO MAIN MENU              ALARM
LOCATION: RIDGEFIELD PARK        SCHEDULED SWITCHING ON
```

Fig. 6.7. Scheduled-switching menu.

To create a schedule, follow these steps:

1. Enter a schedule number, from 0 to 9.

2. Type in the group number you wish to schedule.

3. After you identify the group number, three switching operations and the "help" feature appear on screen. Indicate your choice of function. Enter the time for switching, in military format.

4. If your entry is correct, enter "Y" at the prompt. If not, enter "N."

6.8 Menu Option 5—Display Rack Configuration

This option displays the status of your lines, either on screen or, with the optional Printer Interface, in hard copy. You can view the configuration of an individual rack or the entire system, rack by rack. Line IDs, locations, interface types, current switch positions, alarms, and the status of the common bus are all indicated. Figure 6.8 shows the initial screen.

```
DISPLAY RACK CONFIGURATION                           14:05 OCT 17
                                                     BUZZER OFF

<1>  ONE RACK
<2>  ENTIRE SYSTEM
<H>  <SELECTION> HELP




        <CTRL><E>  EXIT TO MAIN MENU                    ALARM
LOCATION: RIDGEFIELD PARK               SCHEDULED SWITCHING ON
```

Fig. 6:8. Main menu for rack configuration.

To view a single System configuration, follow these steps:

1. Select Option 1. You'll then be asked if the printer is on. If you wish a printout, connect the printer and answer "Y." If not, type "N."

2. Enter the control card ID for the System you want to view. Fig 6.9. shows the screen.

```
DISPLAY RACK CONFIGURATION                           14:05 OCT 17
                                                     BUZZER OFF

RACK #  LINE #  LINE ID  TYPE    CONNECTED TO  ALARMS  COMMON BUS
00      00               RS-232  PORT: B
0       01               RS-232  PORT: B
00      02               NONE
00      03               RS-232  PORT: B
00      04               RS-232  PORT: A
00      05               RJ-11C  PORT: B
00      06               RS-232  PORT: B
00      07               RS-232  PORT: A
00      08               COAX    PORT: B
00      09               NONE
00      10               RS-232  PORT: A
00      11               RS-232  PORT: B
00      12               RS-232  PORT: B
00      13               V.F>    PORT: B
00      14               RS-232  PORT: B


        <CTRL><E>  EXIT TO MAIN MENU                    ALARM
LOCATION: RIDGEFIELD PARK               SCHEDULED SWITCHING ON
```

Figure 6.9. Rack-configuration display.

Each line in the selected System is identified by location, line ID, line interface type, switched position, alarm, and common bus status. If you want to examine a particular line, pause the display by entering CTRL-P. This will freeze the screen at the line, indefinitely. To continue, enter CTRL-P again. When any line shows activity, it will appear on screen.

Option 2 displays the configuration of each rack in the system, starting with Rack #00. After you indicate whether you wish to print results, the program will automatically display the System configurations in order. You can pause the display by entering CTRL-P, and continue it by pressing CTRL-P again.

6.9 Menu Option 6—Display Group Definition

To display or print the configuration of a single group, use this option. You must first enter the number of the group you wish to see and, if you want hard copy of the configuration, connect your printer and enter "Y" at the proper prompt. Your screen will repeat the group number, and display the lines in the selected group.

6.10 Menu Option 7—Display Alarms

If the "alarm" message has appeared in the bottom right corner of the screen at any time, you must select this option in order to clear the notice from the screen (see Fig. 6.10.). You can review the outstanding alarms, observe the activity on your alarm lines, and obtain a printed report.

```
DISPLAY ALARMS                                       14:05 OCT 17
                                                     BUZZER OFF

<1>  DISPLAY ALARM MEMORY
<2>  CONTINUOUS ONLINE ALARM MONITOR
<H>  <SELECTION> HELP




        <CTRL><E>  EXIT TO MAIN MENU                    ALARM
LOCATION: RIDGEFIELD PARK               SCHEDULED SWITCHING ON
```

Fig. 6.10. Display alarms.

Option 1 indicates the time the last alarm occurred on each of the pinouts you requested when you called up Menu Option 1 (Alarm Definition). The screen appears as in Fig. 6.11.

```
                                              14:05 OCT 17
                                               BUZZER OFF

RACK #  LINE #  SIGNAL  ALARM STARTED AT    BACK TO NORMAL AT
00      14      CTS     OCT 17 08:45        OCT 17 9:10
00      12      DCD     OCT 17 09:35
00      14      SQD     OCT 17 10:10
00      13      DCD     OCT 17 10:15




      <CTRL><E> EXIT TO MAIN MENU    <CTRL> <P> PAUSE/CONTINUE ALARM
LOCATION: RIDGEFIELD PARK              SCHEDULED SWITCHING ON
```

Figure 6.11. Alarm information.

It indicates the last time an alarm occurred on each of the defined line signals, and the time the signal was returned to its proper level. After selecting this option, you will be asked if your printer is on. If you wish a printed report, connect your printer and reply with a "Y."

Option 2 gives you an ongoing check of the alarm states of your System. You can receive reports either through your display or in hard copy of all the failures and recoveries from the time you select this option. This information will be recorded: activity by rack number, line number, signal, the time the alarm started, and the time the signal returned to the normal state, the SPACE state. If you want to examine a particular line in the sequence, use CTRL-P to pause the display. Repeat CTRL-P to continue the display.

6.11 Menu Option 8—Display Alarm Definition

With this option, you can check the alarm definitions for the CTS, DCD, and SQD signals on RS-232 alarm cards, and CTS and DCD signals on V.35 cards. The screen is shown in Fig. 6.12.

```
                                              14:05 OCT 17
                                               BUZZER OFF



RACK #   LINE#    CTS         DCD          SQD

00       11       DISABLE     050.0 SEC    030.0 SEC

PRESS ANY KEY TO CONTINUE


      <CTRL><E> EXIT TO MAIN MENU                  ALARM
LOCATION: RIDGEFIELD PARK           SCHEDULED SWITCHING ON
```

Fig. 6.12. Display alarms menu

You may view a line either by entering the line name (as you defined it in Menu Option 2) or by physical location. You'll be given the full line description, which includes System number, line number, and the current alarm definition.

6.12 Menu Option 9—Display Scheduled Switching Setting

With this option, you view the groups slated for automatic switching. All active, disabled, periodic, and unscheduled groups are given, and are identified by schedule number, group number, switching time, and the operation to be performed. Figure 6.13. shows the screen.

```
DISPLAY SCHEDULED SWITCHING SETTING               14:05 OCT 17
                                                   BUZZER OFF


           SCHEDULED SWITCHING SETTING
SCHEDULE #  SWITCHING   TIME    GROUP #  SWITCHING FUNCTION
    0       OCT 20      14:30      0         TOGGLE
    1       EACH DAY    10:44      1         TOGGLE
    2       DISABLE     17:00      0         SWITCH TO B
    3       DISABLE     24:00      1         SWITCH TO A
    4       UNDEFINED

PRESS ANY KEY TO CONTINUE

      <CTRL><E> EXIT TO MAIN MENU                  ALARM
LOCATION: RIDGEFIELD PARK           SCHEDULED SWITCHING ON
```

Fig. 6.13. Display scheduled switching.

6.13 Menu Option S—Switching Functions

This option gives you immediate switching from your terminal. You have 6 subsidiary options displayed onscreen as in Fig. 6.14.

```
                                              14:05 OCT 17
                                               BUZZER OFF
               SWITCHING FUNCTIONS

<1> GANG SWITCHING
<2> LINE SWITCHING                    <5> MONITOR BUS
<3> GROUP SWITCHING
                                      <H> <SELECTION> HELP
<6> SCHEDULED SWITCHING


SELECTION:

      <CTRL><E> EXIT TO MAIN MENU                  ALARM
LOCATION: RIDGEFIELD PARK           SCHEDULED SWITCHING ON
```

Fig. 6.14. Switching functions main menu.

Option 1: Gang Switching

Gang switching operates on all the lines of a System. You can switch them en masse either to a single position (A or B) or to the position opposite the current position (all A lines move to B, all B

lines move to A). After you have entered the option you desire, you will then be asked whether you want to carry the operation through. Enter "Y" or "N," as appropriate.

Option 2: Line Switching

You can switch individual channels to the A or B position, by providing either a line ID or a System and line number. The menu will reply with information on the line in this order: System number, line number, line ID, interface type, and current switched position. By entering "Y" at the proper prompt, you'll switch the line to the opposite position. To abandon the operation, enter "N."

Option 3: Group Switching

You may move a group to the A or B position, or toggle lines within the group to opposite their current positions. Enter the correct group number, and the menu will reply with the list of 3 options. Enter your choice and, then confirm it to switch.

Option 4: Monitoring Bus Function

You may connect the front-panel monitoring port to a terminal in order to test or observe the common port of a single selected RS-232 or V.35 switch card. Data flow will not be interrupted during this operation. The screen in Fig. 6.15. shows a typical V.35 display:
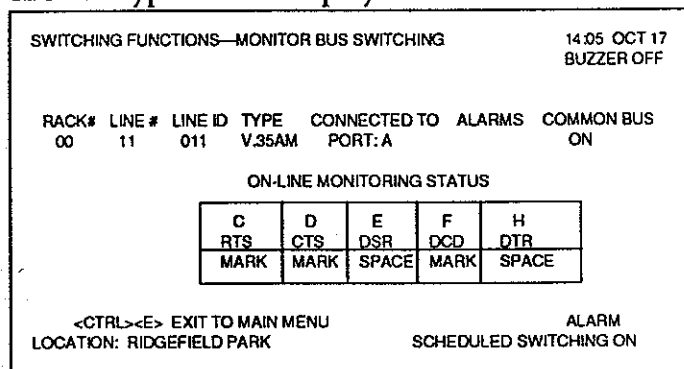
```
SWITCHING FUNCTIONS—MONITOR BUS SWITCHING        14:05 OCT 17
                                                  BUZZER OFF


 RACK#  LINE #  LINE ID  TYPE   CONNECTED TO  ALARMS  COMMON BUS
  00     11     011     V.35AM  PORT: A                  ON

                  ON-LINE MONITORING STATUS

              ┌──────┬──────┬──────┬──────┬──────┐
              │  C   │  D   │  E   │  F   │  H   │
              │ RTS  │ CTS  │ DSR  │ DCD  │ DTR  │
              ├──────┼──────┼──────┼──────┼──────┤
              │ MARK │ MARK │ SPACE│ MARK │ SPACE│
              └──────┴──────┴──────┴──────┴──────┘

   <CTRL><E> EXIT TO MAIN MENU                     ALARM
 LOCATION: RIDGEFIELD PARK          SCHEDULED SWITCHING ON
```

Fig. 6.15. Monitoring bus display.

The leads and pins you can monitor with the RS-232 card are: TD (2), RD (3), RTS (4), CTS (5), DSR (6), DCD (8), TT (15), RT (17), DTR (20), SQD (21), RI (22). The leads and pins for the V.35 card are: RTS (C), CTS (D), DSR (E), DCD (F), DTR (H).

You can add a switch card onto the common bus, or remove it. To add, indicate the card by typing in either the System number and the line position on the chassis, or the line ID. To remove, enter the rack number for the connected card, and the connection will be disabled.

Option 5: Scheduled Switching

You can automate both your periodic and your one-time switching chores with this option, in combination with Option 4—Scheduled Switching Definition. The screen is shown in Fig. 6.16.

```
SWITCHING FUNCTIONS—SCHEDULED SWITCHING          14:05 OCT 17
                                                  BUZZER OFF


ENTER SCHEDULE # or <H> FOR HELP

<1>  PERIODICAL OPERATION
<2>  ONE TIME OPERATION
<3>  DISABLE
<4>  <SELECTION> HELP

SELECTION:


    <CTRL><E> EXIT TO MAIN MENU                   ALARM
 LOCATION: RIDGEFIELD PARK        SCHEDULED SWITCHING ON
```
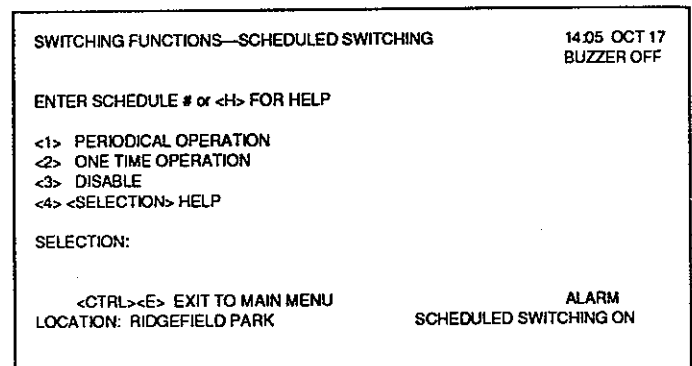
Figure 6.16. Scheduled switching display

Before you begin, you must have already defined a schedule by using Option 4, Switching Schedule Definition. Then enter the schedule number you would like to use, and specify either periodic operation, one-time operation, or disabling a previously set schedule.

Periodic switching recurs every 24 hours on the hour and minute you have specified, while one time operation occurs on the month and day you have entered in your switching definition. When you disable a schedule, you will not affect the switching information contained in the definition.

7 Applications

Figures 7.1 and 7.2 demonstrate two typical multi-System setups. On the left, a terminal connected to a 9600-bps modem at a remote site controls a daisychain. On the right, a local IBM® PC running a sutitable emulation program (see Chapter 4) passes commands to a chain of Systems.
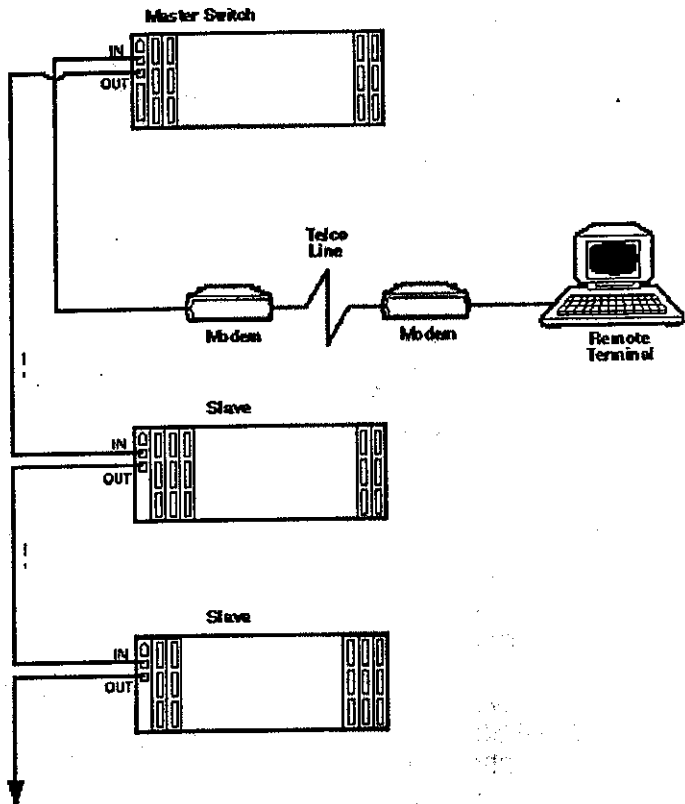
Fig. 7.1. Multi-System control by remote terminals

Fig. 7.2. Multi-System control by local PC.

Appendix A. Control Card DIP Settings

When identifying cards with these DIP settings, remember that the master control-card ID has already been set at the factory. All subsequent extension cards are to be numbered consecutively, starting at 01. The location of the DIP-switch bank is shown in Fig. 3.2.
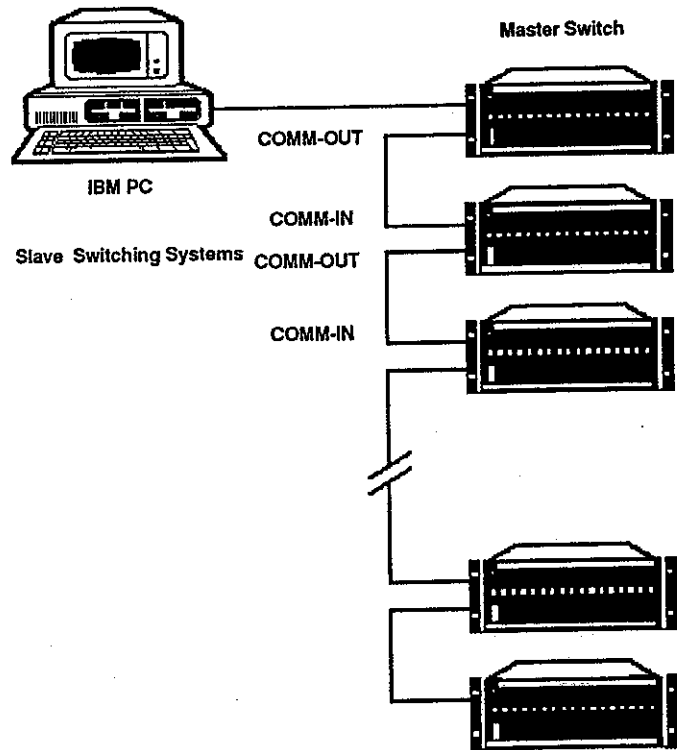
RACK #	1	2	3	4	5	6	7	8
00	ON	ON	ON	ON	ON	ON	ON	ON
01	ON	ON	ON	ON	ON	ON	ON	OFF
02	ON	ON	ON	ON	ON	ON	OFF	ON
03	ON	ON	ON	ON	ON	ON	OFF	OFF
04	ON	ON	ON	ON	OFF	ON	ON	ON
05	ON	ON	ON	ON	OFF	ON	ON	OFF
06	ON	ON	ON	ON	OFF	ON	OFF	ON
07	ON	ON	ON	ON	OFF	ON	OFF	OFF
08	ON	ON	OFF	ON	ON	ON	ON	ON
09	ON	ON	OFF	ON	ON	ON	ON	OFF
10	ON	ON	OFF	ON	ON	ON	OFF	ON
11	ON	ON	OFF	ON	ON	ON	OFF	OFF
12	ON	ON	OFF	ON	OFF	ON	ON	ON
13	ON	ON	OFF	ON	OFF	ON	ON	OFF
14	ON	ON	OFF	ON	OFF	ON	OFF	ON
15	ON	ON	OFF	ON	OFF	ON	OFF	OFF
16	OFF	ON	ON	ON	ON	ON	ON	ON
17	OFF	ON	ON	ON	ON	ON	ON	OFF
18	OFF	ON	ON	ON	ON	ON	OFF	ON
19	OFF	ON	ON	ON	ON	ON	OFF	OFF
20	OFF	ON	ON	ON	OFF	ON	ON	ON
21	OFF	ON	ON	ON	OFF	ON	ON	OFF
22	OFF	ON	ON	ON	OFF	ON	OFF	ON
23	OFF	ON	ON	ON	OFF	ON	OFF	OFF
24	OFF	ON	OFF	ON	ON	ON	ON	ON
25	OFF	ON	OFF	ON	ON	ON	ON	OFF
26	OFF	ON	OFF	ON	ON	ON	OFF	ON
27	OFF	ON	OFF	ON	ON	ON	OFF	OFF
28	OFF	ON	OFF	ON	OFF	ON	ON	ON
29	OFF	ON	OFF	ON	OFF	ON	ON	OFF
30	OFF	ON	OFF	ON	OFF	ON	OFF	ON
31	OFF	ON	OFF	ON	OFF	ON	OFF	OFF

RACK #	1	2	3	4	5	6	7	8
32	ON	OFF	ON	ON	ON	ON	ON	ON
33	ON	OFF	ON	ON	ON	ON	ON	OFF
34	ON	OFF	ON	ON	ON	ON	OFF	ON
35	ON	OFF	ON	ON	ON	ON	OFF	OFF
36	ON	OFF	ON	ON	OFF	ON	ON	ON
37	ON	OFF	ON	ON	OFF	ON	ON	OFF
38	ON	OFF	ON	ON	OFF	ON	OFF	ON
39	ON	OFF	ON	ON	OFF	ON	OFF	OFF
40	ON	OFF	OFF	ON	ON	ON	ON	ON
41	ON	OFF	OFF	ON	ON	ON	ON	OFF
42	ON	OFF	OFF	ON	ON	ON	OFF	ON
43	ON	OFF	OFF	ON	ON	ON	OFF	OFF
44	ON	OFF	OFF	ON	OFF	ON	ON	ON
45	ON	OFF	OFF	ON	OFF	ON	ON	OFF
46	ON	OFF	OFF	ON	OFF	ON	OFF	ON
47	ON	OFF	OFF	ON	OFF	ON	OFF	OFF
48	OFF	OFF	ON	ON	ON	ON	ON	ON
49	OFF	OFF	ON	ON	ON	ON	ON	OFF
50	OFF	OFF	ON	ON	ON	ON	OFF	ON
51	OFF	OFF	ON	ON	ON	ON	OFF	OFF
52	OFF	OFF	ON	ON	OFF	ON	ON	ON
53	OFF	OFF	ON	ON	OFF	ON	ON	OFF
54	OFF	OFF	ON	ON	OFF	ON	OFF	ON
55	OFF	OFF	ON	ON	OFF	ON	OFF	OFF
56	OFF	OFF	OFF	ON	ON	ON	ON	ON
57	OFF	OFF	OFF	ON	ON	ON	ON	OFF
58	OFF	OFF	OFF	ON	ON	ON	OFF	ON
59	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
60	OFF	OFF	OFF	ON	OFF	ON	ON	ON
61	OFF	OFF	OFF	ON	OFF	ON	ON	OFF
62	OFF	OFF	OFF	ON	OFF	ON	OFF	ON
63	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF

Appendix B. Cable Configurations

System to Modem

Use cable cross-pinned as shown below for all System-to-Modem connections.

Modem DB25 M		System DB25F
1	————————————	1
2	————————————	3
3	————————————	2
7	————————————	7
8	————————————	4
20	————————————	5

Daisychaining

Use straight-through DB25 cable to create a daisychain by connecting COMM-OUT and COMM-IN ports, as shown below. (See section 3.2.2 for more information.)

DB25 M		DB25 M
1	————————————	1
2	————————————	2
3	————————————	3
7	————————————	7

V.35 Monitoring Bus

The monitored leads for the bus are: RTS (C), CTS (D), DSR (E), DCD (F), DTR (H). The configuration is shown below.

V.35 Port		Digital Monitoring Port
R	————————————	2
T	————————————	3
C	————————————	4
D	————————————	5
E	————————————	6
B	————————————	7
F	————————————	8
V	————————————	9
X	————————————	10
U	————————————	11
W	————————————	12
H	————————————	15
P	————————————	17
S	————————————	20
Y	————————————	21
AA	————————————	22

Printer Interface Pinning

The COMM IN and COMM OUT ports on the control cards, and the Terminal A and Terminal B ports of the Printer Interface unit follow the standard scheme for RS-232 communications.

Pin #	Signal	Direction
1	Protective Ground	
2	Received Data	In
3	Transmitted Data	Out
5	Clear To Send	Out
7	Signal Ground	
8	Data Carrier Detect	In
20	Data Terminal Ready	In

Printer Interface to Master System

To connect your Printer Interface to your Master Network Switching System, use DB25 straight-through cable.

Printer Interface System Port DB25 Male		Master Control Card COMM-IN Port DB25 Male
1	————————————	1
2	————————————	2
3	————————————	3
5	————————————	5
7	————————————	7
8	————————————	8
20	————————————	20

Printer Interface to Printer

To connect the Interface to a printer, use DB25 straight-through cable.

Printer Port DB25 Male		Printer Interface Printer Port DB25 Male
1	————————————	1
3	————————————	3
7	————————————	7
20	————————————	20

Appendix C. Redundant Power Supply

This failsafe power source can provide power for up to five fully loaded Network Control Systems. It replaces the Power Module for each System.

Components

A complete Redundant Power Supply kit contains a single rackmount chassis, two plug-in power units, two six-foot AC cords, and five six-foot power cords.

Each Redundant Power Supply contains two independent plug-in power units held in a single rackmount chassis. The AC inputs for each unit are fused independently, to provide extra protection against component failure.

There are eight LEDs on the front panel of the chassis: four for the right unit, four for the left. On each side, three LEDs provide visual indicators for +12V, -12V, and +5V current. The fourth serves as an alarm to indicate when a unit has

failed. Another failure signal is given by an internal buzzer, which may be disabled by pressing the ON/OFF button.

Use

For maximum backup protection, plug each of the power units into a separate AC voltage source. Run one unit from your main supply, and one from a backup source.

When the primary unit fails to supply power, the Redundant Power Supply will switch automatically to the spare. To remove a unit for testing, or to replace it, first disconnect the power cord at the back of the unit. Unscrew the two front fasteners, and pull out the unit. Insert a replacement, screw the front fasteners back in, and reconnect the power cord. Turn the ON/OFF switch to ON, and the new unit is now on line.

Appendix D: Switch Units

The Network Control System supports a wide range of switching options with the variety of switch cards listed below. The alarm and monitor versions of the RS-232 and V.35 cards are required if you wish to use those optional functions of your Network Control System.

Card	Code
AB-232 12-Conductor Card	SM603C
w/Alarm and Monitor	SM604C
AB-232 24-Conductor Card	SM605C
w/Alarm and Monitor	SM606C
AB-V.35 18-Conductor Card	SM601C
w/Alarm and Monitor	SM602C
X-232 24-Conductor Card	SM607C
AB Coax BNC Card	SM608C
AB Twinaxial Card	SM609C
AB WANG BNC/TNC Card	SM610C
AB Double Coax Card	SM611C
AB RJ-11 Card (4-Wire)	SM612C
AB RJ-45 Card (8-Wire)	SM613C
AB Voice Frequency 4-Conductor Terminal Strip	SM614C
AB DB9 Card	SM615C
AB DB15 (T-1) Card	SM618C